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Evaluation of the NCI's Cancer Prevention Fellowship Program (CPFP): Final Report

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1. Introduction

The National Cancer Institute's (NCI) Cancer Prevention Fellowship Program (CPFP) is a four-year postdoctoral program for early career scientists that has existed for 25 years. Approximately 200 individuals have completed the program, and there are 40 fellows at present. Since 1992, fellows without a background in epidemiology or statistics are provided with funding during their first year to obtain a Master of Public Health (MPH) degree from an accredited university. The major activity for Cancer Prevention Fellows is mentored research, traditionally involving one or more of the following areas: laboratory-based cancer prevention research, epidemiologic research (including molecular epidemiologic studies and prevention trials), behavioral science research, clinical prevention research, prevention-related policy research, ethics of prevention and public health research, and quantitative or qualitative methodologies in cancer prevention and control research. Preceptors who serve to guide and enrich each fellow's experience are selected from skilled investigators across all NCI divisions, participating Food and Drug Administration (FDA) centers, or local academic institutions. The fellowship also features summer courses in cancer prevention, weekly presentations and meetings with CPFP staff and other fellows, grant-writing workshops, and other learning opportunities. All fellows are expected to develop original scientific projects and to report their findings at scientific meetings and in leading journals.

Key goals of the program are:

- To support early-stage scientists from a diversity of disciplines to conduct cancer prevention research with guidance from NCI mentors;
- To provide structured education and training on scientific research and leadership, especially as they pertain to transdisciplinary and team science; and
- To facilitate fellows' transition to career independence as researchers and leaders.

Purpose and Design of the Evaluation

Despite its long existence, there has not been a comprehensive systematic, formal evaluation of the career outcomes of CPFP trainees in the history of the program. The only outcomes evaluation of the CPFP, conducted in 2006, compared the number of scientific publications of CPFP alumni in the three years since completing the program to the number of publications they produced while in the program. Given the diversity of scientists recruited to the program and potential career outcomes for postdoctoral fellows trained in cancer prevention and control, a sufficient amount of time was required to have a cadre of CPFP alumni of varying career pathways and stages in order to conduct a comprehensive evaluation of career outcomes.

In 2011, CPFP conducted a feasibility study to determine the availability of data on CPFP alumni outputs from archival sources (e.g., PubMed) and topics of interest to CPFP leadership that would involve collection of new quantitative and qualitative data. The feasibility study also included a comprehensive literature review of prior studies evaluating postgraduate intramural training programs. Based on these feasibility study findings, CPFP administrators decided to extend their data collection efforts beyond archival sources by conducting a survey of program alumni and two comparison groups.

In 2012, CPFP contracted with Westat to conduct a comprehensive evaluation of its program to determine if the CPFP is meeting its overarching goal of training leaders in the field of cancer prevention and control. The evaluation of the program would provide insight to the NCI, National Institutes of Health (NIH), and the broader postgraduate training community about the roles that structured training programs in general, and transdisciplinary programs specifically, may have on alumni career outcomes. The resulting evaluation of the CPFP alumni addressed the following research questions:

1. What are the scientific disciplines of CPFP alumni?

2. What is the scientific productivity of CPFP alumni?

3. What are the career choices or pathways (e.g., academic, government, or private sector) of CPFP alumni?

4. What is the career advancement (e.g., leadership positions, promotion to tenured positions) of CPFP alumni?

5. What is the peer recognition (e.g., service on editorial boards, leadership positions within professional organizations, or receipt of professional awards) for CPFP alumni?

6. To what extent do CPFP alumni collaborate with persons from other disciplines in their work? To what extent do CPFP alumni collaborate with each other?

7. To what extent do CPFP alumni feel that participating in the CPFP had an impact on their career trajectory, including positions held, research focus, and current employment?

8. Based on their experiences and beliefs about current and future directions for cancer prevention, what recommendations do CPFP alumni have for maintaining or improving the training aspects (process) of the CPFP?

9. How satisfied were program alumni with their experience in the CPF Program?

To answer these research questions, the evaluation team developed a three-pronged evaluation design consisting of three primary data collection methods—in-depth interviews, bibliometric analysis, and a web survey.[1] The bibliometric analysis and web survey involved all CPFP alumni and individuals from two comparison groups. The first comparison group comprised individuals who applied to CPFP, were reviewed and interviewed by the entire CPFP Scientific Education Committee, but were not selected to participate in the program. The second comparison group comprised early career scientists who were recipients of funding from NCI through the F32 mechanism and who had relevant cancer prevention- and control-oriented projects.

A crosswalk between the research questions, survey populations, and methods to be employed was created to ensure that all research questions would be addressed as appropriate. Highlights from this crosswalk are presented in Table 1-1.

[1] Westat's Institutional Review Board (IRB) reviewed evaluation materials, and the study was exempted under rule 45 CFR 46.101(b) (5). NIH's IRB also reviewed evaluation materials and exempted the study under rule 45 CFR 46.101(b) (2).

Table 1-1. Research design crosswalk

Research question	Research areas	Survey populations	Data collection methods	Survey items
	Background/ demographics	Alumni, applicants, F32 awardees	Web survey	Gender Race Ethnicity Date of birth Degrees
1. What are the scientific disciplines of CPFP alumni?	Background/ demographics	Alumni, applicants, F32 awardees	Web survey	Discipline Degree
2. What is the scientific productivity of CPFP alumni?	Career productivity	Alumni, applicants, awardees	Web survey Bibliometrics	Publications Presentations Competitive funding, etc.
3. What are the career choices or pathways (e.g., academic, government, or private sector) of CPFP alumni?	Career path	Alumni, applicants, awardees	Pilot interviews Web survey	Postdoctoral history Current job Career sector Cancer prevention Research Teaching Salary
4. What is the career advancement (e.g., leadership positions, promotion to tenured positions) of CPFP alumni?	Career advancement	Alumni, applicants, awardees	Pilot interviews Web survey	Leadership positions management/ supervisory roles
5. What is the peer recognition (e.g., service on editorial boards, leadership positions within professional organizations, or receipt of professional awards) for CPFP alumni?	Peer recognition	Alumni, applicants, awardees	Web survey	Professional service Leadership positions in professional service Professional awards (not grant awards) Community service
6. To what extent do CPFP alumni collaborate with persons from other disciplines in their work?	Interdisciplinary work	Alumni, applicants, awardees	Pilot interviews Web survey Bibliometrics	Multidisciplinary collaborations
7. To what extent do CPFP alumni feel that participating in the CPFP had an impact on their career trajectory, including positions held, research focus, and current employment?	Program impact	Alumni	Pilot interviews Web survey	Impact on career trajectory, including positions held, research focus and direction, professional skills, and career professional accomplishments
8. Based on their experiences and beliefs about current and future directions for cancer prevention, what recommendations do CPFP alumni have for maintaining or improving the training aspects (process) of the CPFP?	Recommendations	Alumni	Pilot interviews Web survey	Open-ended recommendations question
9. How satisfied were program alumni with their experience in the CPF Program?	Postdoc satisfaction	Alumni	Pilot interviews Web survey	Mentorship Level of autonomy

The first phase of the evaluation involved in-depth interviews conducted with 27 randomly selected CPFP alumni. Interview topics had been previously identified through the feasibility study, and broadly included questions designed to learn about alumni's experiences during the program and assess the influence of program participation in on their work and career. Interview data were also used to inform development of the web survey. An excerpt from Westat's report on the in-depth interviews including the methodology and findings is provided in Appendix C.

In the second phase of the evaluation, Westat collected and analyzed bibliometric data obtained from archival data sources such as CPFP records, PubMed, and IMPAC II. Bibliometrics is the application of quantitative analysis to publications such as journal articles and their accompanying citation counts. Bibliometric analysis was used to measure CPFP alumni's influence and impact in their field by documenting the frequency that their professional work is published and cited by others in comparison with that of unsuccessful applicants to CPFP and F32 awardees whose research focuses on cancer prevention and control. While bibliometric measures of publications and citations are well-accepted measures of professional outcomes, they have greater applicability in certain career sectors and types of positions, specifically academia and research.

The third phase of the evaluation involved a web survey of alumni and individuals from the two comparison groups. The web survey collected data on a wide range of professional accomplishments activities (e.g., publications, presentations, leadership positions, and awards) as reported by respondents, as well as alumni's perceptions of benefits they received by participating in the CPFP.

Report Organization

Chapter 2 provides detailed information about the methods used in this study, including information about the study populations, including the unweighted and weighted demographics for each population, the data collection methods and analyses.

Chapters 3 and 4 present the analytical findings from the web survey and bibliometrics research, respectively. Chapter 5 provides a discussion of the findings and conclusions from the evaluation of the CPFP.

Appendix A provides the bibliometrics outlier analysis. Appendix B provides the web survey instruments. Appendix C provides an excerpt of the report on the in-depth interviews with a sample of alumni. Appendix D provides the interview protocols used for the in-depth interviews.

2. Methodology

The discussion that follows describes the methodology for the bibliographic and web survey portions of this evaluation. Methods for the in-depth interviews of a sample of alumni have been described previously and can be found in Appendix C.

Study Populations

The bibliometric analysis and web survey were conducted through a census of CPFP alumni, CPFP applicants, and F32 awardees who met eligibility criteria. Eligible CPFP alumni entered the program as of August 31, 1987, were fellows for at least 12 months, and left the program no later than December 31, 2011. A review of the CPFP application database initially identified 211 alumni who met the inclusion criteria. The former deputy director of the CPFP, who is an alumnus of the program, and five alumni listed in the file as deceased were deemed ineligible and excluded from the sampling frame. During data collection, an additional alumnus of the program who had only participated for two months was also deemed ineligible. The resulting sampling frame comprised 204 alumni.

The comparison group of CPFP applicants consists of all applicants to the CPFP who were reviewed and interviewed by the entire CPFP Scientific Education Committee but not selected for the program between January 1, 1987, and December 31, 2011. A review of the CPFP application database initially identified 281 applicants who met the eligibility criteria. During data collection, 22 applicants who were either deceased or accepted into the CPFP but declined to participate were deemed ineligible. The resulting sample frame comprised 259 applicants.

The comparison group of F32 awardees consists of early career scientists who were recipients of a Postdoctoral Individual National Research Service Award from the NIH, also known as the F32, between January 1, 1987, and December 31, 2011, and whom Westat determined were conducting cancer prevention- and control-oriented research. To make this determination, Westat reviewed NIH's IMPACII database using search terms provided by the NCI that included the following: cancer prevention, vaccine, cancer risk, chemoprevention, antitumor, nutrition, tumor suppressor, carcinogenesis, lifestyle factors, environmental factors, interventions, risk

factors, personal behaviors, cancer screening, infections, tobacco, cancer control, occupational factor, early detection, and physical activity. Given the somewhat broad nature of the search terms, F32 awardees whose research was not as directly related to cancer prevention and control may have been included in this comparison group, and no awardees were deemed ineligible due to the specific topic of their research. This review initially identified 367 recipients who met the eligibility criteria. During data collection, five F32 awardees who were either deceased or who declined the award were deemed ineligible. The resulting sampling frame comprised 362 awardees.

The sampling frames described above were used to select the samples for the in-depth interviews of CPFP alumni. The entire frames were used to conduct the bibliometric research and web survey of alumni, CPFP applicants, and F32 awardees.

Data Collection Methods

Web Survey

Instrument development. The web-based survey was developed in consultation with NCI and based, in part, on previous work by Discovery Logic that included a literature review and a feasibility study. Between November 2010 and June 2011, Discovery Logic performed a literature search of training program evaluations and searched for surveys and existing instruments and questions that might be useful as NCI developed the survey. They also looked at publications, grants, and Google searches to assess how much information could be found on a subset of the alumni population. This effort demonstrated that it would be difficult to do the program evaluation without directly contacting individuals, as the information from existing data sources was variable and sparse overall. For the full evaluation, Westat and NCI distilled the key themes and questions of interest to NCI. Westat also incorporated input from the in-depth interviews of alumni into the development of the survey—namely, career outcomes that would better represent the work of individuals for whom publications and presentations were not a key metric of productivity in their field.

Westat conducted a pretest of the instrument of the CPFP alumni survey in May 2013. Convenience sampling was initially used to select respondents for the pretest. In December 2012, CPFP alumni were notified by email of the CPFP evaluation and informed about alumni interviews that would be conducted in winter 2012 and 2013. After receiving that email, a handful of alumni contacted Westat or NCI to indicate a willingness to participate. Alumni who were not selected for the interviews but emailed

with an offer of assistance were contacted for the pretest. Several of these alumni were unavailable for the pretest, and the remaining pretest participants were randomly selected from the alumni roster excluding those alumni who had participated in an earlier interview. Six CPFP alumni participated in the pretest.

Pretest participants were asked to complete and return the survey by fax or email and participate in a telephone debriefing interview. The interviews focused on capturing participants' experience with the survey, including the time needed to complete the survey, questions or instructions that were confusing, lists of response options that seemed incomplete, and information that was difficult for alumni to provide. Interviews generally lasted about 25 minutes, and all six interviews were held the same day the participant returned the survey. Probes specific to individual participants were also developed based on review of completed surveys. Feedback from pretest participants most commonly identified survey items that required more clarity, either through additional instructions or minor modifications of the items themselves. Modifications to the survey were made accordingly.

Recruitment and tracing. The Office of Management and Budget (OMB) package for the evaluation was submitted by NCI in June 2013 and approved on January 27, 2014. Upon OMB approval, potential study participants with a valid email address were sent an introductory email notice about the survey approximately one week prior to sending the invitation with instructions for logging on to the web survey. Initial email invitations were sent to CPFP alumni on February 27, CPFP applicants on March 6, and F32 awardees on March 13. Additional invitations were sent on a rolling basis as tracing was conducted on respondents with inaccurate or missing email addresses. The invitation introduced the purpose and content of the survey, included a link to the web version of the survey, explained that the survey was voluntary and data collected would be confidential, and provided contact information in case potential respondents had questions or comments. A series of reminder emails and one-time telephone follow-up calls were conducted for nonrespondents.

Although the CPFP application and IMPACII database are reliable sources to generate the contact list, some of that information was not available or was outdated. As a result, Westat utilized trained staff to trace contact information for alumni, applicants, and awardees that included email addresses, current employer, home and work addresses, and home and work phone numbers using a number of Internet search tools (e.g., Google, LinkedIn, People Search) and search methods (e.g., the use of key term combinations). Tracing was conducted at two points in time during the study—prior to administering the online surveys and during data collection when

previous contact information was found to be incorrect. Information from the initial tracing was also used for the purposes of the bibliometric analysis, discussed below.

Web survey administration and response rates. Data were collected using self-administered web surveys (see Appendix B for survey instruments). Data collection began in late February 2014 with the alumni survey, and data collection for all three surveys ended in early June 2014. Three reminder emails were sent during the data collection period. Beginning in April, nonrespondents were contacted by phone to encourage them to complete the survey and confirm or obtain an email address, as applicable. A dedicated email mailbox was established so that respondents could request information about the study and/or technical assistance, as needed.

Surveys were completed by 123 CPFP alumni, 115 CPFP applicants, and 146 F32 awardees. Item nonresponse was low, and respondents who completed a majority of each survey were included in the analysis. As a result, two alumni surveys, five applicant surveys, and three F32 surveys were partially completed but included in the analysis.

A final outcome rate for each survey population is presented in Table 2-1. The response rate is calculated by dividing the number of completed surveys by the number of completed and partial surveys, refusals, and unknown eligibility case (e.g., those respondents whom we were not able to contact). The cooperation rate is calculated by dividing the number of completed surveys by the number of completed and partial surveys and refusals, but excluding the number of unknown eligibility cases (i.e., respondents whom we were not able to contact).

Table 2-1. Final survey outcome rates

Rate	CPFP alumni	CPFP applicants	F32 awardees
Total population	204	259	362
Non-contacts	11	37	109
Refusals	0	5	1
Response rate	59%	43%	39%
Cooperation rate	64%	52%	58%

Two main factors primarily accounted for nonresponse: (1) failure to locate respondents and (2) their refusal to participate. Respondents for whom we could not locate accurate contact information through multiple tracing attempts did not receive a survey and had no opportunity to participate in the study. Among respondents who chose not to participate in the study, implicit refusals—respondents who received a survey but never responded—far outnumbered explicit refusals, that is, potential participants who directly stated that they would not participate.

