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Mentoring and Training of Cancer-Related Health Disparities Researchers Committed to Community-Based Participatory Research

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Abstract

Background and Objective: The National Cancer Institute's (NCI) Community Networks Program Centers (CNPCs) provide community-based participatory research (CBPR)-oriented mentoring and training to prepare early-stage/midcareer investigators and student trainees (trainees) in disparities reduction. This paper describes the academic, mentoring, training, and work-life balance experiences of CNPC-affiliated trainees.

Methods: We used a collaborative and iterative process to develop a 57-item, web-based questionnaire completed by trainees from the 23 CNPCs between August 2012 and February 2013. Their CNPC mentors completed a 47-item questionnaire. Descriptive statistics were calculated.

Results: The final analytic sample included 189 of 269 individuals (70%) identified as active participants in CNPC research or training/mentoring. Mentors ($n = 45$) were mostly non-Hispanic White (77.8%) and 48.9% were male. Mentors published a median of 6 (interquartile range [IQR], 3–12) first-authored and 15 (IQR, 6–25) senior authored manuscripts, and secured 15 (IQR, 11–29) grants from the

National Institutes of Health (NIH) and other sources in the previous 5 years. Most trainees ($n = 144$) were female (79.2%), 43.7% were underrepresented racial/ethnic minorities, and 36.8% were first-generation college graduates. Over the previous 5 years, trainees reported a median of 4 (IQR, 1–6) publications as first author and 4 (IQR, 2–8) as co-author; 27.1% reported having one or more NIH R01s. Trainees reported satisfaction with their CNPC mentor (79.1%) and confidence in demonstrating most CBPR competencies.

Conclusion: The CNPC training program consists of a scientifically productive pool of mentors and trainees. Trainees reported rates of scholarly productivity comparable to other national training programs and provided insights into relationships with mentors, academic pressures, and professional–personal life balance.

Keywords

Health disparities, neoplasms, mentors, education, sociology and social phenomena faculty, education, sociology and social phenomena, ethnic groups

Racial/ethnic disparities exist along the cancer continuum.^{1–3} Despite years of research, these disparities remain and, for some cancers, are widening.^{3–6} Although some progress in scientific discoveries related to

prevention and treatment have occurred, much more needs to be done to improve cancer outcomes, especially in high-risk racial/ethnic and underserved populations.

The Community Networks Program Center (CNPC)

initiative (2010–2015) is funded by the NCI’s Center to Reduce Cancer Health Disparities to work with underserved populations to reduce cancer-related health disparities through the application of CBPR approaches for research, training, and outreach. CBPR, which emerged from social justice and action research traditions, engages community and academic partners as equal collaborators in conducting research.^{7–9} Each of the 23 CNPCs forges CBPR partnerships with particular priority populations: eight with African Americans, six with Hispanics/Latinos, two with American Indian/Alaskan Natives, two with Native Hawaiian/Pacific Islanders, one with Asians, and four with multiple or other populations (e.g., rural Appalachians).

One of the aims of the CNPCs is to increase and diversify the pool of biomedical and behavioral scientists skilled in addressing cancer-related health disparities. Specifically, the CNPCs are charged with training investigators in CBPR and other “fourth-generation” research approaches that integrate principles of social, economic, and environmental justice into action to achieve health equity.¹⁰ To be successful, this process must involve experienced senior investigators who are committed to mentoring and training junior investigators in CBPR as a strategy for advancing disparities reduction. For example, the ‘Imi Hale Native Hawaiian Cancer Network is a Native Hawaiian nongovernmental organization that partners

with the University of Hawai‘i to provide mentoring (by senior researchers and community members), training (e.g., courses in CBPR, cultural competency), and pilot research funding to its trainees. The Minnesota Center for Cancer Collaboration uses a three-pronged approach that consists of 1) a mentoring model that pairs trainees, early career faculty, and community practitioners with mentors experienced in CBPR and cancer-related health disparities, 2) two CBPR courses that use blended learning techniques (e.g., flipped classroom approach), and 3) a series of intense educational sessions on grantsmanship. The South Carolina Cancer Disparities Community Network uses a combination of team mentoring, system-based approaches in a “traditional” academic institution (University of South Carolina) and a more community-based approach conducted collaboratively with a local Historically Black College/University, Benedict College. Thus, each CNPC training program incorporates and reflects the unique opportunities and resources of their respected communities.

Despite the special relevance mentoring and training have to reducing health disparities, there is very little information published on this topic. A 2014 search identified only 65 articles in the National Library of Medicine on mentoring and health disparities. Only seven reported on surveys or systematic data collection. Six focused on cancer, includ-

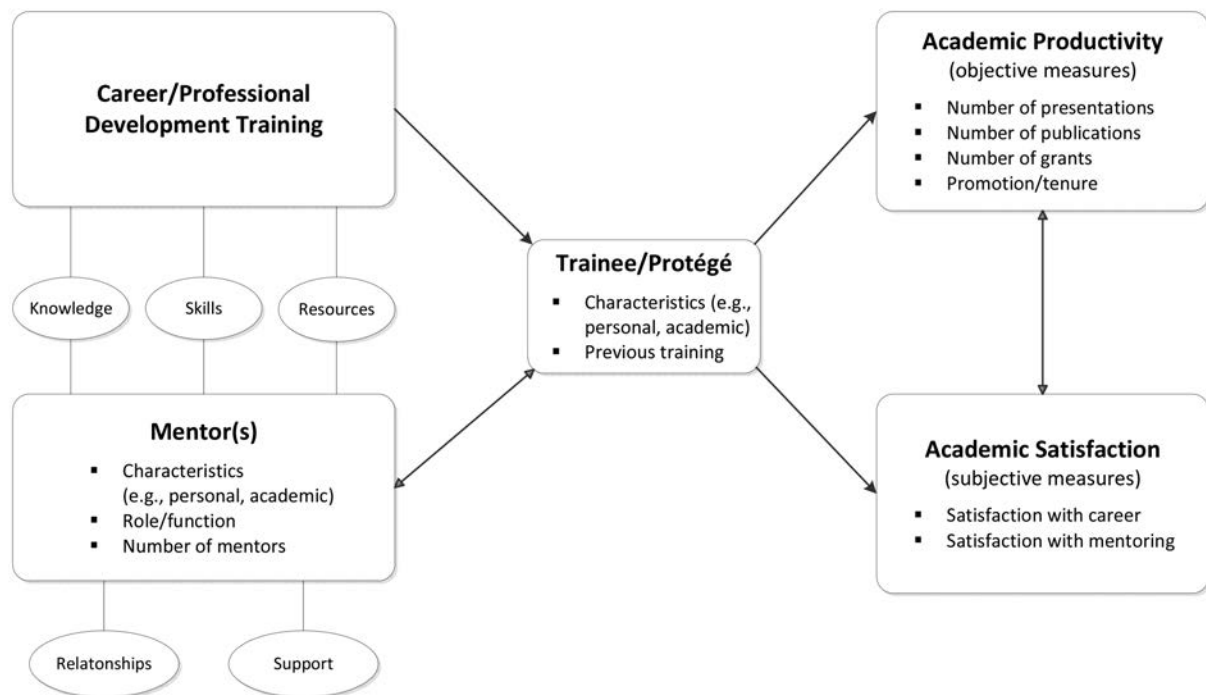


Figure 1. Conceptual Model

ing one published previously by members this team.¹¹ The CNPCs provide a unique model for assessing the mentoring and training experiences of CBPR-trained, health disparities researchers, who are well-positioned to make material improvements to ensure health equity. This article describes the academic, mentoring, professional training, and work–life balance experiences of CBPR-focused student trainees, early-stage/midcareer, and senior investigators from the CNPCs.

METHODS

Questionnaire Development

From October to November 2011, we used a collaborative and iterative process to develop the questionnaire. We used a conceptual model, informed by literature on mentoring and training^{12–14} and consistent with CBPR,^{15,16} to guide questionnaire design (Figure 1). Members of the South Carolina CNPC (T.M.F., H.M.B., J.R.H.) and colleagues from other CNPCs (K.L.B., K.S.O.) revised and enhanced a questionnaire that was developed previously to explore the professional development needs of CBPR-focused junior investigators.¹¹ This enhanced questionnaire was circulated in December 2011 to the National CNPC Training Subcommittee, which consisted of 29 faculty members representing 19 CNPCs at the time of study, for additional content and suggestions. Eight CNPC members (including T.M.F., D.B.F., J.R.H., K.B.) from five CNPCs pilot tested the questionnaire to ensure ease of administration and web functionality.

The final questionnaire consisted of 57 closed-ended (e.g., multiple choice, rating scales) questions for early-stage/mid-career investigators and doctoral student trainees (hereafter *trainees*), and 47 closed-ended questions for senior-level investigators (hereafter *mentors*). Questionnaire skip patterns were determined by response to a multiple-choice question related to the respondent's current career stage. Respondents who indicated they had 15 or more years of research experience and self-identified as a recognized expert in their field were classified as *mentors*. All other respondents were categorized as *trainees*: 1) student trainee (no terminal degree but interest in research career), 2) early-stage investigator (<10 years since completing terminal degree), or 3) midcareer investigator (≥ 10 but not > 15 years of post-terminal degree research experience).