Analyses. Analyses of survey data was conducted in SAS using PROC SURVEY procedures, nonresponse adjusted weights, and a finite population correction (FPC) factor. In order to test statistical differences between alumni and applicants and applicants and awardees, either 95 percent confidence intervals were compared for categorical or ordinal variables (proc surveyfreq) or means for ordinal variables (proc surveyreg). For binary variables, odds were calculated relative to alumni (proc surveylogistic).

Nonresponse weights were created in order to account for nonresponse among alumni, applicants, and awardees and extrapolate survey findings to the full populations of alumni, applicants, and awardees. Weights were derived based on respondents' age, year of application to the CPFP program, sex, and race (for CPFP alumni), respondents' age and year of application to the CPFP program (for CPFP applicants), and respondents' year of application for the F32 award (for F32 awardees). Weighting variables were selected by considering what types of respondent characteristics were known for both respondents and nonrespondents (i.e., weight variables were from the survey frame and not survey responses) and were likely to be correlated with survey responses. Chi-square tests showed that some characteristics had different distributions for respondents and nonrespondents (for example, application year for alumni). Consequently, weights were derived based on all variables in Table 2-2, regardless of whether that single variable was distributed different across respondents and nonrespondents. Although more variables were available for alumni (respondents' age, year of application, sex, and race) than for applicants (respondents' age and year of application) and awardees (respondents' year of application for the F32 award), each population used the maximum number of available variables in order to minimize bias for each population.

Table 2-2. Population and survey respondents of eligible CPFP alumni, applicants, and F32 awardees, by demographics

Demographic	Survey frame		Respondents	
	Number	Percent	Number	Percent
Alumni				
Total	**204**		**123**	
Application year				
1987–91	26	12.7	12	9.8
1992–96	31	15.2	13	10.6
1997–2001	55	27.0	35	28.5
2001–06	67	32.8	46	37.4
2007–11	25	12.3	17	13.8
Age				
<=35	10	4.9	7	5.7
36–45	83	40.7	59	48.0
46–55	68	33.3	35	28.5
56–65	33	16.2	16	13.0
66+	10	4.9	6	4.9
Gender				
Male	58	28.4	33	26.8
Female	146	71.6	90	73.2
Race				
Asian	32	15.7	16	13.0
Black	17	8.3	11	8.9
Hispanic	12	5.9	4	3.3
White	139	68.1	91	74.0
Unknown or other	4	2.0	1	0.8
Applicants				
Total	**259**		**115**	
Application year				
1987–91	40	15.4	15	13.0
1992–96	49	18.9	22	19.1
1997–2001	59	22.8	20	17.4
2001–06	53	20.5	28	24.3
2007–11	58	22.4	30	26.1
Age				
<=35	20	7.7	11	9.6
36–45	70	27.0	35	30.4
46–55	70	27.0	32	27.8
56–65	59	22.8	17	14.8
66+	38	14.7	18	15.7
Unknown	2	0.8	2	1.7
Awardees				
Total	**362**		**146**	
Application year				
1987–91	17	4.7	8	5.5
1992–96	30	8.3	10	6.8
1997–2001	123	34.0	42	28.8
2002–06	86	23.8	34	23.3
2007–11	106	29.3	52	35.6

NOTE: CPFP alumni data was provided by NCI and the applicant data were downloaded from NCI's CPFP application database, while F32 awardee data were downloaded from IMPACII. Percents may not sum to 100 due to rounding.

Weighted and unweighted estimates for demographic characteristics are shown in Table 2-3. Note that for most characteristics, differences between survey respondents (i.e., unweighted) and estimates for the target populations (i.e., weighted) are similar, though differences are more pronounced for CPFP applicants. All statistics and analyses presented in this chapter are based on weighted data.

Table 2-3. Unweighted and weighted respondent demographics

	CPFP alumni		CPFP applicants		F32 awardees	
Demographics	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
Gender						
Male	25.8%	26.8%	30.7%	34.6%	46.1%	46.8%
Female	74.2	73.2	69.3	65.4	53.9	53.2
Ethnicity						
Hispanic	3.3	3.9	6.2	5.1	0.7	0.9
Non-Hispanic	96.7	96.1	93.8	94.9	99.3	99.1
Race						
American Indian/ Alaskan Native	0.0	0.0	0.9	0.7	0.7	0.6
Asian	11.4	14.0	13.9	12.7	17.8	17.8
Black	8.1	6.8	16.5	16.6	2.7	2.5
Native Hawaiian and Other Pacific Islander	0.0	0.0	0.0	0.0	0.0	0.0
White	76.4	75.1	67.0	68.2	80.1	80.2

NOTE: Data were self-reported by survey respondents. Percents for race may not sum to 100 because of missing data or rounding.

Bibliometric Analysis

Bibliometric analysis is the quantitative evaluation of scientific activity and impact in the context of published research. Such analysis is typically used to compare or evaluate the productivity of researchers or institutions. The foundational assumption of bibliometrics is that the publication of research results is desirable for the dissemination and advancement of knowledge. As such, quantitative analysis of publication records is meaningful for assessing the performance and impact of a set of publications. To this end, citations, references, and journal subject matter are all valuable bibliometric information to be analyzed (Rosas et al. 2011).

Teaming with Thomson Reuters Research Data & Services, Westat conducted bibliometric analyses of the publications authored by CPFP alumni, CPFP applicants, and F32 alumni. To begin, Westat identified each individual to be included in the analysis and traced meta-data (names, email addresses, current positions and affiliations) to be compiled into datasets for each group. These data were then employed by Thomson Reuters to match individuals to publications cataloged in their proprietary database ScienceWire.[2] Specifically, sophisticated matching algorithms utilize the meta-data to accurately generate publications lists for each individual.[3] These publication lists then went through a series of manual reviews ending with Westat reviewing each publication list for false positive matches and errors. After these quality control steps were taken, bibliometric measures were compiled. In Table 2-4, the various bibliometric measures obtained from these data organized by the level of measurement (publication level and journal level) are shown. These measures are aggregated at the group level for analysis and interpretation.[4]

Table 2-4. Bibliometric measures

Bibliometric measure	Measure level	Measure description
Publication counts	Publication	A sum of all publications for a given group.
Citation counts and averages	Publication	Instances when publications reference the publications of a given group. Citations can be summed and averaged.
Journal impact factors	Journal	Calculated by dividing the number of current year citations to the source items published in that journal by the total number of citable articles published over a designated period of time (e.g., two or five years). For this evaluation, two-year impact factors were utilized.
Journal subject categories (JSC)	Journal	Indicators, generated by Thomson Reuters, of the typical topics covered by material in a given journal; a journal can have more than one JSC.

[2] ScienceWire is a combined database of MEDLINE/PubMed and Web of Science.

[3] Publications were identified for each individual based on names, institutional address of affiliation, email address, shared co-authors across multiple publications, as well as other information available via publications. Thomson Reuters and Westat performed quality assurance of publication matches with a focus on ruling out false positives for problematic names and other errors.

[4] All measures are based on unweighted data.

Table 2-4. Bibliometric measures—Continued

Bibliometric measure	Measure level	Measure description
Citation benchmarks	Publication	Benchmarks for citation statistics are obtained by matching a set of publications to a set of benchmark publications based on similarity of journals and journal subject categories. Citation statistics for these benchmark publications are then used for comparison.
Papers by journal impact factor quartiles	Publication	Publication counts for a given publication set are disaggregated by the quartiles of journal impact factors associated with each publication.
Journals by publication count	Journal	The top 10 journals for a publication set by the number of publications appearing in a journal.
Journals by journal impact factor	Journal	The top 10 journals for a publication set by the highest journal impact factors.
Interdisciplinarity indices	Journal	Diffusion and integration indices characterizing the diversity of citations to and by a set of publications.
H-index	Publication	Indicates the number of papers an individual author has with at least “h” citations each.
Authorship distribution	Publication	A distribution count of author-group sizes.

3. Survey Analysis

Web surveys were administered to CPFP alumni, applicants, and F32 awardees in order to complement other evaluation methods by collecting quantitative data not available through existing NIH or other databases. Aspects of the CPFP such as mentorship, creation of leaders in the cancer and cancer prevention research fields, participant opinions on program benefits, and participant leveraging of skills and relationships developed during the program could only be addressed through additional data collection and respondents' self-assessments. While these data would not be available from other sources, it should be noted that they represent self-reports from respondents and, as with all surveys, may be subject to measurement error due to respondent memories, differences in interpretations of survey items, and other differences in the cognitive process of completing questionnaires.

All statistics and analyses presented in this chapter are based on weighted data (as discussed in Chapter 2) in order to account for nonresponse among alumni, applicants, and awardees, and are therefore extrapolated to the full populations of alumni, applicants, and awardees. Weights were derived based on respondents' age, year of application to the CPFP program, sex, and race (for CPFP alumni), respondents' age and year of application to the CPFP program (for CPFP applicants), and respondents' year of application for the F32 award (for F32 awardees). Weighting variables were selected by considering what types of respondent characteristics were known for both respondents and nonrespondents and were likely to be correlated with survey responses. Missing data are excluded from all analyses, and all differences cited in the text of this chapter are based on appropriate significant tests. For more details about data collection and survey development, please refer to Chapter 2.

Demographics

CPFP alumni reported statistically significant differences from their two comparison groups, CPFP applicants and F32 awardees, on demographic characteristics such as gender, race, and educational background. Almost three-quarters of CPFP alumni were female (73.2 percent), and a majority of both comparison groups were also female (65.4 percent of CPFP applicants and 53.2 percent of F32 awardees), though the population of awardees consisted of a

statistically smaller proportion of women (Table 3-1). The majority of all populations were White (75.1 percent of alumni, 68.2 percent of applicants, and 80.2 percent of awardees), and about one-seventh were Asian (14.0 percent of alumni, 12.7 percent of applicants, 17.8 percent of awardees). Racial and ethnic differences across groups occurred for those who self-identified as Black; 6.8 percent of alumni reported they were Black, which was greater than the share of awardees (2.5 percent) and less than applicants (16.6 percent). Few alumni self-identified as Hispanic (3.9 percent) and none as either American Indian or Alaska Native, which was statistically similar to both applicants and awardees.

Table 3-1. Respondent demographics

Demographic	CPFP alumni	CPFP applicants	F32 awardees
Gender			
Male	26.8%	34.6%	46.8*%
Female	73.2	65.4	53.2*
Race and ethnicity			
Hispanic	3.9	5.1	0.9
American Indian or Alaska Native	0.0	0.7	0.6
Asian	14.0	12.7	17.8
Black or African American	6.8	16.6*	2.5*
Native Hawaiian or Other Pacific Islander	0.0	0.0	0.0
White	75.1	68.2	80.2

*Different from CPFP alumni with alpha=.05. Percents may not sum to 100 due to rounding or multiple responses selected.

At the time of data collection, alumni reported being an average age of 48. Alumni were both younger than applicants (age 53) and older than F32 awardees (age 43). Alumni entered the CPFP at an average of 14 years prior to data collection, in 2000; this was comparable to applicants, who applied an average of 15 years prior, in 1999. Alumni began their affiliation with CPFP earlier than when awardees received their F32 awards (11 years prior to data collection, in 2003).

A majority of all three groups reported holding a PhD (74.1 percent of alumni, 67.4 percent of applicants, and 85.5 percent of awardees), and more awardees than alumni indicated having earned a PhD. Most alumni reported holding an MPH (81.6 percent), which is currently a program requirement, and this prevalence was higher than both applicants (36.2 percent) and awardees (4.3 percent). One-tenth of alumni held an MD (9.6 percent), which was higher than awardees (3.9 percent) but lower than applicants (22.1 percent).

Current Employment

Employment History

CPFP alumni, applicants, and F32 awardees reported on their employment status, current employers and fields of employment. Two-thirds of alumni completed exactly one postdoctoral or fellowship program during their career, including the CPFP (67.4 percent), which is statistically similar to F32 awardees (77.1 percent) but higher than CPFP applicants (51.8 percent). One-quarter of applicants (25.0 percent) indicated they had not completed a postdoctoral or fellowship program. Only 1.7 percent of alumni reported holding a postdoctoral or fellowship position at the time of data collection, which was similar to applicants (2.0 percent) but less than the 10.4 percent of F32 awardees who indicated they were working as a postdoc or fellow.

At the time of the survey, the majority of CPFP alumni were employed on a full-time basis (92.0 percent), similar to both applicants (83.2 percent) and awardees (96.4 percent). About a third were primarily[5] employed by NCI (34.6 percent), with an additional one-third at universities or other academic institutions (32.8 percent; Table 3-2). The remaining one-third of alumni were employed at other government agencies, research centers, or in industry. This employment situation differed from both CPFP applicants and F32 awardees, who were primarily employed by academic institutions (49.6 percent and 62.9 percent, respectively). Alumni were more likely to be employed by NCI than both applicants and awardees, which is expected based on the experiences and connections obtained through their participation in the program. Alumni were also more likely to be employed at another NIH Institute or Center than awardees. Alumni, applicants, and awardees who worked at a government agency other than NIH most commonly worked at the Food and Drug Administration (particularly alumni and applicants), the Centers for Disease Control and Prevention (particularly awardees), and the Department of Veterans Affairs.

Alumni were less likely to be employed by universities and academic institutions than both applicants and awardees, and less likely to be employed by independent cancer research centers or private companies than awardees. Although fewer alumni were employed at universities, those who were reported higher rates of tenure and were less likely to be outside of the tenure track. Nearly half of academic alumni were tenured (47.9 percent), greater than both applicants (34.0 percent) and awardees (28.9

[5] Respondents were asked to indicate their "primary" employer due to respondents frequently holding positions across more than one employer.

percent). Only 13.0 percent of academic alumni were not on the tenure track, lower than both applicants (49.9 percent) and awardees (35.5 percent).

Table 3-2. Primary employer

Primary employer	CPFP alumni	CPFP applicants	F32 awardees
NCI	34.6%	5.2%*	2.1%*
NIH	5.2	5.0	0.6*
Other government agency	9.6	18.3	3.9
University or other academic institution	32.8	49.6*	62.9*
Independent cancer research center or some other health research institution	3.9	2.2	11.0*
Clinic or hospital	1.3	1.7	2.7
Foundation or professional association	2.0	0.7	0.0*
Private company	5.6	13.8	16.0*
Self-employed	5.1	3.4	0.8*

*Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding.

CPFP alumni most commonly reported being employed in a public health field (57.4 percent) or the behavioral or social sciences (26.5 percent; Table 3-3). Applicants, on the other hand, most commonly reported working in epidemiology or public health (36.2 percent), the biological or biomedical sciences (28.1 percent), and medicine (22.2 percent), while almost three-quarters of F32 awardees were in the biological or biomedical sciences (71.5 percent).

Table 3-3. Employment discipline

Discipline	CPFP alumni	CPFP applicants	F32 awardees
Behavioral or social sciences	26.5%	14.8%*	6.1%*
Biological or biomedical sciences	17.9	28.1	71.5*
Epidemiology and/or public health	57.4	36.2*	6.6*
Mathematical sciences	3.4	2.9	0.8
Medicine	13.8	22.2	15.3
Nutrition sciences	15.5	8.1	0.8*
Physical science	0.7	0.0	13.8*

*Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to multiple responses selected.

Alumni were more likely to be working in both public health and the behavioral or social sciences than applicants and awardees (57.4 percent of alumni in public health, compared to 36.2 percent of applicants and 6.6 percent of awardees; 26.5 percent of alumni in the behavioral or social sciences, compared to 14.8 percent of applicants and 6.1 percent of awardees). Additionally, alumni were less likely than

awardees to work in the biological or biomedical sciences (17.9 percent, compared to 71.5 percent) and physical sciences (0.7 percent, compared to 13.8 percent).

In Table 3-4, employment sector was further collapsed into government (NCI, NIH, or other government agency), academia, industry, or some other area (independent cancer research center or other health research institution, clinical or hospital, foundation or professional association, or self-employment).[6]

Some differences in employment discipline persisted across various fields of employment for alumni, applicants, and awardees. For employment disciplines in which alumni reported differences from applicants, those differences were generally attributable to one or two employment sectors. In contrast, when alumni differed from awardees, those differences were generally spread across more sectors. For example, as shown in Table 3-3, alumni were more likely than both applicants and awardees to report working in epidemiology or public health. Comparing differences by employment sector, alumni who worked in academia or some other field were more likely than applicants in academia or some other field to categorize their primary work as epidemiology or public health (50.5 percent of academic alumni, compared to 28.9 percent of academic applicants; 76.8 percent of alumni in some other field, compared to 38.5 percent of applicants in some other field; Table 3-4). Comparing alumni and F32 awardees, alumni were more likely to work in epidemiology or public health in all four sectors, for example, 57.2 percent of governmental alumni compared to 10.9 percent of governmental awardees.