Regardless of career stage, there were a total of 39 common questions asked of all respondents: two on CNPC characteristics (e.g., regional location, priority population), 16 on participant personal and academic characteristics (e.g., gender, race/ethnicity, first-generation college graduate), 18 on scholarly activities (e.g., in the previous 5 years the number of presentations, publications, grants), and 3 on work–life balance and satisfaction (e.g., satisfaction with ability to balance work and family life). The additional 18 questions, asked only of trainees, consisted of 12 questions about their mentoring experiences with CNPC mentors (e.g., satisfaction with the relationship the primary CNPC mentor) and 6 questions assessing their training competencies (e.g., confidence in CBPR competencies)^{12,15–17} and professional training opportunities and needs (e.g., interest in trainings on grant writing, budgeting, etc.).¹³ The additional eight questions asked only of mentors pertained to their mentoring experiences (e.g., number people currently being mentored).

Questionnaire Administration

The study was approved by the University of South Carolina Institutional Review Board. We uploaded the questionnaire to Qualtrics® and collected data from August 2012 to February 2013. Eligible CNPC members had to 1) be a doctoral student, postdoctoral fellow/associate, or faculty member at the time of study, 2) have a primary affiliation with a university, and 3) be currently participating in CNPC research or training/mentoring activities. Each CNPC provided an exhaustive list of names, titles, and email addresses of their CNPC members who met study eligibility. We emailed eligible participants a personalized link to the questionnaire, and sent monthly email reminders (as appropriate). Some respondents encountered firewall security issues; consequently, we forwarded the questionnaire to them through the South Carolina CNPC program website using a personalized, secure login.

Analysis

We estimated frequencies or medians and interquartile range (IQR), as appropriate, of respondent CNPC characteristics for the total sample and by career stage. Scholarly activities and work–life balance factors were analyzed by career stage. We also used descriptive statistics to describe the mentoring experiences and CBPR and professional development training

resources/needs of the trainees. All analyses were conducted in SAS® version 9.3 (Cary, NC).

RESULTS

Study Sample

A total of 269 eligible participants were identified. Of these, 206 (80%) started and 195 (76%) completed the questionnaire. Among the 195 respondents, 6 did not respond to the question to indicate their career stage, leaving a total of 189 (70%) individuals with analyzable data—144 trainees and 45 mentors.

Overview of CNPC Mentors

As shown in Table 1, the majority of mentors were non-Hispanic White (77.8%), at the rank of full professor/endowed chair (82.2%) and tenured (75.6%). About one-half (49%) were male. In the previous 5 years, mentors reported a median of 6 (IQR, 3–12) first-authored publications, 15 (IQR, 6–25) senior-authored publications (last author placement), and 13 (IQR, 9–20) co-authored publications. Publications included manuscripts focused on cancer, health disparities, and other related topics. Mentors reported a median of 15 (IQR, 11–29) total grants funded by the NIH and other sources in the previous 5 years, including more than 80% reporting at least one NIH R01 and/or project grants/cooperative agreements, and 62.2% reporting NIH direct costs of more than \$5 million per person (data not shown). In terms of work–life balance and satisfaction (data not shown), the majority of mentors indicated they were extremely or quite satisfied with their career (93.3%), and with their ability to balance work and family (82.2%). Most reported being in a relationship (62.2%) and/or caring for children (42.2%).

Overview of CNPC Trainees

Most trainees were female (79.2%) and reported doctoral/post-doctoral training (91.7%; Table 1). Sixty-three percent were identified as other than White, non-Hispanic and 43.7% were from underrepresented minority (URM) groups (as defined by the NIH and National Science Foundation).¹⁸ More than one third (36.8%) were first-generation college graduates. In terms of scholarly productivity (Table 2), trainees reported a median of 4 (IQR, 1–6) first-authored publications,

1 (IQR, 0–3) senior-authored publication, and 4 (IQR, 2–8) co-authored publications in the previous 5 years. Trainees also reported a median of 3 (IQR, 1–7) funded grants in the previous 5 years. Twenty-seven percent of them reported involvement in at least one NIH R01, with the largest proportion of them (36.8%; $n = 53$) reporting NIH grant funding amounts of up to \$1 million in total direct costs in the previous 5 years.

Mentoring and Training Experiences of Trainees

Questions on mentoring and training experiences were asked only of trainees. More than half (52.1%) reported having two or more mentors (including their CNPC mentor), and 79.1% indicated they were very satisfied or satisfied with their CNPC mentor (Table 3). Only 31.3% of trainees reported being of the same race as their CNPC mentor, and 45.8% were of the same gender. Ad hoc analyses showed that mentorship satisfaction did not differ if the CNPC mentor was not of the same gender as their trainee (Fishers exact test, $p = .06$; data not shown). However, trainees who were the same race as their mentor were more likely to report being very satisfied or satisfied (93.3%; $n = 42/45$) versus racially discordant trainee–mentor relationships (72.7%; $n = 72/99$; Fishers exact test, $p = .01$; data not shown).