Comparing employment disciplines by cohorts yielded similar findings. Respondents were categorized based on the year in which they entered CPFP (alumni), applied to the program (applicants), or received an F32 award (awardees) as 1996 or earlier, 1997–2001, 2002–06, or 2007–11. For employment disciplines in which alumni reported differences from applicants, these differences were generally attributable to one or two cohorts. When alumni differed from awardees, differences occurred across multiple cohorts (Table 3-5). For example, comparing alumni and applicants, alumni were less likely than applicants to work primarily in biological or biomedical sciences only for the most recent cohort, 2007–11 (4.9 percent of alumni compared to 36.4 percent of applicants). Comparing alumni and awardees, alumni were less likely than awardees to work in biological or biomedical sciences for three

[6] Some combinations of respondent type and sector are uncommon, particularly alumni working in industry, applicants working in some other area, and awardees working in government, so findings for these areas should be interpreted with caution.

Table 3-4. Employment discipline, by sector

Discipline	Alumni				Applicants				Awardees			
	Govern-ment	Academic	Industry	Other	Govern-ment	Academic	Industry	Other	Govern-ment	Academic	Industry	Other
Behavioral or social sciences	18.3%	37.4%	31.9%	27.3%	11.9%	17.1%*	5.2%	27.3%	8.8%	7.7%*	0.0%*	4.9T*
Biological or biomedical sciences	23.0	14.7	0.0	14.2	31.8	25.4	35.6*	18.2	76.2*	73.7*	57.9*	74.8*
Epidemiology and/or public health	57.2	50.5	58.0	76.8	50.5	28.9*	31.8	38.5*	10.9*	5.6*	4.5*	11.3*
Mathematical sciences	2.4	6.7	0.0	0.0	5.2	3.0	0.0	0.0	0.0	1.3	0.0	0.0
Medicine	9.9	12.5	42.0	20.3	8.2	30.9*	26.5	11.2	17.6	11.2	27.8	18.6
Nutrition sciences	12.0	29.1	0.0	0.0	0.0*	11.8*	10.6	9.1	0.0*	1.3*	0.0	0.0
Physical science	0.0	2.1	0.0	0.0	0.0	0.0*	0.0	0.0	0.0	13.7*	32.5*	0.0

*Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to multiple employment disciplines selected.

of four cohort categories (22.2 percent of alumni compared to 73.8 percent of awardees for 1997–2001; 15.4 percent of alumni compared to 67.6 percent of awardees for 2002–06; 4.9 percent of alumni compared to 78.8 percent of awardees for 2007–11).

The higher incidence of statistically significant differences between alumni and F32 awardees than alumni and applicants may be partially attributable to differences in the populations, that is, CPFP and F32 awards may appeal to those with different career intentions or inclinations.

Table 3-5. Employment discipline, by cohort

	Alumni				Applicants				Awardees			
Discipline	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Behavioral or social sciences	16.0%	20.7%	31.6%	38.2%	9.8%	14.3%	9.9%*	23.2%	6.4%	2.4%*	8.8%*	7.7%*
Biological or biomedical sciences	20.0	22.2	15.4	4.9	20.5	33.2	16.9	36.4*	45.5	73.8*	67.6*	78.8*
Epidemiology and/or public health	40.0	63.8	67.8	33.4	27.5	34.0*	26.0*	49.6	12.8*	4.8*	8.8*	3.8*
Mathematical sciences	4.0	2.7	4.0	0.0	3.8	6.3	0.0	0.0	0.0	2.4	0.0	0.0
Medicine	16.0	9.4	15.4	8.1	22.1	13.5	26.1	17.3	4.5	21.4	8.8	17.3
Nutrition sciences	28.0	10.5	8.0	13.0	4.2*	10.3	12.8	3.3	0.0*	2.4	0.0*	0.0
Physical science	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	35.4*	11.9*	8.8*	9.6

*Different from CPFP alumni with alpha=.05.

NOTE: C1 refers to the cohort 1996 or earlier, C2 to 1997–2001, C3 to 2002–06, and C4 to 2007–11. Percents may not sum to 100 due to multiple employment disciplines selected.

For alumni, some trends in employment discipline appeared over time. For more recent program entry years, alumni were more likely to categorize their employment discipline as behavioral or social science, epidemiology and/or public health, and physical sciences. Additionally, more recent alumni were less likely to categorize their employment discipline as nutrition sciences.

Employment Activities

Survey respondents rated the extent to which their jobs involved research activities, including research in cancer prevention and control. CPFP alumni reported that they devote more of their current work to cancer prevention and control than both applicants and awardees. As shown in Table 3-6, alumni were more likely to spend a very large percentage of their time (more than three-quarters) on cancer prevention and control than both applicants and awardees, less likely to devote no

time, and reported a higher average rating of how much of their time is dedicated to cancer prevention and control (3.5, compared to 2.0 for applicants and 2.5 for awardees).

Over half of alumni who are no longer working in cancer prevention or control attributed this shift in career focus to having a better opportunity in another field (53.1 percent), and alumni were more likely to offer this reason than F32 awardees (25.7 percent). The most cited explanation by both applicants and awardees was a change in their career or professional interests (52.4 percent for applicants, 32.6 percent for awardees), while alumni were less likely to offer this explanation than both comparison populations (10.6 percent). Note that these reasons should be interpreted with caution particularly among alumni, due to the small number no longer working in cancer prevention (12.4 percent of alumni, or a weighted estimate of 24 alumni based on 14 respondents).

Table 3-6. Percent of current work in cancer prevention and control

Percent of time	CPFP alumni	CPFP applicants	F32 awardees
None	12.4%	47.8%*	31.0%*
A small percentage (1%–25%)	18.2	31.2*	31.7*
A moderate percentage (26%–50%)	18.4	8.4*	13.2
A large percentage (51%–75%)	11.9	1.3*	3.1*
A very large percentage (76%–100%)	39.2	11.3*	21.0*
Mean (1–5)	3.5	2.0*	2.5*

* Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding.

Among those who devoted at least a small percentage of their time to cancer prevention or control (as shown in Table 3-6), alumni reported spending more time on research and research support for cancer prevention and control, including research management, monitoring, reviewing, funding, analysis, and dissemination, than both applicants and awardees (Table 3-7). For example, 38.0 percent of alumni reported spending 76 percent of their time or more on research activities in cancer prevention, which is higher than both applicants (17.2 percent) and awardees (23.2 percent).

Table 3-7. Percent of current work in research and research support in cancer prevention and control

Percent of time	CPFP alumni	CPFP applicants	F32 awardees
None	3.7%	19.2%*	3.7%
A small percentage (1%–25%)	20.9	45.7*	41.6*
A moderate percentage (26%–50%)	21.7	13.5	16.1
A large percentage (51%–75%)	15.8	4.4*	15.4
A very large percentage (76%–100%)	38.0	17.2*	23.2*
Mean (1–5)	3.6	2.5*	3.1*

*Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding.

In addition to the time they spent on research in cancer prevention or control in their current job, respondents were asked about the time they spent on all research activities, not solely research activities in cancer prevention or control, as well as the time they spent on teaching-related activities. Half of alumni reported that they spent a very large percentage of their time on any type of research activity, both related and unrelated to cancer prevention and control (53.3 percent; Table 3-8). The average survey scale rating for how much time is devoted to research was higher for alumni (4.0) than applicants (3.2), but lower than awardees (4.3). As shown in Table 3-9, alumni indicated that they spent less time on teaching-related activities (2.1) than both applicants (2.3) and awardees (2.3), which is expected given than fewer alumni classified their primary employer as an academic institution than applicants and awardees (see Table 3-2).

Table 3-8. Percent of current work in research and research support

Percent of time	CPFP alumni	CPFP applicants	F32 awardees
None	4.4%	15.4%*	2.4%
A small percentage (1%–25%)	11.6	31.2*	7.4
A moderate percentage (26%–50%)	17.0	6.5*	10.4
A large percentage (51%–75%)	13.7	14.1	18.8
A very large percentage (76%–100%)	53.3	32.8*	61.1
Mean (1–5)	4.0	3.2*	4.3*

* Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding.

Table 3-9. Percent of current work in teaching

	CPFP alumni	CPFP applicants	F32 awardees
None	22.0%	26.0%	19.5%
A small percentage (1%–25%)	53.1	41.9	45.3
A moderate percentage (26%–50%)	19.0	14.1	20.8
A large percentage (51%–75%)	4.4	8.2	10.9
A very large percentage (76%–100%)	1.5	9.9	3.5
Mean (1–5)	2.1	2.3*	2.3*

* Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding.

Multidisciplinary Activities

A multidisciplinary work environment is a key aspect of the CPFP. Employed CPFP alumni reported engaging in significantly higher levels of multidisciplinary collaborative activities than both applicants and awardees. Alumni reported that they worked with researchers in other disciplinary areas, published or presented in areas, incorporated multiple fields into their own work (Table 3-10). Alumni were involved in multidisciplinary activities to a greater extent than applicants (six of six areas) and awardees (five of six areas). For example, alumni collaborated with professionals from other disciplines more frequently than both applicants and awardees (average ratings of 4.1, compared to 3.7 for applicants and 3.7 for awardees), and published with professionals from other disciplines more often (3.4, compared to 2.7 for applicants and 3.1 for awardees).

Table 3-10. Collaborative and multidisciplinary activities

Professional activity	CPFP alumni	CPFP applicants	F32 awardees
Incorporate research from multiple fields/disciplines into your work	4.0	3.7*	3.7*
Collaborate with professionals from multiple disciplines	4.1	3.7*	3.7*
Manage and/or lead professionals from multiple disciplines	3.4	2.8*	2.8*
Present at multidisciplinary conferences or meetings	3.2	2.8*	2.8*
Publish in multidisciplinary journals or publications	3.2	2.6*	3.0
Publish with professionals from multiple disciplines	3.4	2.7*	3.1*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=Not at all, 2=A small extent, 3=A moderate extent, 4=A large extent, 5=A very large extent).

Career Activities

Alumni, applicants, and awardees were asked about professional activities in which they have participated during their career, including research, publications and presentations, and community service. Survey respondents were asked to either rate the extent to which they played a role in various activities across the entirety of their career (not at all, a small extent, a moderate extent, a large extent, or a very large extent), or, for discrete activities for which enumeration over a career would be burdensome (e.g., presented at a professional conference), to categorize the number of times they participated in publication, presentation, and community service activities in the past five years only (none, once, two or three times, four or five times, six or more times). For both types of activities, average scores were computed for each population. Because frequency ratings are based on limited response option categories rather than true enumerations, it should be noted that average scores reflect the response option categories and not frequencies of each activity.

As shown in Table 3-11, alumni self-reported that to a greater extent than applicants, they explored new topics in cancer research (average rating of 3.1 compared to 2.1), made a significant contribution to advancing innovative ideas in cancer research (3.0, compared to 1.8), and addressed key knowledge gaps in cancer research (3.23, compared to 2.0). Alumni also reported having more extensive roles than applicants in making a significant contribution to a scientific breakthrough in cancer research (2.3, compared to 1.6) and developing funding initiatives to address knowledge gaps in cancer research (2.3, compared to 1.5). While alumni claimed more than frequently awardees to having developed funding initiatives to address knowledge gaps in cancer research (2.3, compared to 1.9), awardees provided higher self-ratings than alumni for the extent to which they made a significant contribution to scientific breakthroughs in cancer research (2.7 for awardees, compared to 2.3 for alumni).

Table 3-11. Professional activities in career

Professional activity	CPFP alumni	CPFP applicants	F32 awardees
Pursued a new theoretical direction or address a topic previously unexplored in cancer research	3.1	2.1*	3.2
Made a significant contribution to a scientific breakthrough in cancer research	2.3	1.6*	2.7*
Made a significant contribution to advancing innovative ideas in cancer research	3.0	1.8*	2.9
Addressed key knowledge gaps in cancer research	3.3	2.0*	3.1
Developed funding initiatives to address knowledge gaps in cancer research	2.3	1.5*	1.9*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=Not at all, 2=A small extent, 3=A moderate extent, 4=A large extent, 5=A very large extent), excluding respondents who selected NA.

Publication- and presentation-related work is an important indicator of an individual's contribution to the scientific community, and respondents reported on the frequency of their recent scholarly activities. CPFP alumni reported higher frequencies of publication and presentation activities than both applicants and awardees.[7] Considering activities in the previous five years (excluding activities that occurred before completing a doctoral degree and postdoctoral work), alumni authored or co-authored journal articles or book chapters more often than applicants (Table 3-12). For example, when asked about authoring or co-authoring papers in peer-reviewed journals, alumni provided an average rating of 4.1, which was significantly greater than applicants' average rating of 3.2. Alumni authored or co-authored technical reports, presented or chaired conference sessions, and organized conference sessions or meetings more frequently than both applicants and F32 awardees. For example, alumni provided an average rating of 4.1 when asked about recent presentations at professional conferences and scientific meetings, greater than both applicants (3.2) and awardees (3.4).

[7]See Chapter 4 for a bibliometric analysis of alumni, applicant, and awardee publication.

Table 3-12. Publication and presentations activities in past 5 years

Activity	CPFP alumni	CPFP applicants	F32 awardees
Publication activities			
Authored or co-authored a paper in a published peer-reviewed journal	4.1	3.2*	4.0
Authored or co-authored a chapter in a published book	2.0	1.5*	1.9
Authored or co-authored a published book	1.2	1.1	1.1
Authored or co-authored a technical report or white paper	1.9	1.6*	1.4*
Presentation activities			
Presented at a professional conference or scientific meeting	4.1	3.2*	3.4*
Chaired a session or workshop at a professional conference or scientific meeting	2.5	1.8*	1.9*
Organized a session or workshop at a professional conference or scientific meeting	2.3	1.6*	1.7*
Organized a professional conference or scientific meeting	2.0	1.4*	1.4*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=None, 2=Once, 3=Two or three times, 4=Four or five times, 5=Six or more times).

Respondents were also asked about community-related and other professional activities to ensure that a wide variety of measures of career engagement and success were represented. CPFP alumni reported more frequent recent participation in community service activities. In the past five years (excluding activities that occurred before completing a doctoral degree and postdoctoral work), alumni reported translating cancer research for a lay audience more frequently than applicants (2.5, compared to 1.8), presenting information to patient advocacy groups (1.9, compared to 1.6) and serving on local health advisory boards more frequently than awardees (1.7, compared to 1.4), and serving on national health advisory boards more frequently than both applicants and awardees (1.8, compared to 1.2 and 1.3, respectively; Table 3-13).

Table 3-13. Community service activities in past 5 years

Community service activity	CPFP alumni	CPFP applicants	F32 awardees
Advised or presented information to a patient advocacy or support group.....	1.9	1.8	1.6*
Translated cancer research information for a lay audience	2.5	1.8*	2.3
Served on a local health advisory board, panel, or committee	1.7	1.6	1.4*
Served on a national health advisory board, panel, or committee	1.8	1.2*	1.3*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=None, 2=Once, 3=Two or three times, 4=Four or five times, 5=Six or more times).

For other types of professional activities not categorized as relating to scientific breakthroughs, publications and presentations, or community service, alumni reported higher average frequencies in several areas. In the past five years (excluding activities that occurred before completing a doctoral degree and postdoctoral work), alumni participated more often in working groups related to cancer research, served as a journal reviewer or editor, and led or co-led a clinical trial more often than both applicants and awardees (Table 3-14). For example, alumni reported an average rating of 1.9 for their involvement with cancer research working groups, which was greater than applicants' average rating of 1.3 and awardees' average rating of 1.4. For activities related to generating funding for their work and commercializing products they had developed, alumni reported these events at a lower frequency than F32 awardees. Alumni reported lower rates than awardees of filing for or receiving a patent (1.1, compared to 1.7) and developing a prototype, technology, or marketable product (1.1, compared to 1.3). Alumni also reported lower rates of receiving a competitive grant, contract, or subcontract for their work (2.3, compared to 2.6), although higher rates than applicants (1.8).