The most commonly reported challenge of trainees was that their CNPC mentor did not have enough time to interact with them. In addition to being mentored, 76.5% of trainees mentored other faculty or students. Of 10 potential mentoring needs (Table 3), the top two areas in which mentees wanted assistance were with “growth and training opportunities” and “grant funding.” Concern about having a mentor who “related to your identity (e.g., gender, race)” was least important.

Because of training provided by the CNPCs, most trainees reported that they were confident/very confident in nearly all 10 CBPR competencies, with the exception of understanding the policy implications of CBPR (43.8%; $n = 63$), and having the ability to write CBPR-oriented grants (45.8%; $n = 66$; Table 4). Only 36.8%, however, felt they were thriving in the academic environment as a CBPR-engaged investigator. In professional development (Table 4), the majority of trainees were interested or very interested in training opportunities focused on grant writing (75.7%; $n = 109$), career planning (75.0%; $n = 108$), and conducting collaborative research (72.2%; $n = 104$).

Table 1. Summary of Survey Respondent Characteristics by Self-Reported Career Stage

Early-Stage/Midcareer Investigators and Student Trainees (n = 144) ^a				Early-Stage/Midcareer Investigators and Student Trainees (n = 144) ^a			
Variables	Total Sample (N = 189)	and Student Trainees (n = 144) ^a	Senior Investigators/Mentors (n = 45)	Variables	Total Sample (N = 189)	and Student Trainees (n = 144) ^a	Senior Investigators/Mentors (n = 45)
Gender				Academic title/status			
Male	51 (27.0)	29 (20.1)	22 (48.9)	Student/research assistant or associate/postdoc	33 (17.5)	33 (22.9)	0 (0.0)
Female	137 (72.5)	114 (79.2)	23 (51.1)	Assistant Professor	66 (34.9)	65 (45.1)	1 (2.2)
Missing	1 (0.5)	1 (0.7)	0 (0.0)	Associate Professor	31 (16.4)	25 (17.4)	6 (13.3)
Age (y)				Full Professor/Endowed chair	40 (21.2)	3 (2.1)	37 (82.2)
≤34	42 (22.2)	42 (29.2)	0 (0.0)	Other (e.g., Director)	18 (9.6)	18 (12.5)	0 (0.0)
35–44	71 (37.6)	69 (47.9)	2 (4.4)	Missing	1 (0.5)	0 (0.0)	1 (0.3)
≥45	76 (40.2)	33 (22.9)	43 (95.6)	Tenure track/tenure status			
Race/ethnicity				Non-tenure track	86 (45.5)	76 (52.8)	10 (22.2)
White, non-Hispanic	89 (47.1)	54 (37.5)	35 (77.8)	1–4 years tenure track	38 (20.1)	38 (26.4)	0 (0.0)
Black, non-Hispanic	35 (18.5)	32 (22.2)	3 (6.7)	≥5 years tenure track	5 (2.7)	4 (2.8)	1 (2.2)
White, Hispanic	19 (10.1)	17 (11.8)	2 (4.4)	Tenured	58 (30.7)	24 (16.7)	34 (75.6)
Black, Hispanic	1 (0.5)	1 (2.0)	0 (0.0)	Missing	2 (1.1)	2 (1.4)	0 (0.0)
Asian	23 (12.7)	20 (13.9)	3 (6.7)	CNPC region			
Native Hawaiian/Pacific Islander	7 (3.7)	7 (4.9)	0 (0.0)	Midwest	65 (34.5)	51 (35.4)	14 (31.1)
American Indian/Alaskan Native	4 (1.6)	4 (2.8)	0 (0.0)	Northeast/Mid-Atlantic	32 (16.9)	26 (19.4)	6 (13.3)
Other	7 (3.7)	3 (2.08)	4 (8.89)	South	40 (21.1)	31 (21.5)	9 (20.0)
Missing	3 (1.6)	3 (2.1)	1 (2.2)	West	42 (22.2)	33 (22.9)	9 (20.0)
First-generation college graduate				>1/national	9 (4.8)	2 (1.4)	7 (15.6)
Yes	70 (37.0)	53 (36.8)	17 (37.8)	Missing	1 (0.5)	1 (0.7)	0 (0.0)
No	117 (61.9)	89 (61.8)	28 (62.2)	CNPC target population			
Missing	2 (1.1)	2 (1.4)	0 (0.0)	African American	41 (21.7)	30 (20.8)	11 (24.4)
Education				Asian	22 (11.6)	17 (11.8)	5 (11.1)
Bachelor's degree or less	2 (1.1)	2 (1.4)	0 (0.0)	Hispanic/Latino	31 (16.4)	27 (18.8)	4 (8.9)
Masters	11 (5.8)	9 (6.3)	2 (4.4)	Native American/Alaskan Native	9 (4.8)	7 (4.9)	2 (4.4)
Doctoral/postdoctoral training	175 (92.6)	132 (91.7)	43 (95.6)	Native Hawaiian/Pacific Islander	12 (6.4)	10 (6.9)	2 (4.4)
Missing	1 (0.5)	1 (0.7)	0 (0.0)	Appalachian or rural communities	2 (1.1)	3 (2.4)	1 (2.2)
Academic discipline (multiple responses)				>1 target population	69 (36.5)	49 (26.9)	20 (44.4)
Medicine	22 (11.6)	14 (9.7)	8 (17.8)	Missing	3 (1.6)	3 (2.1)	0 (0.0)
Public Health or Health Science	112 (59.3)	95 (66.0)	23 (51.1)				
Psychology	25 (13.2)	31 (21.5)	8 (17.8)				
Other	29 (15.3)	39 (27.1)	6 (13.3)				

^a Defined as 1) a student trainee (no terminal degree but interest in research career); 2) early-stage investigator (within 10 years of completing terminal degree); or 3) midcareer investigator (≥10 but not >15 years of research experience).

Table 2. Summary of Scholarly Activity in the Previous 5 Years by Career Stage

Activity	Early Stage/Midcareer Investigators and Student Trainees (n = 144)	Senior Investigators/Mentors (n = 45)
Scholarly activity in the previous 5 years		
Oral presentations at academic conferences		
Missing	1 (0.7)	0 (0.0)
None	13 (9.0)	0 (0.0)
1–10	94 (65.3)	4 (8.9)
≥11	36 (25.0)	41 (91.1)
Oral presentations nonacademic settings		
Missing	0 (0.0)	0 (0.0)
None	19 (13.2)	1 (2.2)
1–10	96 (66.7)	14 (31.1)
≥11	29 (20.1)	30 (66.7)
Poster presentations at academic conferences		
Missing	3 (2.1)	1 (2.2)
None	9 (6.3)	4 (8.9)
1–10	98 (68.1)	28 (62.2)
≥11	34 (23.6)	12 (26.7)
Poster presentations nonacademic settings		
Missing	1 (0.7)	0 (0.0)
None	65 (45.1)	17 (37.8)
1–10	70 (48.6)	24 (53.3)
≥11	8 (5.5)	4 (8.9)
No. of investigators with ≥1 NIH-funded grants (multiple responses)		
Missing	21 (14.6)	0 (0.0)
Research Project Grant Program (R01)	39 (27.1)	38 (84.4)
Multi-Project Grants and Cooperative Agreements (e.g., P01, U54)	49 (34.0)	39 (86.7)
Small and Exploratory/Developmental Grants (e.g., R03, R21)	34 (23.6)	28 (62.2)
Research Education and Training grants (e.g., R25, K-awards)	31 (21.5)	31 (68.9)
Other (e.g., R15, Diversity Supplement)	54 (37.5)	26 (57.8)
NIH total direct costs		
Missing	14 (9.7)	1 (2.2)
Not applicable	44 (30.6)	1 (2.2)
< \$500,000–\$1,000,000	53 (36.8)	4 (8.9)
\$1,000,001–\$2,500,000	10 (6.9)	3 (6.7)
\$2,500,001–\$5,000,000	10 (6.9)	8 (17.8)
> \$5,000,000	13 (9.0)	28 (62.2)
No. of investigators with 1≥ non-NIH funded grants		
Missing	26 (18.1)	20 (44.4)
Other federal agencies	24 (16.7)	27 (60.0)
National, regional, or local nonprofit agencies	37 (25.7)	10 (22.2)
Pharmaceutical manufacturers/companies	4 (2.8)	18 (40.0)
Program within my university/college	41 (28.5)	14 (31.1)
Other(s)	77 (53.5)	38 (84.4)
Median number of NIH and other funded grants (IQR, n)	3 (1–7, n = 144)	15 (11–29, n = 45)
Mean number of publications (IQR, n)		
First-author publications	4 (1–6, n = 141)	6 (3–12, n = 45)
Senior author publications (last placement)	1 (0–3, n = 122)	15 (6–25, n = 45)
Co-author publications	4 (1–7, n = 138)	13 (9–20, n = 45)

IQR, interquartile range; NIH, National Institutes of Health.