Table 3-14. Other professional activities in past 5 years

Other professional activity	CPFP alumni	CPFP applicants	F32 awardees
Established or appointed to a working group on cancer research	1.9	1.3*	1.4*
Served as a reviewer for a journal	4.1	2.8*	3.6*
Served as an editor of a journal or served on a journal review board	1.8	1.3*	1.5*
Led or co-led a clinical trial	1.5	1.2*	1.1*
Received a competitive grant, contract, or subcontract for your work	2.3	1.8*	2.6*
Filed or received a patent	1.1	1.0	1.7*
Developed a prototype, technology, or marketable product	1.1	1.1	1.3*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=None, 2=Once, 3=Two or three times, 4=Four or five times, 5=Six or more times).

Since completing their doctoral degree and postdoctoral work, almost all alumni (92.0 percent) have served as a mentor to others working in their organization (Table 3-15). Alumni were significantly more likely than both applicants and awardees to have served as a project leader (81.7 percent, compared to 60.0 percent and 66.3 percent, respectively) and to have held some other type of leadership role that was not a specific focus of the questionnaire (86.5 percent, compared to 72.6 percent and 65.7 percent, respectively). Additionally, while alumni were less likely than awardees to have advanced to more senior positions in their careers (75.1 percent, compared to 82.8 percent), they were more likely than applicants to have assumed leadership or management responsibilities (53.8 percent, compared to 42.9 percent) and to have served as a mentor (92.0 percent, compared to 83.0 percent).

Table 3-15. Career advancement

Career advancement	CPFP alumni	CPFP applicants	F32 awardees
I have advanced to a more senior-level position	75.1%	71.7%	82.8*%
I have assumed a role as a project leader (e.g., technical group leader)	81.7	60.0*	66.3*
I have assumed leadership or management responsibilities (e.g., section chief)	53.8	42.9*	48.5
I have served as a mentor to others in my organization	92.0	83.0*	86.6
I have assumed other leadership roles (e.g., led a committee)	86.5	72.6*	65.7*

*Different from CPFP alumni with alpha=.05.

Considering the entirety of their careers, alumni were satisfied with their professional lives. As shown in Table 3-16, more alumni were "extremely satisfied" with their career progress (21.6 percent) than both applicants (10.8 percent) and awardees (9.7 percent). Alumni were also more satisfied with their careers on the whole, providing a significantly higher average satisfaction rating (3.9, compared to 3.5 for applicants and 3.5 for awardees). Two-thirds of CPFP alumni reported that their salary was competitive with their peers (67.6 percent), and alumni did not statistically differ from either applicants (63.0 percent) or awardees (71.4 percent) in this perception. Additionally, as shown in Table 3-17, applicants and awardees were more likely to report lower salary ranges than alumni. For example, fewer alumni reported that their current salary fell within the $50,000–$74,999 range than both applicants and awardees (2.6 percent of alumni, compared to 18.1 percent of applicants and 25.2 percent of awardees).

Table 3-16. Satisfaction with career progress

Satisfaction level	CPFP alumni	CPFP applicants	F32 awardees
Not at all	0.7%	4.2%	1.5%
A little satisfied	3.3	6.9	10.9*
Somewhat satisfied	25.4	33.0	25.0
Very satisfied	49.0	45.3	41.8
Extremely satisfied	21.6	10.6*	9.7*
Mean (1-5)	3.9	3.5*	3.5*

*Different from CPFP alumni with alpha=.05.

NOTE: Percents may not sum to 100 due to rounding or missing data.

Table 3-17. Current salary

	CPFP alumni	CPFP applicants	F32 awardees
Less than $50,000	2.4%	9.1%*	7.1%
$50,000-$74,999	2.6	18.1*	17.5*
$75,000-$99,999	14.7	24.5	25.2*
$100,000-$124,999	34.8	12.5*	18.1*
$125,000-$149,999	15.8	9.9	9.8
$150,000-$174,999	11.3	6.6	11.2
$175,000-$199,999	6.1	4.1	4.7
$200,000-$224,999	3.5	1.6	0.6
$225,000 or more	3.6	3.5	3.7
Not applicable	5.3	10.0	2.0

*Different from CPFP alumni with alpha=.05

NOTE: Percents may not sum to 100 due to rounding or missing data.

Some differences in the frequency with which respondents participated in various career-related activities can be explained by the sector in which alumni, applicant, and awardees are employed. Respondents were categorized as working in

government (NCI, NIH, or another governmental agency), academia, industry, or in some other sector (independent research center, clinic or hospital, foundation, or self-employed) based on their survey responses (as shown in Table 3-2), as well as by program entry or, for applicants, application year (as shown in Table 3-5). Cautions due to limited sample sizes, particularly for employment sector (alumni working in industry, applicants working in some other area, and awardees working in government), remain.

When alumni reported different activity levels from applicants and awardees, it was most often driven by differences among those working in academia, though differences were also present within other sectors of employment. For example, as shown in Tables 3-18 and 3-19, academic alumni reported higher average frequencies than both applicants and awardees in academia for publishing in peer-reviewed journals (4.7, compared to 3.8 for applicants and 4.2 for awardees). Few differences were present within industry, which may be due to the relatively small number of survey respondents who reported working for a private company. For almost all activities, sector differences between alumni and awardees were indicative of higher frequencies among alumni, with the exceptions of receiving grants, patents, and developing marketable products.

Differences across cohorts always reflected higher levels of activities for alumni than applicants for awardees. For example, as shown in Table 3-20, alumni who entered CPFP from 2007 to 2011 reported higher average frequencies of organizing a session or workshop at a professional conference or scientific meeting than both applicants and awardees in the same cohort (2.0 for alumni, compared to 1.3 for applicants and 1.2 for awardees). More differences occurred when comparing alumni to applicants than alumni to awardees, although for applicants, alumni reported higher activity levels primarily for the first three cohorts of awards only (i.e., 1996 or earlier, 1997–2001, and 2002–06). This is likely due to survey instructions for respondents to consider activities that occurred after completing their doctoral degree and postdoctoral work; for the most recent members of cohort 4, this exclusion would leave only a small window of time in which differences between alumni, applicants, and awardees could appear.

Table 3-18. Professional activities, by employment sector

Activity	Alumni				Applicants				Awardees			
	Government	Academic	Industry	Other	Government	Academic	Industry	Other	Government	Academic	Industry	Other
Professional activity												
Pursued a new theoretical direction or addressed a topic previously unexplored in cancer research	3.1	3.0	1.6	3.7	2.0*	2.2*	1.6	2.2*	3.4	3.3	2.4	3.5
Made a significant contribution to a scientific breakthrough in cancer research	2.2	2.5	1.5	2.6	1.5*	1.9*	1.4	1.3*	2.7	2.8	2.2	3.0
Made a significant contribution to advancing innovative ideas in cancer research	3.1	3.0	1.9	3.0	1.8*	2.0*	1.5	1.8*	2.8	3.0	2.4	3.2
Addressed key knowledge gaps in cancer research.....	3.4	3.3	2.3	3.3	1.8*	2.2*	1.6	1.9*	3.4	3.1	2.3	3.4
Developed funding initiatives to address knowledge gaps in cancer research ...	2.8	2.1	1.6	1.5	1.3*	1.8	1.2	1.4	2.3	1.9	1.5	1.7

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=None, 2=Once, 3=Two or three times, 4=Four or five times, 5=Six or more times).

Table 3-19. Career activities, by employment sector

Activity	Alumni				Applicants				Awardees			
	Government	Academic	Industry	Other	Government	Academic	Industry	Other	Government	Academic	Industry	Other
Publication activity												
Authored or co-authored a paper in a published peer-reviewed journal	4.2	4.7	2.4	3.8	3.1*	3.8*	2.3	2.2*	3.4	4.2*	3.3	4.2
Authored or co-authored a chapter in a published book	1.9	2.5	1.3	1.5	1.5*	1.8*	1.2	1.0	1.7	2.0*	1.4	1.9
Authored or co-authored a published book	1.2	1.3	1.0	1.1	1.0	1.2	1.0	1.0	1.0	1.1*	1.1	1.1
Authored or co-authored a technical report or white paper	1.9	1.6	2.4	2.3	1.7	1.5	2.0	1.2*	1.5	1.4	1.3*	1.6*
Presentation activity												
Presented at a professional conference or scientific meeting	4.2	4.5	2.2	3.7	3.2*	3.7*	2.9	2.6*	3.5	3.8*	2.2	3.2
Chaired a session or workshop at a professional conference or scientific meeting	2.6	2.8	1.3	2.3	1.8*	2.1*	1.5	1.4*	2.0	2.1*	1.3	1.5*
Organized a session or workshop at a professional conference or scientific meeting	2.3	2.5	1.5	2.1	1.8*	1.7*	1.7	1.0*	1.8	1.8*	1.2	1.7
Organized a professional conference or scientific meeting	2.4	1.6	1.1	2.2	1.6*	1.5	1.2	1.0*	1.5*	1.5	1.0	1.5*
Community service activity												
Advised or presented information to a patient advocacy or support group	1.7	2.1	1.1	2.4	1.9	1.9	1.3	1.6	2.0	1.7*	1.3	1.8
Translated cancer research information for a lay audience	2.2	3.0	1.9	2.9	1.5*	1.9*	2.1	2.4	3.1*	2.1*	1.9	2.8
Served on a local health advisory board, panel, or committee	1.3	2.3	1.1	1.8	1.2	1.9	1.2	1.6	2.1*	1.4*	1.2	1.2
Served on a national health advisory board, panel, or committee	1.6	1.9	1.3	2.0	1.1*	1.4*	1.0	1.0*	1.4	1.3*	1.3	1.0*

Table 3-19. Career activities, by employment sector—Continued

Activity	Alumni				Applicants				Awardees			
	Government	Academic	Industry	Other	Government	Academic	Industry	Other	Government	Academic	Industry	Other
Other professional activity												
Established or appointed to a working group on cancer research	2.0	2.0	1.0	1.7	1.3*	1.4*	1.2	1.2*	1.4*	1.4*	1.2	1.3
Served as a reviewer for a journal	4.1	4.7	3.1	3.1	2.6*	3.6*	2.1	2.0*	2.9*	3.9*	2.6	3.7
Served as an editor of a journal or served on a journal review board	1.8	1.9	1.6	1.4	1.1*	1.4*	1.0	1.2	1.0*	1.6	1.1	1.5
Led or co-led a clinical trial	1.3	1.8	1.0	1.4	1.2	1.4	1.0	1.1	1.0*	1.2*	1.1	1.0
Received a competitive grant, contract, or subcontract for your work	1.5	3.7	1.5	2.0	1.2*	2.3*	1.9	2.0	2.2*	3.0*	1.2	2.3
Filed or received a patent	1.1	1.1	1.0	1.1	1.0	1.1	1.0	1.1	1.1	1.6*	2.5*	1.8*
Developed a prototype, technology, or marketable product	1.1	1.2	1.0	1.3	1.2	1.1	1.3	1.1	1.0	1.3*	1.4	1.4

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=Not at all, 2=A small extent, 3=A moderate extent, 4=A large extent, 5=A very large extent), excluding respondents who selected NA.

Table 3-20 Career activities, by cohort

Activity	Alumni				Applicants				Awardees			
	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
Publication activity												
Authored or co-authored a paper in a published peer-reviewed journal	3.8	4.0	4.6	4.0	2.9*	2.7*	3.3*	4.0	4.0	4.4	4.1*	3.3*
Authored or co-authored a chapter in a published book	2.1	2.0	1.9	1.9	1.5*	1.4*	1.7	1.5	2.5	2.1	1.8	1.5
Authored or co-authored a published book	1.2	1.1	1.2	1.2	1.1	1.2	1.1	1.0	1.3	1.1	1.1	1.0
Authored or co-authored a technical report or white paper	2.0	1.9	1.9	1.5	1.8	1.7	1.4*	1.2	2.4	1.3*	1.3*	1.2
Presentation activity												
Presented at a professional conference or scientific meeting	3.8	4.2	4.3	4.0	3.1*	2.8*	3.3*	3.7	3.8	3.4*	3.6*	3.1*
Chaired a session or workshop at a professional conference or scientific meeting	2.5	2.8	2.4	2.2	1.9	1.9*	1.7*	1.4*	2.5	2.2*	1.9*	1.2*
Organized a session or workshop at a professional conference or scientific meeting	2.2	2.6	2.2	2.0	1.8	1.6*	1.6*	1.3*	2.1	2.0*	1.5*	1.2*
Organized a professional conference or scientific meeting	2.0	2.4	1.7	1.7	1.5	1.4*	1.6	1.1*	1.8	1.7*	1.1*	1.2*
Community service activity												
Advised or presented information to a patient advocacy or support group	1.8	2.2	2.0	1.7	1.9	1.7	2.2	1.4	1.5	1.9	1.9	1.2*
Translated cancer research information for a lay audience	2.2	2.3	3.0	2.5	1.8	1.3*	2.2*	2.0	2.1	2.6	2.6	1.8*
Served on a local health advisory board, panel, or committee	1.4	1.8	2.0	1.2	1.8	1.4	1.7	1.3	1.9	1.3*	1.3*	1.2
Served on a national health advisory board, panel, or committee	1.7	2.1	1.7	1.5	1.5	1.1*	1.1*	1.2	1.7	1.2*	1.4	1.1*
Other professional activity												
Established or appointed to a working group on cancer research	2.2	1.7	1.9	2.0	1.3*	1.0*	1.4*	1.6	1.2*	1.5	1.3*	1.2*
Served as a reviewer for a journal	3.8	4.0	4.3	4.2	2.5*	2.2*	3.2*	3.6	4.2	3.8	4.0	2.7*
Served as an editor of a journal or served on a journal review board	1.9	1.5	2.0	1.5	1.4*	1.2	1.2*	1.2	1.9	1.8	1.2*	1.1*
Led or co-led a clinical trial	1.4	1.6	1.4	1.5	1.3	1.0*	1.3	1.3	1.0*	1.1*	1.2	1.1
Received a competitive grant, contract, or subcontract for your work	2.2	2.1	2.7	1.6	1.7	1.9	1.8*	1.8	2.6	2.8	3.0	2.0
Filed or received a patent	1.0	1.0	1.2	1.0	1.0	1.0	1.1	1.1	2.4	2.0	1.5	1.3
Developed a prototype, technology, or marketable product	1.1	1.2	1.2	1.1	1.1	1.0	1.2	1.2	1.7	1.4	1.4	1.2

* Different from CPFP alumni with alpha=.05. C1 refers to the cohort 1996 or earlier, C2 to 1997–2001, C3 to 2002–06, and C4 to 2007–11.

NOTE: Average score on 5-point scale (1=None, 2=Once, 3=Two or three times, 4=Four or five times, 5=Six or more times).

Alumni exhibited few variations in the frequency of their recent professional activities. Considering their publication, presentation, community service, and other professional activities (i.e., excluding survey items that asked about respondents' entire careers), more recent alumni reported higher rates of authoring or co-authoring a paper in a published peer-review journal, higher rates of translating cancer research information for a lay audience, and higher rates of serving as a reviewer for a journal. Additionally, recent alumni reported lower rates of organizing a professional conference or scientific meeting.

Professional Associations and Awards

CPFP alumni are active members of professional associations. Most (82.6 percent) reported being a current member in at least one professional association, with nearly two-thirds (63.5 percent) holding membership in two or more groups, and 15.4 percent in four or more (Table 3-21). About one-third (34.5 percent) held a volunteer leadership position during the past five years, and one-fifth (18.6 percent) held an elected leadership position during the same time period. Alumni were similar to both applicants and awardees in their professional association membership and leadership roles.

Table 3-21. Professional association membership and leadership

Membership/leadership	CPFP alumni	CPFP applicants	F32 awardees
Current professional association membership			
None	17.4%	17.9%	15.7%
One	19.1	17.2	28.9
Two	30.2	28.3	28.1
Three	17.8	16.5	16.6
Four or more	15.4	20.1	10.8
Professional association leadership			
Volunteer leadership position	34.5	29.7	24.7
Elected leadership position	18.6	13.3	15.6

NOTE: Percents may not sum to 100 due to rounding.

Half of alumni (52.1 percent) received a professional award in the past five years. This prevalence was higher than both CPFP applicants (30.3 percent) and F32 awardees (35.6 percent).

Program Benefits

Benefits of CPFP Participation

Alumni were asked several survey items about the extent to which their participation in CPFP provided benefits to their knowledge and skills in research, professional activities, and career activities. F32 awardees were asked a smaller number of items about the career-related benefits of their National Research Service Awards Postdoctoral Fellowship, providing a comparative population for those items.