Table 3. Summary of Mentoring Experiences of Early-Stage/Midcareer Investigators and Student Trainees^a (n = 144)

Mentoring Item	n (%)
Mentoring team	
Missing	16 (11.1)
1 mentor	53 (36.8)
2 or more mentors	75 (52.1)
Satisfaction with CNPC mentor	
Missing	16 (11.1)
Very satisfied	67 (46.5)
Satisfied	47 (32.6)
Dissatisfied	8 (5.6)
Very dissatisfied	6 (4.2)
Challenges with CNPC mentor^b	
Missing	15 (10.4)
I do not currently have any challenges in my relationship with my primary CNPC mentor.	73 (50.7)
My mentor does not have enough time to interact with me.	20 (13.9)
My mentor does not understand my needs.	5 (3.5)
My mentor has very different goals from me.	6 (4.2)
My mentor does not have the expertise I need to complete my research.	5 (3.5)
My mentor does not have the connections to the community that I need.	4 (2.8)
Other	16 (11.1)
Time mentoring others (h/wk)	
Missing	14 (9.4)
I do not mentor other faculty or trainees.	21 (14.1)
<1	39 (26.2)
1–2	26 (17.5)
3–5	24 (16.1)
>5	25 (16.8)
Mentoring Needs (in order from most needed or wanted to least)	
Providing growth and training opportunities	
Providing grant funding	
Assisting with career	
Facilitating networking with colleagues	
Training in disciplinary or community-based research	
Building self-confidence in research	
Offering encouragement and inspiration	
Assisting with building community relationships	
Promoting professional behavior	
Relating to your identity (in terms of gender, race, ethnicity, background, etc.)	

CNPC, Community Networks Program Center.

^a Defined as: 1) a student trainee (no terminal degree but interest in research career); 2) early-stage investigator (within 10 years of completing terminal degree); or 3) midcareer investigator (≥10 but not >15 years of research experience).

^b Adapted from Branchaw J, Pfund C, & Rediske R, 2010. Entering Research: Workshops for Students Beginning Research in Science. W.H. Freeman & Co., New York, for use at HELI (2011 AND 2012).

Most trainees reported being in a relationship (56.3%) and/or caring for a children (49.3%; Table 5). The majority (77%) indicated they were extremely or quite satisfied with their careers; however, 43.1% (n = 62) reported that they were not very satisfied or not at all satisfied with their ability to balance work and family. Ad hoc analyses showed that those who reported having any type of relationship or primary care responsibility were more likely to report that they were not very satisfied or not at all satisfied with their work–life balance (79%; n = 49/62) versus those who did not report any primary care responsibilities (44.8%; n = 13/29; Fishers exact test, p = .03; data not shown).

DISCUSSION

A key goal of the NCI CNPC initiative is to train qualified health disparities researchers in CBPR and promote their career development. More than 60% of the trainees responding to this questionnaire were racial/ethnic minorities, and 43.7% were URM trainees. Although the rate of URM trainees has room for improvement, this finding demonstrates that the CNPCs are an important contributor to diversifying the scientific pipeline. In contrast, 77.8% of CNPC mentors were non-Hispanic Whites. Given that URM faculty face unique issues in their academic careers that are not commonly experienced by their White counterparts, including racism and a disproportionate burden to advise minority students and serve on committees,¹⁹ the lack of diversity among the CNPC mentors could be seen as a potential challenge. However, the majority of CNPC trainees in our study reported that they were satisfied with their CNPC mentor (and those who were racially concordant with their mentors even more so) and ranked relating to their CNPC mentor in terms of their identity (e.g., race) as their least important mentoring need. This may have occurred for several reasons. First, trainees may have been uncertain of the confidentiality of their responses and reported being satisfied with their CNPC mentor because it was a more socially desirable response. Second, although many URM researchers may view racial/ethnic concordance with their mentors as desirable, they acknowledge the reality of the shortage of such mentors in academia.²⁰ Third, the non-URM mentors from the CNPCs may be experienced with

mentoring URM trainees and may not be representative of non-URM mentors in general. Fourth, given that more than one-half of trainees reported having a mentoring team, it is possible that URM trainees in particular may be getting some of their more unique needs met by someone other than their CNPC mentor. Regardless, these findings underscore the continued need to enhance diversity in science and to tailor research training and mentoring programs to address

the cultural perspectives and needs of URMs.

Our study also found that CNPC trainees were relatively successful in terms of scholarly products, reporting a median of two total publications and one funded grant per year, and nearly one-third of them were involved in at least one NIH R01 in the previous 5 years. These rates of scholarly productivity were comparable to findings from other NIH-supported training programs^{21,22} and those targeting URMs.²³ National

Table 4. Level of Confidence with and Interest in Community-Based Participatory Research (CBPR) and Professional Development Training Activities among Early-Stage/Midcareer Investigators and Student Trainees^a

Training Activity	<i>n</i>	<i>n</i> (%)	<i>n</i> (%)
		Not at All Confident/ Somewhat Confident	Confident/ Very Confident
CBPR Competencies^b			
Knowledge of and skills in applying the principles of CBPR	136	50 (36.8)	86 (63.2)
Understanding the social determinants of health and developing skills and commitment for fostering community and social change	136	22 (16.2)	114 (83.8)
Ability to transfer CBPR skills to the community, thereby enhancing community capacity	136	53 (39.0)	83 (61.0)
Ability to share CBPR skills with other faculty and or trainees	134	53 (39.6)	81 (60.4)
Ability to work effectively in and with diverse communities	136	24 (17.6)	112 (82.4)
Understanding of the policy implications of CBPR and ability to work with communities in conjunction with advocacy groups and decision-makers in translating the process and findings of CBPR into policy	135	72 (53.3)	63 (46.7)
Ability to balance tasks in academia (research, teaching, service) posing special challenges to those engaged in CBPR in order to thrive in an academic environment	134	81 (60.4)	53 (39.6)
Ability to write grants expressing CBPR principles	136	70 (51.5)	66 (48.5)
Knowledge of community-based teaching and learning approaches	136	50 (36.8)	86 (63.2)
Ability to negotiate across community-academic groups	136	58 (42.6)	78 (57.4)
Professional Development Training Topics			
Grant writing	135	26 (19.3)	109 (80.7)
Budgeting	134	36 (26.9)	98 (73.1)
Presentation skills	134	84 (62.7)	50 (37.3)
Manuscript development	134	44 (32.8)	90 (67.2)
Conducting collaborative research	135	31 (23.0)	104 (77.0)
Courses on specific cancer prevention and control topics	135	54 (40.0)	81 (60.0)
Mentoring and being mentored	134	49 (36.6)	85 (63.4)
Career planning	135	27 (20.0)	108 (80.0)
Teaching	134	72 (53.7)	62 (46.3)
Work-life balance	134	50 (37.3)	84 (62.7)

^a Defined as 1) a student trainee (no terminal degree but interest in research career); 2) early-stage investigator (within 10 years of completing terminal degree); or 3) midcareer investigator (≥ 10 but not > 15 years of research experience).

^b See Reference 17.

data showing that African Americans are significantly less likely to be awarded R01s compared to Whites^{24,25} make the future outcomes of the CNPC training program even more important. Given the representativeness and diversity of the trainees in this study, a future assessment investigating potential differences by URM status in the receipt of R01s and other scientific products among CNPC trainees is warranted.

Mentoring is a key facilitator to encouraging CBPR,^{11,26–28} and as noted, most trainees were satisfied with their CNPC mentor and reported having a team of mentors. Many of the CNPC training programs are structured such that trainees have multiple mentors from a variety of disciplines and backgrounds, including nonacademic community mentors. The experiences that CNPC trainees gain from working with mentoring teams and collaborating with community members in CBPR help trainees to develop skills consistent

with transdisciplinary science.^{29,30} With transdisciplinary and translational approaches emerging as priorities critical to the elimination of health disparities,³¹ CNPC trainees may be well-positioned to be involved with and ultimately lead these team science efforts.

The trainees in our study also expressed confidence in demonstrating CBPR competencies. The CNPCs specifically emphasize the development of CBPR skills, such as through academic courses, seminars, and/or direct involvement in research and pilot projects. Our findings suggest that the CNPC training programs are transferring these skills. Given that 15 of the current 23 CNPCs were previously funded as NCI Community Networks Programs (CNPs; 2005–2010), most of these programs have worked for close to a decade with their respected underserved communities.^{15,32} Long-standing relationships with partnering communities accelerates the CBPR process and enhances the learning experiences of the CNPC trainees.

Although trainees reported feeling competent in most CBPR skills, few felt they were thriving in the academic environment. This concurs with research showing that only 36% of NIH Clinical and Translational Science Award trainees felt that community-engaged research was valued in the promotion and tenure process.³³ Specific academic disincentives include those institutions that have a preference for single-authored publications, and lack of funding to support faculty time to build community relationships and community capacity for research.³⁴ Recommendations for ways to document and assess CBPR and other scholarship in promotion and tenure decisions have been developed.³⁵

Compared with their mentors, twice as many CNPC trainees, particularly those in relationships or caring for family member(s), reported challenges with balancing work and life as CBPR-focused investigators. The topic of work–life balance has been incorporated into other health-related research training programs.^{36,37} This topic is particularly salient for training in CBPR, where expectations for in-kind contributions of time and effort can be high.³⁸

There were strengths and limitations to this study. Compared with our previous survey of the CNPs,¹¹ we used a stronger methodological approach to define the denominator and to obtain a more representative sample. Our 70% response rate was also respectable for survey research.³⁹ An important

Table 5. Work–Life Balance and Job Satisfaction Among Early-Stage/Midcareer Investigators and Trainees (N = 144)^a

Variables	n (%)
Primary care responsibilities ^b	
Spouse/partner	81 (56.3)
Child/children	73 (49.3)
Elderly parent(s)	22 (15.3)
None of the above	29 (20.1)
Other	5 (3.5)
Job satisfaction	
Extremely satisfied	33 (22.9)
Quite satisfied	78 (54.2)
Not very satisfied	30 (20.8)
Not at all satisfied	1 (0.7)
Missing	2 (1.4)
Ability to balance work–life	
Extremely satisfied	13 (9.0)
Quite satisfied	67 (46.5)
Not very satisfied	55 (38.2)
Not at all satisfied	7 (4.9)
Missing	2 (1.4)

^a Defined as 1) a student trainee (no terminal degree but interest in research career); 2) early-stage investigator (within 10 years of completing terminal degree); or 3) midcareer investigator (≥10 but not >15 years of research experience).