CPFP alumni reported high levels of satisfaction with their experiences and benefits received from the program. Nearly all alumni (92.5 percent) agreed that considering their career progression, they would repeat their decision to participate in the program. Most (86.8 percent) reported that they have encouraged others to apply for the same program.

Alumni reported that their participation in CPFP was beneficial to building their skills related to content and research, participating in professional activities, and providing career-related benefits. Considering the direct impact of the program on their knowledge, skills, and research, close to half of alumni rated the program as extremely beneficial related to contacts who advised or collaborated with alumni on research (48.7 percent), knowledge or expertise in public health (47.4 percent), and scientific subject matter knowledge or expertise (45.6 percent; Table 3-22). Almost all participants reported that the program was at least somewhat beneficial in nine different skill areas, with one exception; about one-quarter found the program extremely (12.3 percent) or very (11.2 percent) beneficial in providing experience using specialized equipment or technology, while half (55.7 percent) rated the program's contribution as a little or not at all beneficial. As the program does not explicitly seek to train participants in specialized equipment or technology, it is notable that a significant minority gained at least some benefits in this area.

For several knowledge-related benefits, more recent alumni provided higher average ratings than previous cohorts. Average ratings increased by program entry year for alumni experience using specialized equipment and/or technology ($F=30.93$, $p<0.0001$), confidence in performing research ($F=10.01$, $p=0.002$), the overall quality of their research ($F=7.26$, $p=0.0081$), and the progress of their research ($F=9.23$, $p=0.0029$).

Table 3-22. Benefits of CPFP to knowledge, skills, and research

Potential benefit	Not at all or a little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial
Scientific subject matter knowledge/expertise	1.9%	11.7%	40.8%	45.6%
Knowledge/expertise in public health	10.5	10.1	32.0	47.4
Research skills and/or techniques	8.6	19.3	32.6	39.5
Experience using specialized equipment and/or technology	55.7	20.8	11.2	12.3
Confidence in performing research	11.5	20.5	34.0	34.0
The overall quality of your research	9.5	19.3	34.5	36.8
The specific direction of your research	12.3	27.1	21.3	39.3
The progress of your research	10.7	24.3	34.5	30.6
Your ability to conduct independent research	9.9	19.1	33.4	37.7
Contacts who advised or collaborated with you on your research	12.6	17.0	21.7	48.7

NOTE: Percents may not sum to 100 due to rounding.

CPFP alumni rated the program as beneficial for their professional-related knowledge and skills. Most considered their participation to be either very or extremely beneficial toward their presentation skills (71.7 percent) and publication skills (58.4 percent; Table 3-23). Close to half believed the program was very or extremely beneficial to their grant or contract writing skills. Over one-third provided top ratings in the program's contributions to mentoring skills (36.9 percent) and leadership or management skills (37.2 percent). These areas evoked fairly symmetric ratings from alumni, who selected the highest and lowest ratings in comparable proportions; 39.0 percent reported little or no benefits to mentoring, and 33.7 percent reported little or no benefits to management skills.

For almost all professional-related benefits, more recent alumni provided higher ratings than previous cohorts. Responses differed by program entry year when rating presentation skills ($F=29.04$, $p<0.0001$), grant and/or contract writing skills ($F=24.03$, $p<0.0001$), mentoring skills, ($F=25.13$, $p<0.0001$), and leadership and/or management skills ($F=20.19$, $p= p<0.0001$).

Table 3-23. Benefits of CPFP to professional-related knowledge and skills

Potential benefit	Not at all or a little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial
Publication skills	13.5%	28.1%	30.5%	27.9%
Presentation skills	13.4	15.0	34.6	37.1
Grant and/or contract writing skills	27.8	25.6	33.0	13.7
Mentoring skills	39.0	24.1	24.5	12.4
Leadership and/or management skills	33.7	29.1	23.8	13.4

NOTE: Percents may not sum to 100 due to rounding.

Alumni considered their participation in CPFP to be beneficial for their careers. Most believed the program was very or extremely beneficial in helping achieve career goals (73.2 percent) and

securing a post-fellowship position (70.3 percent; Table 3-24). A majority considered the program very or extremely beneficial toward influencing the specific direction (56.4 percent) or progress (51.2 percent) of their current research, and close to half (46.5 percent) reported that the program had been very or extremely beneficial in providing them with contacts that helped them find employment. Of those who reported that these areas were relevant to their experiences with the program, about half rated the program as very or extremely beneficial in securing subsequent positions (53.1 percent) and obtaining funding (48.2 percent).

For some career-related benefits, alumni ratings increased with the year of program entry. Differences were present when alumni reported on the their CPFP experiences providing them with contacts who helped them find employment (F=12.82, p=0.0005), positively influencing their ability to attain funding for their work (F=11.18, p=0.0013), helping them achieve their career goals (F=8.11, p=0.0052), and influencing the specific direction of their current research (F=8.96, p=0.0034).

Table 3-24. Benefits of CPFP to career-related activities

Potential benefit	Not at all or a little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial	Not applicable
Securing your first position after the fellowship	14.0%	7.3%	22.2%	48.1%	8.4%
Securing subsequent positions following your first position after the fellowship	17.1	8.7	9.6	19.6	45.1
Providing you with contacts that have helped you find employment	25.7	11.7	16.5	30.0	16.1
Positively influencing your ability to obtain funding for your work	20.1	11.7	14.7	14.8	38.8
Helping you achieve your career goals	11.9	11.4	31.9	41.3	3.5
Influencing the specific direction of your current research	17.3	16.3	21.4	35.0	10.0
Influencing the progress of your current research	16.9	18.9	20.5	30.7	12.9

NOTE: Percents may not sum to 100 due to rounding.

Comparative Benefits of CPFP Participation and F32 Award

For some potential benefits, F32 awardees were asked comparable questions about their experiences, allowing for direct comparisons between CPFP alumni and F32 awardees' responses. Average ratings of career benefits differed between CPFP alumni, when asked about the impact of their fellowship, and F32 awardees, when asked about their National Research Service Awards Postdoctoral Fellowship. As shown in Table 3-25, of the seven areas posed to both groups of respondents, alumni provided higher ratings than awardees in five areas: securing your first position after the fellowship (4.0, compared to 3.8), providing contacts that helped you find employment (3.4, compared to 2.3), helping you achieve your career goals (4.0, compared to 3.7), influencing the specific

direction of your current research (3.7, compared to 3.4), and influencing the progress of your current research (3.6, compared to 3.2). Both groups provided similar ratings on the extent to which their program was beneficial toward securing subsequent positions, excluding their first post-fellowship position (3.4 for alumni, 3.2 for awardees). When asked about the benefits of their program toward positively influencing their ability to obtain work-related funding, awardees rated their program as more beneficial than alumni (3.5 for awardees, compared to 3.1 for alumni).

Table 3-25. Benefits to career-related activities for CPFP alumni and F32 awardees

Potential benefit	CPFP alumni	F32 awardees
Securing your first position after the fellowship	4.0	3.8*
Securing subsequent positions following your first position after the fellowship	3.4	3.2
Providing you with contacts that have helped you find employment	3.4	2.3*
Positively influencing your ability to obtain funding for your work	3.1	3.5*
Helping you achieve your career goals	4.0	3.7*
Influencing the specific direction of your current research	3.7	3.4*
Influencing the progress of your current research	3.6	3.2*

* Different from CPFP alumni with alpha=.05.

NOTE: Average score on 5-point scale (1=Not at all beneficial, 2=A little beneficial, 3=Somewhat beneficial, 4=Very beneficial, 5=Extremely beneficial), excluding respondents who selected NA.

Reflections and Recommendations

Alumni were asked several open-item questions about their experiences with CPFP. These questions included what they fund to be the most valuable aspect of the program, their recommendations for program improvement, and what they deemed to be the most significant improvement program administrators could make. Their responses to those questions are discussed below, and in many ways, they reflect what a smaller subset of alumni indicated during in-depth interviews conducted in winter 2011–12.

Most Valuable Aspects of the Program

Of the 123 CPFP alumni who responded to the survey, 96 gave specific feedback about the program's most valuable features. Alumni noted a broad range of positive facets of the fellowship, most of which were directly tied to the structured nature of the program and NCI's collaborative environment. The most commonly praised aspects of the fellowship were the training and education it provided for alumni, especially the opportunity to obtain an MPH. This public health training often served to facilitate career transitions, helping bench scientists and clinicians move into the population sciences. Several alumni cited this aspect of the fellowship as crucial to their careers.

It was a great opportunity for me to transition from academia into a public health research setting. Before the fellowship I was uncertain whether this was the path for me; working at NCI with colleagues committed to a public health mission convinced me.

[The CPFP] allowed me to make a mid-career change, provided the MPH (new skills) and a structure within which to explore new possibilities.

The MPH training was invaluable for someone whose career has not been in public health.

Other alumni cited the coursework and professional development training as key benefits of the program. One alumnus specifically mentioned the breadth of training opportunities afforded to fellows, specifically "opportunities for training in leadership, mentoring, presentations and publication." Several others discussed how the program gave them insight into the NIH environment, peer review process, and grants administration. One alumnus cited the program as a key reason for being competitive in the grant process and taking on leadership roles in later endeavors.

[CPFP provided the] knowledge of how to contribute to NCI's strategic scientific agenda that has subsequently enabled me to position myself and my team to respond to NCI FOA. In a parallel vein, having the CPFP on my CV gave me scientific legitimacy and knowledge to play an active program-building role on a campus seeking to grow population science and cancer control.

One of the cornerstones of the CPFP that alumni consistently praised was the mentoring that they received from program mentors, preceptors, other researchers, and their peers. Overall, alumni praised the program's "great mentors with high integrity," the opportunity for "learning from the expertise of so many great public health experts in tobacco control," and "the mentoring I received from all angles-[the] preceptor of course, but also several additional mentors along with my peer CPFs." The program's collaborative and open environment allowed for mentor-mentee relationships across disciplines, and more than one alumnus cited CPFP directors as some of their most significant mentors during their fellowship. Several others emphasized how the program's flexibility and the autonomy afforded to fellows enhanced the mentorship model. For example, allowing fellows to select their own mentors based on their research interests was deemed by some alumni as integral to a successful mentoring relationship.

About a quarter of alumni identified the importance of the connections they made while in the CPFP, and how the program integrated them into a community of researchers that extended beyond the fellowship. These connections provided alumni with long lasting professional networks, research collaborations, and even personal ties with mentors or peers from the fellowship. Several alumni cited their cohort's camaraderie and the lasting friendships that resulted as key benefits of the CPFP, emphasizing the importance of "the connections—being involved with a cohort of postdocs who provided support and with whom I continue to stay in contact." Others emphasized professional

networking opportunities, "including being exposed to a variety of possible career paths (e.g., academic, government, industry, etc.)." Another alumnus mentioned continued collaboration with CPFP mentors: "My unofficial mentors were wonderful. I still collaborate extensively on manuscripts with [one of them]."

The CPFP also provides scientists and clinicians the opportunity to learn in a multidisciplinary environment and examine cancer prevention and control from different perspectives. About one-fifth of alumni highly commended this aspect of the program, emphasizing that this program gave them a glimpse of cancer prevention from different disciplines in which they had not received training. One alumnus commented that the CPFP "provided me with a holistic understanding about cancer prevention." Others cited exposure to other researchers' work and the opportunity to enhance knowledge and skills as prime outcomes of the program.

> *The most valuable aspect of the CPFP is its interdisciplinary structure that allowed me to expand knowledge and skills directly applicable to cancer prevention and control.*

> *The CPFP provided me with broad training in cancer prevention and control through exposure to other fellow's work and the summer curriculum. This allows me to contribute to projects across the cancer prevention and control spectrum and collaborate broadly with many types of researchers.*

Less common benefits cited by alumni include an appreciation for the opportunity to work on large, national projects; the funding they received during their fellowship; and the confidence the program instilled in its fellows.

Overall, alumni referenced many valuable aspects of the CPFP that enhanced their professional development, academic integrity, and research capabilities. One alumnus summed up the benefits of the CPFP program by mentioning many of these facets as intertwining to create an excellent professional and personal experience.

> *To the degree that I'm married to my work, I credit the CPFP for setting us up :) The CPFP's MPH requirement forced me to do a project in a field that was unfamiliar to me… and with which I subsequently fell in love. More importantly, the CPFP's funding model for the research phase meant that labs could take a chance on a scientist who had only recently moved into biostats/bioinformatics, allowing me to continue to develop in my new field rather than have it be a passing fling. The CPFP broadened my horizons and enabled me to pursue a completely different avenue of research. This was completely unexpected; I'd planned to continue in [my original field] when I applied. The eye-opening experience of my MPH project and the freedom to then return to the NCI and choose a lab that supported me continuing in this new direction was unparalleled. I NEVER would have envisioned that I'd be doing the research I'm doing now, and it's all a direct result of the CPFP.*

Program Recommendations

In addition to being asked to identify the most valuable aspects of the CPFP, alumni were also asked to name the single most important improvement they would suggest for the continued success of the fellowship, as well as other improvements they would like to see made. Of the 123 alumni who responded to the survey, 78 provided at least one recommendation. Recommendations included overarching structural changes, leadership- and culture-related improvements, and content-focused suggestions. Given the 25-year span of the CPFP and its development during that time, it is necessary to consider that some of these recommendations may be most relevant to a fellow's particular time in the program, while others may be more broadly applicable across years.

The most common type of recommendations fell under the umbrella of structural changes to the CPFP. Several alumni felt that the length of the fellowship at the time they were fellows was inadequate. This seemed to be especially common among alumni from the earlier years of the program that only had a two-year fellowship, and it was considered by some alumni to be particularly important for fellows spending the first year of the program earning their MPH. Other alumni referenced the uncertainty of funding during their tenure in the program and how that caused stress among their cohort. Another alumnus mentioned the lack of flexibility in how long the fellowship was funded.

Another structural improvement mentioned was for NCI to increase opportunities for fellows to collaborate outside of the NIH. These recommendations included opportunities to work in clinical settings, with organizations in the academic and private sectors, internationally, and within the community.

> *Encourage international research work in cancer prevention and control—this was my interest and there was no funding in it nor opportunities within NIH.*
>
> *[Provide] additional partnerships for fellows with extramural entities such as universities and research institutes.*

Many alumni also desired increased grant opportunities to assist with funding during or after the fellowship. For example, one alumnus suggested that fellows be able to "compete for grant funding from an internal source of funding," while others wanted the chance to submit applications for grants outside of NIH. It was evident from many of these alumni's comments that the ability to apply for competitive funding was closely connected to their ability to pursue positions across different employment sectors and be attractive job candidates.

I received no opportunity/experience in grant writing, or developing external collaborations when I was a fellow. It resulted in few opportunities for appointments outside of the federal government. The academic offers were essentially another type of post-doc or non-tenure research associate appt. Longevity was dependent upon successful completion of grant funding.

The ability to submit an application for a K01 or K07 while being an NIH fellow. Doing so would make fellows much more competitive on the job market for soft money faculty positions.

Greater access to "springboard" grant mechanisms. Only having access to the K22 and K99/R00 limits our ability to compete on the job market with those who have other K, NSF awards.

Other structural improvements that alumni suggested involved employment benefits and policies. Fellows saw themselves as employed researchers rather than students, and they wanted to have the same benefits as their counterparts outside of the NIH. One alumnus cited a need for benefits like the ability to telework or receive maternity or paternity leave, while another recommended a change in the fellow pay structure.

A real reported salary, not an "award" on which we do not contribute to social security! And with that, access to TSP. At all my universities, postdocs had access to the same benefits faculty and staff do, and the NCI should be no different.

The next most common set of recommendations that alumni made involved improvements to the training that fellows receive during the program. Of those alumni who recommended training improvements, most suggested increasing the amount of training fellows received in grant writing, which dovetails with the desire for additional grant opportunities. To a lesser extent, alumni desired additional opportunities for leadership and management training, manuscript submission and publication, teaching, mentoring, and other specific content training. One alumnus suggested that fellows have more flexibility in their training, so they could tailor their work to their own interests.

Stronger emphasis on grant writing and preparation. Fellows should walk out of the program with a fleshed out grant proposal (K award, R03, etc.).

Executive coaching outside of scientific mentors, teaching of management and leadership skills as well as about the politics of science. I felt like politics hit me in the face when I started my faculty position.