^b Adds up to >100% because participants could select ≥1 options.

metric of most academic training programs is that its faculty and student trainees are promoted and progress in their career, which may include taking positions or obtaining additional training at other institutions. This transience, nevertheless, caused some flux in our denominator, particularly when we had to extend our study period due to unanticipated high-security firewalls that blocked our email invitations and reminders. Fortunately, we remained engaged with the CNPC principal investigators, project managers, and the National CNPC Training Subcommittee to ensure we included and excluded participants as appropriate; for example, when a participant was no longer a part of a particular site's training program.

FUTURE DIRECTIONS

Our study identified some key areas for future training. Trainees expressed limited confidence in, and a need for, further training in grant writing, which also was identified by a previous study of academic researchers interested in CBPR.⁴⁰ Additional training topics identified as important included how to 1) conduct collaborative research, 2) advance one's

career as a CBPR-engaged investigator, including understanding how community-engaged research is evaluated for tenure and promotion, 3) balance academic responsibilities with community-related needs/concerns, and 4) balance CBPR-related work and family/life. In addition to formal training topics, expanding direct support for senior mentors would allow them to devote more time to mentorship. Because academic institutions are placing increased administrative and scientific demands on their faculty, mentors could use direct support to prioritize mentoring trainees over other service activities.

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Appendix A.

Community Network Program Center Name	Institution(s)	Principal Investigator	Grant Number
Alameda County Network Program for Reducing Cancer Health Disparities	University of California, Berkeley	Joan Bloom	U54CA153506
Appalachia Community Cancer Network	University of Kentucky	Mark Dignan	U54CA153604
Asian Community Cancer Health Disparities Center	Temple University	Grace Ma	U54CA153513
Carolina Community Network Center to Reduce Cancer Health Disparities	University of North Carolina at Chapel Hill	Paul Godley	U54CA153602
Center for Hispanic Health Promotion: Reducing Cancer Disparities	Fred Hutchinson Cancer Research Center	Beti Thompson	U54CA153502
Community Health Centers Community Program Center	Meharry Medical College	Margaret Hargreaves	U54CA153708
Deep South Network for Cancer Control	University of Alabama at Birmingham	Ed Partridge	U54CA153719
ʻImi Hale Native Hawaiian Cancer Network	Papa Ola Lokahi	Kathryn Braun	U54CA153459
Johns Hopkins Center to Reduce Cancer Disparities	Johns Hopkins University	Adrian Dobs	U54CA153710
Kansas Community Cancer Disparities Network	University of Kansas Medical Center	Allen Greiner	U54CA154253
Karmanos Cancer Institute	Wayne State University	Terrance Albrecht	U54CA153606
Latinos Contra el Cancer	University of Texas MD Anderson Cancer Center	David Wetter	U54CA153505
Minnesota Community Network Center for Eliminating Cancer Disparities	University of Minnesota	Kola Okuyemi	U54CA153603
Program for the Elimination of Cancer Disparities (PECaD)	Washington University	Graham Colditz	U54CA153460
Redes en Accion: The National Latino Cancer Research Network	University of Texas Health Science Center in San Antonio	Amelie Ramirez	U54 CA153511
Regional Native American Community Network Program Center—Native People for Cancer Control	University of Washington; Black Hills Center for American Indian Health	Dedra Buchwald (Co-PI); Jeffery Henderson (Co-PI)	U54CA153498
SC Cancer Health Disparities Community Network	University of South Carolina	James Hebert	U54CA153461
South Florida Center for Reducing Cancer Disparities (SUCCESS)	University of Miami	Olveen Carrasquillo	1U54CA153705
Tampa Bay Community Cancer Network (TBCCN)	Moffitt Cancer Center	Clement Gwede	U54CA153509
The American Indian/Alaska Native Initiative on Cancer	Mayo Clinic Comprehensive Cancer Center	Judith Kaur	U54 253605
The National Center for Reducing Asian American Cancer Health Disparities (AANCART)	University of California-Davis	Moon Chen	U54CA153499
Weaving an Islander Network for Cancer Awareness, Research and Training (WINCART)	California State University-Fullerton	Sora Tanjasiri	U54CA153458
Western New York Cancer Coalition 2 Center to Reduce Disparities	Roswell Park Cancer Institute	Willie Underwood	U54CA153598