Give fellows (junior ones) the chance to teach—very important for securing faculty jobs (research alone isn't enough for a FTE at most universities in the US, Canada, and Europe).

A LOT more training in how to mentor. Typically, helping to guide the students in one's postdoc lab gives one some exposure to mentoring. NIH postdocs differ from academic postdocs, however, in that there typically aren't students/grads around. Now I find myself with grads of my own, and at a complete loss for how to mentor them!

More choice for professional development activities; for example, not everyone is going to need to write grants, but all are required to do the grant writing course. Perhaps have a few required trainings and then options for choices among others so that fellows can customize their training to meet their career needs.

Alumni also recommended greater focus on career preparation, with the hope that the training and experiences offered by the CPFP would help facilitate a career after the fellowship through a number of career paths, not just in government research. Alumni most often recommended increasing the diversity of disciplines represented by CPFP and increasing fellows' exposure to different careers. One alumnus suggested that the program "broaden the vision of career paths that are good options for fellows and not focus on a 'single' path for success."

The program could really benefit from a more expansive view of "multidisciplinary"—a definition that includes other critical components of public health including law, policy, and social work… this was ultimately very limiting in my career search.

Increasing exposure to the range of academic faculty jobs early (e.g., at free standing cancer centers, at medical schools, schools of public health, etc.) to help fellows make a more informed decision about what type of position they would like after the program.

…fellows need a better grasp of breadth of options, nuance and range (e.g., hard money, soft money, not/tenure-track, med school, public health school) to figure out best fit. The NCI has a stake in how and where fellows leave the program… CPFP needs to introduce fellows to options sooner so fellows can both shape time and products while at NCI, as well as reflect on their own priorities and interests.

Almost a quarter of alumni that made a recommendation suggested improving the mentoring aspect and/or the leadership of the CPFP. More alumni called for revamping the mentoring process, and many of those alumni wanted more direction and guidance, especially during the initial stages of the fellows' first research experiences in the program. To a lesser extent, alumni wanted additional screening of potential mentors, more transparency in terms of mentor and fellow expectations, and more overall mentor involvement, both from preceptors and other, unofficial mentors. While some alumni particularly enjoyed having multiple mentors (as mentioned previously), some alumni felt it difficult to find any mentors that matched their interests or struggled when mentors had differing opinions.

I don't think anyone should go into the fellowship if there is the possibility one won't find a mentor in their field.

…Although I appreciate the separation of the preceptor and mentorship of the CPFP, I think that my mentor should have been more involved in my formal mentoring (e.g., annual reviews, presentations, etc.). He never got to provide formal guidance on my career, and I think that was a mistake, because he understood my discipline better than the CPFP leadership did. When I got conflicting advice from him and the CPFP leadership, it was hard to know what to do. In my current position, we use team mentoring, and I think it works very well. I would like to see more of a team mentoring approach in the CPFP with CPFP staff, the preceptor, one other NCI person

who is not the primary mentor but is in a related area, and perhaps a peer or fellow who is one year ahead of the current fellow. The evaluations were always incredibly stressful for all of us, and we often felt misunderstood. I think this could be a more positive experience with a team approach.

The feedback from one alumnus underscored the importance of fellows creating a relationship with a good mentor, and suggested that mentors be better recognized for their extensive efforts.

Overall, I was very happy with the program. I would have liked for my preceptor to have received more recognition for what he did, as he spent many hours with me, and never really received much thanks for it from the CPFP as far as I could tell.

The last major area of improvement that alumni suggested involved the culture of the CPFP, which included cultivating a positive atmosphere, facilitating connections and collaboration, and enhancing the recruitment and selection processes. Most of the alumni who cited this area for improvement wanted enhanced opportunities for fellows to connect with alumni and to have a stronger alumni network. They felt that fellows would be better able to succeed if they had connections to alumni who were well versed in the program and could serve as unofficial mentors, in addition to peers. One alumnus specifically mentioned having an annual reunion to facilitate this, while another suggested taking advantage of technology to enable long-distance peer connections.

… have a reunion annually to foster continued collaborations and grant writing collaborations. Invite alumni from the cancer prevention fellowship program to present their research findings at NCI.

Take advantage of broad network of alumni more: given travel limitations, take advantage of webinars and other remote models etc. to increase current fellows exposure to alumni.

Other alumni cited a need to improve "the culture and rigor of the CPFP" and enhance the atmosphere of respect for peers, mentors, and all associated researchers. One alumnus suggested "more effort in helping to cultivate collegiality and collaborative work ethics in Fellow"; this sentiment was echoed by other alumni who desired additional opportunities for collaboration with their peers in the fellowship.

A few alumni felt that the selection process and overall diversity of the program could be improved, specifically by increasing the number of racial and ethnic minorities in the program and recruiting more medical physicians to bring a different culture to the fellowship. Overall, some alumni felt that if the selection process allowed for a more diverse set of fellows, a stronger program would result.

Improving the fellow selection process. This is inherently a subjective process, but many qualified applicants were turned down in my opinion because they were perceived to be not sufficiently focused on public health and cancer prevention according to ill-defined criteria. The selection committee consisted of a rather narrow sector within NCI. Broadening the membership of the selection committee to include established researchers (perhaps even from different NIH institutes whose interests intersect with NCI), whose definition of cancer prevention may be broader, might improve recruitment and enhance the multi-disciplinary emphasis of the program.

Of all of the improvements that alumni recommended, the ones that alumni most commonly cited as the single most important improvement were in the program's structure, training, and mentoring. Overall, alumni were very positive and constructive in their feedback, and there were many alumni who indicated they did not have suggestions to improve the CPFP. Some of those who indicated no improvements were necessary felt they were not in a position to judge the current program, while others thought the program was excellent as is and that no improvements were needed.

4. Bibliometric Analysis

Bibliometrics are examined in this evaluation to address the scientific productivity of CPFP alumni and the scientific disciplines of that productivity, and to draw comparisons to CPFP applicants' and F32 awardees' scientific productivity and disciplines. As one component of the evaluation, the bibliometric results reported here should be considered in conjunction with all other results collected for a holistic appreciation of the qualities and outcomes of the program. Bibliometric analysis is the quantitative evaluation of scientific activity and impact in the context of published research. Such analysis is typically used to compare or evaluate the productivity of researchers or institutions. Bibliometrics are not without limitations. Specifically, bibliometrics quantitatively illustrate scientific productivity (e.g., publications) and the reception of scientific products by the field (e.g., citations). As such, the quality of such publications and how publications are actually utilized by the field remain in question. Additionally, concerns exist that citations and journal impact factors may be indicators of popularity as much as quality of science. However, the foundational assumption of bibliometrics is that the publication of research results is desirable for the dissemination and advancement of knowledge. As such, quantitative analysis of publication records is meaningful for assessing the performance and impact of a set of publications. To this end, citations, references, and journal subject matter are all valuable bibliometric information to be analyzed (Rosas et al. 2011).

Information used in this report to assess and explore the productivity of CPFP alumni, CPFP applicants, and F32 awardees includes data on research products (e.g., publications) aggregated by Westat and Thomson Reuters using vetted researcher biographical information, sophisticated automated matching processes, and the Thomson Reuters' ScienceWire database.[8] In this process, CPFP alumni, CPFP applicants, and F32 awardees are matched to journal publications and corresponding bibliometric analytics associated with those publications archived in ScienceWire.[9] For more details, please refer to Chapter 2. Comparisons between each group are done descriptively rather than based on statistical tests. This approach is taken due to the interdependent character of bibliometric data, which leads statistical tests to be easily biased. In Exhibit 4-1, we show the various bibliometric measures obtained from these data organized by the level of measurement (publication level and journal level). All measures are calculated using unweighted data.

[8] ScienceWire is a combined database of MEDLINE/PubMed and Web of Science, which is Thomson Reuters' proprietary publications index.

[9] Publications were identified for each individual based on names, institutional address of affiliation, e-mail address, shared co-authors across multiple publications, as well as other information available via publications. Thomson Reuters and Westat performed quality assurance of publication matches with a focus on ruling out false positives for problematic names and other errors.

Exhibit 4-1. Bibliometric measures

Bibliometric measure	Measure level	Measure description
Publication counts	Publication	A sum of all publications for a given group.
Citation counts and averages	Publication	Instances when publications reference the publications of a given group. Citations can be summed and averaged.
Journal impact factors	Journal	Calculated by dividing the number of current year citations to the source items published in that journal by the total number of citable articles published over a designated period of time (e.g., two or five years). For this evaluation, two-year impact factors were utilized.
Journal subject categories (JSC)	Journal	Indicators, generated by Thomson Reuters, of the typical topics covered by material in a given journal; a journal can have more than one JSC.
Citation benchmarks	Publication	Benchmarks for citation statistics are obtained by matching a set of publications to a set of benchmark publications based on similarity of journals and journal subject categories. Citation statistics for these benchmark publications are then used for comparison.
Papers by journal impact factor quartiles	Publication	Publication counts for a given publication set are disaggregated by the quartiles of journal impact factors associated with each publication.
Journals by publication count	Journal	The top 10 journals for a publication set by the number of publications appearing in a journal.
Journals by journal impact factor	Journal	The top 10 journals for a publication set by the highest journal impact factors.
Interdisciplinarity indices	Journal	Diffusion and integration indices characterizing the diversity of citations to and by a set of publications.
H-index	Publication	Indicates the number of papers an individual author has with at least “h” citations each.
Authorship distribution	Publication	A distribution count of author-group sizes.

Publication Productivity, Impact, Authorships, and Dissemination

Publication Count

CPFP alumni have produced a large number of publications. Specifically, as shown in Table 4-1, 6,541 publications were matched as publications with CPFP alumni authors. These publications are distributed across 111 CPFP alumni with an average of almost 59 publications per CPFP alumni. In comparison, 2,566 publications were identified as publications with CPFP applicant authors for an

average of almost 47 publications per CPFP applicant. Similarly, 5,568 publications were identified as publications with F32 awardees authors with an average of about 44 publications per F32 awardee. Additionally, there were more F32 awardees (126) than CPFP alumni (111). Despite this difference, CPFP alumni produced more publications.

Table 4-1. Publication count, by group

Group	Group size	Publication count	Mean publications per person
CPFP alumni	111	6,541	58.93
CPFP applicants.....	55	2,566	46.65
F32 awardees.....	126	5,568	44.19

An outlier among CPFP alumni was identified as having contributed to 2,747 publications. After manually reviewing and confirming the accuracy of the publication matches for this individual, additional analyses were conducted to explore their impact on the bibliometrics. Appendix A details findings from this outlier analysis. Briefly, removing them lowered the number of CPFP alumni publications by 1,020 publications; however, the average number of citations and average journal impact factor associated with the CPFP alumni group both increased. Despite this individual's inordinate productivity, they were left in subsequent analyses reported below in order to avoid the evaluation-biasing results.

Journal Impact Factor

Publication count is one simple indicator of how active each group is in producing scholarly work. However, publication counts do not indicate the quality or readership of the journals in which publications appear. Journal impact factor (JIF) is a measure of the frequency with which the typical article in a journal has been cited in a particular year or period.[10] As such, a high impact factor is considered a measure of journal prestige; a high impact factor also indicates that publications in such a journal reach a large audience. For example, publications in a journal with a JIF of 10 would each be expected to receive 10 citations each year. Appearing in a journal with a high JIF indicates a publication has a high likelihood of receiving many citations and presumably in turn attracts researchers to submit publications to that journal.

Table 4-2 presents statistics on the journal impact factors for journals in which publications of CPFP alumni, F32 awardees, and CPFP applicants appear. Impact factors associated with CPFP alumni publications ranged from 0 to 101.78[11] and the mean impact factor associated with CPFP

[10]Again, journal impact factor is calculated by dividing the number of current year citations to the source items published in that journal by the total number of citable articles published over a designated period of time (e.g., two or five years). For this evaluation, two-year impact factors were utilized, which is standard practice for bibliometric analysis.

[11]The impact factors for the individual issues of a journal in which a publication appears are utilized in these statistics. As such, the maximum impact factor of 101.78 for CPFP alumni is likely an outlier.

alumni publications is 4.83. The mean indicates that on average, publications in the journals in which CPFP published receive almost five citations each year. In comparison, the average impact factors associated with F32 awardees publications and CPFP applicant publications were higher than for CPFP alumni publications, but these two groups had lower maximum impact factors associated with their publications.

Table 4-2. Journal impact factors associated with each group

Group	Minimum	Median	Mean	Maximum
CPFP alumni	0.00	3.70	4.83	101.78
CPFP applicants	0.23	4.45	5.57	53.49
F32 awardees	0.08	4.56	6.52	53.30

Another way to utilize journal impact factors is to look at the distribution of publications based on journal impact factor quartiles. Table 4-3 presents such distributions for each group. For all three groups, the majority of their publications are in the top quartile for journal impact factors. CPFP alumni have the highest number of publications in their top quartile, while CPFP applicants have the highest proportion of publications in their top quartile. These results suggest that each group is producing a large number of publications in journals with relatively high impact factors.

Table 4-3. Publication count, by group and journal impact factor quartile

	Top quartile		Second quartile		Third quartile		Bottom quartile	
Group	Count	Percent	Count	Percent	Count	Percent	Count	Percent
CPFP alumni	4,743	75.6	838	13.3	454	7.3	238	3.8
CPFP applicants	2,100	84.0	239	9.4	138	5.5	29	1.1
F32 awardees	4,339	81.0	750	14.0	188	3.5	77	1.5

Citations

Journal impact factors indicate the quality of a journal and the general size of its audience. However, impact factors do not directly measure the extent to which published research is being utilized. Citation statistics account for other researchers' use of publications. As such, citation statistics are an important indicator of the extent to which research is being used by the field.

Table 4-4 presents the citation statistics for each group with calculations being based only on publications with at least one citation. Of CPFP alumni publications, 57 percent or 3,730 publications had at least one citation. CPFP applicants produced 1,558 publications, or 61 percent of all the groups' publications, had at least one citation. And of F32 awardee publications, 65 percent or 3,623 publications had at least one citation. CPFP alumni publications were cited a total of 102,044 times. The average number of citations per CPFP alumni publication was 27 citations and the maximum number of citations of a CPFP alumni publication was 2,208 citations. In comparison, CPFP applicants were cited a total of 59,524 times. The average number of citations per CPFP applicant

publication was 25 citations and the maximum number of citations of a CPFP applicant publication was 1,661 citations. F32 awardees were cited 155,821 times (the most of all three groups). The average number of citations per F32 awardees publication was 43 citations and the maximum number of citations of a F32 publication was 4,613 citations.

Table 4-4. Citation count, by group

Group	Total publi-cations	Publication receiving citations	Citation count	Minimum	Median	Mean	Maximum
CPFP alumni.....	6,541	3,730	102,044	1	11	27	2,208
CPFP applicants	2,566	1,558	59,524	1	14	25	1,661
F32 awardees.....	5,568	3,623	155,821	1	14	43	4,613

Another way of looking at citation statistics is by normalizing them by the scientific fields, as defined by journal subject categories, in which each group publishes. Specifically, the journal subject categories assigned to journals by Thomson Reuters are used to normalize citation statistics. This normalization is done by recalculating citations based only on those coming from journals of the same subject categories. Table 4-5 presents the field normalized average number of citations for each group. After normalizing based on field, the average number of citations to F32 awardees publications and CPFP alumni publications were reduced substantially. These results suggest both CPFP alumni publications and F32 awardees publications are receiving a large amount of citations from publications outside of the fields in which they themselves publish.

Table 4-5. Field normalized citation count, by group

Group	Mean
CPFP alumni.....	13
CPFP applicants.....	26
F32 awardees.....	20

We can also compare citation counts for each group to citation counts for benchmark publications. Table 4-6 presents the number of publications that received citation counts greater than, equal to, and less than their benchmark publications for each group. Journal subject categories, as determined by Thomson Reuters, are used to match each groups' publications to publications within the same journals and fields. Citation statistics are then gathered for these benchmark publications for comparison to each corresponding group.

Again, CPFP alumni have the most publications with citation counts greater than their benchmark counterpart publications (2,864). However, F32 awardees have the highest proportion of their publications with citation counts greater than their benchmark publications (56.6 percent). CPFP

applicants have the lowest proportion of their publications with citation counts greater than their benchmark publications (50.7 percent).

Table 4-6. Comparison of observed citations to benchmark citations, by group

Group	Observed citations to benchmark citations	Publication count	Percent
CPFP alumni	Greater than benchmarks	2,864	52.5
	Equal to benchmarks	785	14.4
	Less than benchmarks	1,804	33.1
CPFP applicants	Greater than benchmarks	1,145	50.7
	Equal to benchmarks	367	16.2
	Less than benchmarks	747	33.1
F32 awardees	Greater than benchmarks	2,695	56.6
	Equal to benchmarks	510	10.7
	Less than benchmarks	1,552	32.7

NOTE: Publications counts do not match those previously listed because these calculations include publications with 0 citations and not all publications have benchmarks for comparison.

Lastly regarding citations, we can look at the number of highly cited publications for each group. A publication is considered highly cited if it belongs to the top 10 percent of times cited for publications within a given group. CPFP alumni produced 296 highly cited papers, that is, 296 papers were in the top 10 percent of citations for all CPFP alumni publications. F32 awardees produced 467 highly cited papers, and CPFP applicants produced 172 highly cited papers.

Table 4-7. Highly cited publications, by group

Group	Highly cited publication count	Percent of publications with citations
CPFP alumni	296	7.9
CPFP applicants	172	11.0
F32 awardees	467	12.9

Across all of these various citation statistics, these results suggest CPFP alumni produced the largest number of publications receiving any citations (3,730 publications with at least one citation), F32 awardees produced more highly cited publications (467 highly cited publications), and on average CPFP applicants produced publications that averaged the most citations coming from within their own field (26 field normalized citations).

Authors and Authorships

In addition to publications, bibliometric measures can also be examined to assess authors and authorships for each group. One such measure is the H-index. The H-index indicates the number of

papers an individual author has with at least "h" citations each. For example, if a CPFP alumnus had an H-index of 10, he/she is an author of 10 publications with at least 10 citations each. As such, the H-index balances publication productivity and the utilization of publications as demonstrated by citations.

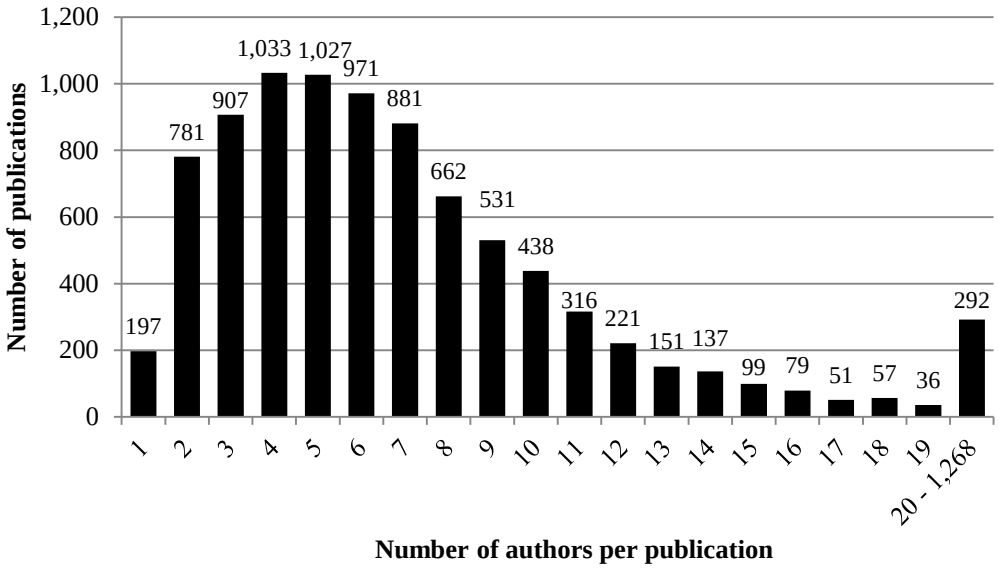
Table 4-8 presents H-index statistics for each group. There are 109 CPFP alumni with H-index values. The average H-index for CPFP alumni is 12, meaning on average CPFP alumni each have 12 publications with at least 12 citations apiece. The maximum H-index among CPFP alumni is 53, meaning that at least one CPFP alumni has 53 publications with at least 53 citations each. In comparison, there were 52 CPFP applicants with H-index values and they averaged an H-index of 10 with a maximum of 51. There were also 122 F32 awardees with H-index values; they averaged an H-index of 12, and the maximum H-index among them is 79. These results suggest that the CPFP alumni and F32 awardees author groups are fairly comparable regarding publication productivity and utility, and both groups have higher average H-index values compared to CPFP applicants.

Table 4-8. H-index, by group

Group	Author count	Minimum	Mean	Maximum
CPFP alumni	109	1	12	53
CPFP applicants	52	1	10	51
F32 awardees	122	1	12	79

We can also look at authorship and co-authorship patterns. Figure 4-1 displays the distribution of author group sizes for all publications across all three groups. These statistics cannot be disaggregated by group because of the potential for CPFP alumni, F32 awardees, and CPFP applicants to co-author together. However, we can see that across all publications, there is a clear tendency to co-author; i.e., 54 percent of all publications have between three and seven authors each. We can disaggregate authorships. There were a total of 69,785 authorships across all publications. Of those, 6 percent (4,151 authorships) were CPFP alumni, 5 percent (3,676 authorships) were F32 awardees, and 2 percent (1,597 authorships) were CPFP applicants. These results suggest a tendency to co-author; a possibility of CPFP alumni, F32 awardees, and CPFP applicants to co-author together; and a tendency to co-author with individuals not identified as either CPFP alumni, F32 awardees, or CPFP applicants.

Figure 4-1. Distribution of the size of author groups for publications across all groups



Journals

In this section, we describe the journals in which CPFP alumni, CPFP applicants, and F32 awardees publish.[12] These data indicate that each group publishes in a range of medical, health, and science journals of varying esteem indicated by journal impact factor. Table 4-9 presents the top 10 journals in which each group published most often with corresponding journal impact factors.

Table 4-9. Top 10 journals, by group and publication count

Group and journal title	Publication count	JIF
CPFP alumni		
Cancer Epidemiology, Biomarkers & Prevention	406	4.158
American Journal of Epidemiology	280	4.786
Faseb Journal	229	10.021
Transfusion	120	3.240
Gastroenterology	113	11.945
Cancer Causes & Control	112	2.932
Journal of the National Cancer Institute	107	13.898
International Journal of Cancer	104	4.701
American Journal of Clinical Nutrition	101	5.688
Journal of the American Dietetic Association	96	2.075

[12]Impact factors listed in this report may vary within the same journal over time. As such, for example, the JIF of the *New England Journal of Medicine* may vary between each group's lists.

Table 4-9. Top 10 journals, by group and publication count—Continued

Group and journal title	Publication count	JIF
CPFP applicants		
Diabetes	190	8.101
Cancer Epidemiology, Biomarkers & Prevention	88	4.213
Diabetes Care	82	6.557
Breast Cancer Research and Treatment	81	3.962
Blood	73	9.859
Journal of Clinical Oncology	68	13.183
American Journal of Epidemiology	60	4.592
Gastroenterology	55	11.559
Circulation	51	12.278
Cancer Research	45	7.737
F32 awardees		
Abstracts of Papers of the American Chemical Society	183	24.428
Cancer Research	133	7.865
Proceedings of the National Academy of Sciences of the United States of America	114	9.965
Faseb Journal	108	8.370
Journal of Biological Chemistry	107	5.901
Journal of the American Chemical Society	85	7.621
Blood	81	9.846
Neuro-Oncology	72	5.246
Journal of Immunology	70	6.305
Gastroenterology	67	12.253

The journals in which CPFP alumni published most often were *Cancer Epidemiology, Biomarkers & Prevention* (406 publications), *American Journal of Epidemiology* (280 publications), and *Faseb Journal* (229 publications). Of their top 10 journals, the one with the highest journal impact factor is *Journal of the National Cancer Institute* with an impact factor of 13.898. This impact factor suggests that the 107 publications appearing in that journal will on average receive about 14 citations each within two years of publication. In comparison, CPFP applicants published most often in *Diabetes* (190 publications), *Cancer Epidemiology, Biomarkers & Prevention* (88 publications), and *Diabetes Care* (82 publications). Of their top 10 journals, the journal with the highest impact factor is *Journal of Clinical Oncology*. F32 awardees publications were more spread out across journal; however, the journal impact factors for their top 10 are slightly higher. For example, the journal F32 awardees published most often, *Abstracts of Papers of the American Chemical Society* (183 publications), has an impact factor of 24.428.

Table 4-10 presents the top 10 journals with the highest journal impact factors for each group. Across all groups, publications appear in highly prestigious journals. The highest impact factor is among CPFP alumni, with one of their publications appearing in the journal *Clinical Research,* which

has an impact factor of 57.778.[13] CPFP alumni also produced 31 publications in the *New England Journal of Medicine,* which has an impact factor of 44.581.

Table 4-10. Top 10 journals, by group and journal impact factor (JIF)

Group and journal title	JIF	Publication count
CPFP alumni		
Clinical Research	57.778	1
CA-A Cancer Journal for Clinicians	54.570	5
New England Journal of Medicine	44.581	31
Nature Genetics	35.813	14
Nature Reviews Cancer	35.255	2
Abstracts of Papers of the American Chemical Society	31.000	14
Science	30.807	5
Lancet	30.145	12
Cell	29.194	1
Physiological Reviews	27.677	1
CPFP applicants		
Nature Genetics	36.377	1
New England Journal of Medicine	33.285	4
Cell	32.403	1
Science	29.015	3
Lancet Oncology	22.589	2
Lancet	22.577	8
Endocrine Reviews	22.469	1
JAMA-Journal of the American Medical Association	21.928	24
Annals of Internal Medicine	16.116	4
British Medical Journal	14.093	1
F32 awardees		
Annual Review of Immunology	52.761	1
Chemical Reviews	40.197	1
Nature Reviews Cancer	37.545	1
New England Journal of Medicine	35.928	32
Nature Reviews Molecular Cell Biology	35.522	2
Nature Genetics	34.794	24
Nature Reviews Cancer	34.518	5
Nature	33.429	27
CA-A Cancer Journal for Clinicians	32.886	1
Nature Reviews Immunology	32.695	1

NOTE: *Nature Reviews Cancer* appears in the top 10 journals for the F32 awardee group twice. This circumstance occurs when a journal's impact factor changes between the periods in which JIFs are calculated. In such situations, the journal is treated as separate cases.

[13]This impact factor does not match the maximum impact factor listed previously in Table 4-2. This difference is due to the level of analysis—for Table 4-2, impact factor statistics are calculated based on the particular issue of a journal in which a publication appears and, as such, the maximum impact factor reflects the issue of a journal in which a publication appears. For Table 4-10, impact factor calculations are based on all journal issues in a year, thus mitigating the outlier maximum impact factor of 101.78 from Table 4-2.

Summary

CPFP alumni have produced a large volume of publications in a range of prestigious journals. Citations to these publications are high.

- A total of 6,541 publications were produced by 111 CPFP alumni.
- The average journal impact factor among these CPFP alumni publications is 4.83.
- There have been 102,044 citations to 3,730 CPFP alumni publications.
- On average, CPFP alumni publications received about 27 citations.
- On average, CPFP alumni publications are cited more often than their benchmark publications.
- CPFP alumni have an average H-index of 12 and tend to co-author on publications.
- CPFP alumni publish in highly esteemed journals for medicine, health studies, and science.

Journal Subject Categories and Interdisciplinarity

Journal Subject Categories

Journal subject categories (JSCs) are taken from ScienceWire and are indicators of the typical topics covered by material in a given journal; a journal can have more than one JSC. Table 4-11 displays the 10 JSCs most often associated with the publications of each group. Among CPFP alumni publications, journals have a clear concentration in oncology and public, environmental and occupational health. These are also the top JSCs associated with F32 awardees and CPFP applicant publications, but there is not as much publication count concentration. Unique among CPFP alumni relative to F32 awardees are the JSCs regarding nutrition and dietetics; general and internal medicine; gastroenterology and hepatology; and hematology. Nutrition and dietetics is also a unique JSC among CPFP alumni relative to CPFP applicants.

Table 4-11. Top 10 journal subject categories, by group and publication count

Group and journal subject category	Publication count
CPFP alumni	
Oncology	1,930
Public, Environmental & Occupational Health	1,457
Nutrition & Dietetics	522
Biochemistry & Molecular Biology	440
Medicine, General & Internal	348
Cell Biology	312
Gastroenterology & Hepatology	277
Biology	243
Hematology	202
Genetics & Heredity	173
CPFP applicants	
Oncology	701
Public, Environmental & Occupational Health	399
Endocrinology & Metabolism	388
Medicine, General & Internal	178
Hematology	144
Gastroenterology & Hepatology	126
Biochemistry & Molecular Biology	97
Genetics & Heredity	90
Clinical Neurology	86
Cell Biology	76
F32 awardees	
Oncology	1,040
Biochemistry & Molecular Biology	848
Cell Biology	673
Chemistry, Multidisciplinary	411
Clinical Neurology	411
Genetics & Heredity	285
Surgery	259
Neurosciences	258
Multidisciplinary Sciences	240
Immunology	236

Interdisciplinarity

There are a set of bibliometric measures to assess the interdisciplinarity of publication sets based on the JSCs associated with them: the integration index (Porter et al. 2007) and the diffusion index (Carley and Porter 2012). Both of these indices have been validated for use with the JSCs of ScienceWire. The integration index allows us to quantify the extent to which each group's publications incorporate and build on a diverse range of existing research. The diffusion index allows us to quantify the extent to which each group's publications are incorporated in and built upon by a diverse range of research. In applying the integration index, the JSCs associated with publications referenced by each group's publications are used to calculate an integration diversity value. In applying the diffusion index, the JSCs associated with publications that cite each group's publications are used to calculate a

diffusion diversity value. Both indices range from 0 to 1, with 0 indicating no diversity and 1 indicating maximum diversity.

In Table 4-12, we present statistics for the integration index values among each group's publications. Among CPFP alumni, the average integration index value was .627. This result suggests that CPFP alumni publications incorporated research from a moderate number of disciplines. Again, F32 awardees publications (.600) and CPFP applicant publications (.601) averaged lower values.

Table 4-12. Publication diversity, by group and integration index

Group	Minimum	Median	Mean	Maximum
CPFP alumni	0	.653	.627	.879
CPFP applicants	0	.626	.601	.838
F32 awardees	0	.612	.600	.874

In Table 4-13, we present statistics for the diffusion index values among each group's publications. Among CPFP alumni, the average diffusion index value was .592. This result suggests that CPFP alumni publications reach audiences of relatively moderate diversity in terms of subject matter. F32 awardees publications (.586) and CPFP applicant publications (.574) averaged slightly lower diffusion index values.

Table 4-13. Publication diversity, by group and diffusion index

Group	Minimum	Median	Mean	Maximum
CPFP alumni	0	.658	.592	.873
CPFP applicants	0	.639	.574	.858
F32 awardees	0	.634	.586	.848

Taken together these results are not particularly surprising given each group's focus in various areas of medical research, cancer prevention, and science.

Summary

CPFP alumni publications incorporate a moderate variety of disciplines and are disseminated across a moderate variety of disciplines. There is a clear focus on oncology and public health and unique focus on nutrition and dietetics.

- The top three journal subject categories associated with CPFP alumni publications are oncology; public, environmental and occupational health; and nutrition and dietetics.
- Indices utilizing JSCs to assess the integration and diffusion of research suggest that on average, CPFP alumni research is integrating a moderate number of disciplines and utilized in a moderate number of disciplines.

5. Summary and Conclusions

This evaluation and its research questions have been designed to closely align to the goals of the CPFP: supporting early-stage scientists from a diversity of disciplines to conduct cancer prevention research with guidance from NCI mentors; providing structured education and training on scientific research and leadership, especially as they pertain to transdisciplinary and team science; and facilitating fellows' transition to career independence as researchers and leaders. While the findings are particularly salient to CPFP, they are also relevant to the broader postgraduate training community as they pertain to the career preparation of postdoctoral students in the biomedical sciences and the influence of this training on subsequent career paths of participants.

This chapter is organized by research question, summarizing findings from the survey and bibliometric analyses, and ends with concluding remarks about the effectiveness of the CPFP in meeting its goals and implications for postdoctoral training programs.

Summary of Findings by Research Question

What are the scientific disciplines of CPFP alumni?

More than eight in 10 CPFP alumni reported current employment in a public health field or the behavioral or social sciences. Across cohorts, increasing percentages of alumni were working in a public health field until the most recent cohort, while the trend for alumni working in the behavioral or social sciences shows increases across all four cohorts. Although to a much lesser extent, alumni also commonly identified their discipline as the biological or biomedical sciences, followed by nutrition sciences and medicine.

Almost nine in 10 alumni reported that they are still working in cancer prevention and control, with half of alumni spending *most* of their time on cancer prevention and control, more than both applicants and awardees. Similar results were found for the amount of time alumni spent on research and research support activities in cancer prevention and control. Of those alumni who are no longer working in the field of cancer prevention and control, just over half cited having had a better opportunity in another field that led to their shift in career focus.

What is the scientific productivity of CPFP alumni?

Overall, the bibliometric data demonstrated a solid record of publications by CPFP alumni and therefore a strong record of scientific productivity. Alumni have produced a sizable number of

publications that have been cited by a large number of researchers. These publications appear in a varied and prestigious set of journals and have a clear focus on the scientific discipline of cancer prevention and control. CPFP alumni publications appear to be cited more often and appear in more prestigious journals compared to publications of CPFP applicants. Further, CPFP alumni publications are comparable with F32 awardee publications in terms of overall productivity, citation counts, and journal impact factors. Both groups also appear to receive a substantial number of citations from publications outside of their own scientific field. Across all groups, there is a clear tendency to co-author with other researchers. Exploring these authorship patterns further may be of interest to assess who is co-authoring with whom and in what areas of cancer prevention are they co-authoring about most often.

While a valuable measure of an individual's professional productivity, bibliometric data focus on publications and many of the individuals in this study are currently employed in fields where other measures of their productivity are as pertinent, if not more so. The survey examined several different areas of career accomplishments of alumni, applicants, and awardees. The survey data showed that alumni generally had higher or similar rates of recent professional, publication, and community service activities compared to applicants and awardees. Specifically, CPFP alumni reported higher frequencies of publication and presentation activities than both applicants and F32 awardees for the most recent five-year period, including authoring or co-authoring technical reports, presenting or chairing conference sessions, and organizing conference sessions or meetings.

Similarly, CPFP alumni reported more frequent recent participation in community service activities for the most recent five years, including translating cancer research for a lay audience more frequently than applicants, presenting information to patient advocacy groups and serving on local health advisory boards more frequently than F32 awardees, and serving on national health advisory boards more frequently than both applicants and awardees. CPFP alumni also participated more often in working groups related to cancer research, served as a journal reviewer or editor, and led or co-led a clinical trial more often than both applicants and awardees. However, alumni reported lower rates than F32 awardees in filing for or receiving a patent; developing a prototype, technology, or marketable product; and receiving a competitive grant, contract, or subcontract for their work.

Over the entirety of their careers, alumni reported higher rates than applicants of key scientific activities such as developing funding initiatives to address knowledge gaps in research, making significant contributions to advancing innovative ideas in cancer research, and addressing key knowledge gaps in cancer research. Unsurprisingly, alumni generally reported similar rates of these activities when compared to awardees.

What are the career choices or pathways (e.g., academic, government, or private sector) of CPFP alumni?

At the time of the survey, CPFP alumni were less concentrated in any one career sector than either applicants or F32 awardees. About a third of alumni were primarily employed by NCI, with an additional third at universities or other academic institutions, and the remaining third employed at other government agencies, in research centers, or in industry. Half of applicants and almost two-thirds of awardees, on the other hand, were primarily employed at academic institutions. Alumni were more likely to be employed by NCI than both applicants and awardees, and more likely to be employed at another NIH Institute or Center than awardees, as expected given their connection to NCI and NIH through the fellowship.

What is the career advancement (e.g., leadership positions, promotion to tenured positions) of CPFP alumni?

Although fewer alumni were employed at universities, those who were reported higher rates of tenure and were more likely to be on the tenure track than applicants and F32 awardees. Slightly more than one in 10 alumni were not on the tenure track, compared to half of applicants and just over-one third of awardees. Alumni were also more likely than both applicants and awardees to have reported positively on several indicators on career advancement, including serving as a project and holding some other type of leadership role. Three-quarters of alumni reported that they had advanced to more senior positions in their careers; although alumni were less likely than awardees to have reported such career advancements, they were more likely than applicants to have assumed leadership or management responsibilities and to have served as a mentor.

What is the peer recognition (e.g., service on editorial boards, leadership positions within professional organizations, or receipt of professional awards) for CPFP alumni?

CPFP alumni are active members of professional associations, with most alumni currently belonging to at least one professional association and almost two-thirds belonging to two or more associations. During the most recent five years, about one-third of alumni held a volunteer leadership position in a professional association and almost one-fifth were elected to a leadership position in an association. These participation rates in associations and leadership roles were similar to those of both applicants and awardees. In addition, half of alumni reported that they had received a professional award during the most recent five years, compared to about one-third of applicants and awardees.

To what extent do CPFP alumni collaborate with persons from other disciplines in their work?

Alumni in both the in-depth interviews and survey responses often referred to the multidisciplinary focus as one of the more valuable aspects of the program. In the survey, alumni reported participating in multidisciplinary activities at a higher rate than both applicants and F32 awardees. These activities include incorporating research from multiple disciplines in their work, collaborating and publishing with professionals from multiple disciplines, and managing multidisciplinary teams. The bibliometric analyses provided some additional support for the survey results through an examination of the interdisciplinarity of publications. Specifically, the bibliometric analyses examined the extent to which each group's publications incorporated a diverse range of research and the extent to which their own publications, in turn, were incorporated by a diverse range of research. While alumni publications were shown to have a clear focus on oncology, public health, and nutrition and dietetics, their publications incorporated a moderate variety of disciplines and were disseminated across a moderate variety of disciplines at slightly higher rates than the publications of applicants and awardees.

To what extent do CPFP alumni feel that participating in the CPFP had an impact on their career trajectory, including positions held, research focus, and current employment?

Alumni gave high satisfaction rates for the program; more than nine in 10 alumni would repeat their decision to participate in the program. Alumni rated CPFP highly on scientific knowledge, skills, and research; professional knowledge and skills; and career preparation activities. Moreover, where comparisons with awardees were possible (i.e., career-related activities), alumni provided more favorable responses. Also worthy of noting, program entry year was a significant factor for most program benefits, with more recent entrants providing higher ratings.

Just over three-quarters of alumni provided more detailed information about the program's strengths and the ways in which they had benefited. Alumni most commonly praised the training and education they received, especially the opportunity to obtain an MPH. These findings match those of the in-depth interviews, particularly the profound effect of the MPH on alumni's careers. Alumni cited the continuing importance of this training in their career, and some noted that the public health training they received helped facilitated a major transition in their career (e.g., from bench to population science).

For many alumni, the mentoring they received during the fellowship helped shaped their careers, and many alumni noted that they have an ongoing relationship with their CPFP mentors. In addition to the support alumni received through their mentors, alumni were exposed to a multidisciplinary environment in which to learn about and explore cancer prevention and control from different perspectives. For many alumni, this exposure broadened their view and understanding of the field.

Several alumni emphasized the autonomy with which they were allowed to chart their own course and conduct research of aligned to their interests.

In addition to the mentoring relationship, about a quarter of alumni identified the importance of other connections they made while in the CPFP and how the program integrated them into a community of researchers that extended beyond the fellowship. These connections provided alumni with long-lasting professional networks and research collaborations.

Based on their experiences and beliefs about current and future directions for cancer prevention, what recommendations do CPFP alumni have for maintaining or improving the training aspects (process) of the CPFP?

Almost two-thirds of alumni who responded to the survey provided recommendations for the program, many of which aligned with those provided previously by a smaller sample of alumni during the in-depth interviews. In addition, many of the recommendations reflect a common desire on the part of fellows to be well-rounded and attractive job candidates as they continue their career after the fellowship.

Among survey respondents, alumni most frequently made recommendations related to specific structural features of the program. These recommendations include funding fellows for a period of time sufficient for them to obtain an MPH (if applicable), conduct their research, and publish their findings. Alumni recommended that CPFP increase opportunities for fellows to collaborate with researchers and practitioners outside of the NIH, for example, in clinical settings. Alumni also recommended increased flexibility and opportunities to apply for grant funding while still a fellow. Alumni responding to the survey also made several suggestions regarding the training they received during the fellowship, namely that CPFP increase the amount of training and experience fellows receive in grant writing and, to a lesser extent, leadership and management, manuscript submission and publication, teaching, and mentoring. One alumnus suggested that fellows be allowed to tailor their training to their own interests.

Several alumni recommended that the program place greater focus on career preparation to better facilitate transition to their post-fellowship career. Specifically, alumni most often recommended increasing the diversity of disciplines represented by CPFP and increasing fellows' exposure to different careers. As the survey data indicate, alumni are currently employed in a variety of career sectors, and many have asked that their postdoc experience prepare them to continue their career along a variety of career paths.

Almost a quarter of alumni made recommendations related to the mentoring and leadership of the program. While many alumni praised the autonomy that they received as part of the fellowship,

alumni responding to the survey frequently requested more guidance from their mentors, especially during the initial stages of the fellowship. These recommendations echo comments made by alumni during the in-depth interviews. To a lesser extent, alumni also recommended additional screening of potential mentors to ensure they would be an appropriate fit for the role, clearer expectations regarding the mentoring relationship, and more overall involvement on the part of mentors.

Finally, alumni made several recommendations related to the general culture and atmosphere of CPFP, including facilitating connections and collaboration among fellows and alumni, and enhancing the recruitment and selection processes. Most of the alumni who made a recommendation on this topic wanted to increase opportunities for fellows to connect with alumni and establish a stronger alumni network. Other alumni cited a need to improve "the culture and rigor of the CPFP" and ensure an atmosphere of respect for all of those involved in the program including peers, mentors, and other researchers. A few alumni felt that the selection process and overall diversity of the program could be improved with greater emphasis on recruiting racial and ethnic minorities in the program, as well as individuals from a broader array of professional experiences (e.g., physicians).

Concluding Remarks

Each year, the National Science Foundation (NSF) and NIH sponsor the Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS), which collects data on the number and characteristics of graduate students, postdoctoral appointees, and doctorate-holding nonfaculty researchers in the fields of science, engineering, or selected health fields[14]. These data are collected from all academic institutions in the United States granting research-based master's degrees or doctorates and are used to gauge trends in graduate enrollment, postdoc appointments, and financial support.

According to the 2010 GSS, there were approximately 63,000 postdocs at these academic institutions in the United States in 2010, which represents a 10 percent increase in postdocs from 2009 and a 25 percent increase from 2007 (Einaudi, Heuer, & Green, 2013). As Einaudi et al. note, the number of postdocs is at a peak and reflects an ongoing expansion of postdoc employment, with postdoc positions becoming an important, often expected, career step in a number of disciplines. Moreover, because these numbers exclude individuals in nonacademic postdoc positions such as fellows in CPFP, the number of postdocs is even greater. Despite the increased number of postdocs, however, there are few published evaluations of such programs. As such, this evaluation not only provides NCI with valuable information about the CPFP's effectiveness, identifies areas for program improvement, and informs decision making related to the program, but it also makes an important contribution to the literature on postdoctoral training programs.

[14] See http://www.nsf.gov/statistics/srvygradpostdoc/#sd.

Overall, there is considerable support for the conclusion that the CPFP is meeting its three primary goals. First, the program is designed to support early-stage scientists from a diversity of disciplines to conduct cancer prevention research with guidance from NCI mentors. The fellowship represents a critical juncture of alumni's careers, and consequently, training and mentorship were vital aspects of the fellowship experience. Not only did alumni have overwhelmingly positive views of the program and the training and mentorship they received, but many have continuing contact and collaborations with their CPFP mentors, peers, and other NCI and NIH staff. Alumni generally rated the benefits that they received from the fellowship very highly, including its impact on their scientific subject matter knowledge and expertise, their knowledge in public health, and their research skills. Moreover, on seven career-related benefits where comparisons with awardees was possible, alumni provided higher ratings of the impact of the CPFP than awardees of the F32 fellowship in five areas: securing their first position after the fellowship, providing contacts that helped them find employment, helping them achieve their career goals, influencing the specific direction of their current research, and influencing the progress of their current research.

Second, the program aims to provide structured education and training on scientific research and leadership, especially as they pertain to transdisciplinarity and team science. CPFP leadership have recognized the increasing demand for applying interdisciplinary approaches to complex problems in public health research and the need for postdoctoral training to expose early-career scientists to knowledge outside of their own discipline and facilitate their ability to communicate and collaborate with professionals from other disciplines (Chang et al., 2005). Alumni in the in-depth interviews were overwhelmingly positive in their assessment of the way in which the fellowship brought them into the fold of a diverse community of cancer prevention professionals, often describing it as a hallmark feature of the program. In addition, when asked to name the most valuable aspect of the CPFP, about one-fifth of alumni noted its transdisciplinary approach. Alumni's inclination toward a multidisciplinary approach was also reflected in findings from the survey and bibliometric data, which showed that alumni often incorporated research from multiple disciplines into their work and often had their own work incorporated into the work of other researchers across disciplines.

Finally, the program is geared toward facilitating fellows' transition to career independence as researchers and leaders. As noted by one alumnus during the in-depth interviews, "[The program director at the time] really encouraged people that this should be their only postdoc, that people coming out of this fellowship should be relatively independent and ready to go." Findings from the evaluation show that an overwhelming majority of CPFP alumni have remained in cancer prevention and control, that they are more widely distributed across career sectors than either applicants or awardees, and that on most measures, alumni have demonstrated career productivity at or above those individuals in the two comparison groups. Alumni have been published extensively and in a varied and prestigious set of journals, with a clear focus on the cancer prevention and control. Their work also appears to be cited more often and appear in more prestigious journals than the work of CPFP

applicants. Alumni often compare favorably to applicants and awardees on other measures, as well, including community service activities such as translating cancer research for a lay audience more frequently than applicants and presenting information to patient advocacy groups. Over the entirety of their careers, alumni reported higher rates than applicants of key scientific activities such as developing funding initiatives to address knowledge gaps in research, making significant contributions to advancing innovative ideas in cancer research, and addressing key knowledge gaps in cancer research.

Alumni did, however, report lower rates of receiving competitive grants and contracts, an area identified by alumni in which they would like to receive more training and opportunities. On the other hand, because so many of the CPFP fellows pursue post-fellowship positions in government, it is possible that receiving grants is not a relevant indicator of their career productivity and success as it would be for a researcher in academia.

Regardless, many of the improvements that alumni suggested point directly to better positioning themselves in their career. Alumni identified several areas—including more grant-writing professional development and opportunities—where NCI could play a more active role in helping them transition from the fellowship to their post-fellowship careers in cancer prevention. Included among these recommendations was for NCI to increase opportunities for fellows to gain experience in a greater variety of venues, such as clinical settings, organizations in the academic and private sectors, international work, and within the community. Many alumni expressed great interest in exploring a number of career paths, not just those in government or academic research, but they appeared somewhat divided in terms of whether the CPFP broadens their career horizons or leads them in a particular direction. Given the numbers of alumni who are currently employed in government research, and more specifically NCI, the latter perspective may be accurate or could reflect a selection bias on the part of individuals who apply for the CPFP fellowship.

Finally, mentorship was identified as both one of the most valuable aspects of the program and an area where the program could be improved. As noted elsewhere, the mentoring relationship is a highly individual one with a considerable number of variables that factor into its success, including the experience and background of the fellow prior to entering the CPFP and the extent to which they need more or less guidance as they establish themselves as independent researchers. Fellows interview and select their own mentors, but some alumni called for more NCI involvement in the screening of mentors and the mentoring process. Because mentors from the fellowship can be lifelong mentors to and collaborators with alumni, and thus have the potential to play a significant role in the development of the next generation of cancer prevention researchers and leaders, the mentoring position is worthy of closer examination.

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Appendix A.

Bibliometrics Outlier Analysis

Bibliometric Outlier Analysis

In the course of conducting bibliometric analyses on the CPFP alumni group, an outlier was identified as having produced an exceedingly large number of publications. This individual was removed, and select bibliometrics were re-run to explore the relative impact of this individual on the bibliometric analysis. Table A-1 displays the total number of publications, average number of citations, average journal impact factor, and number of highly cited papers for the CPFP alumni group before and after removing this outlier. These results demonstrate that this individual contributed an inordinate number of publications to the alumni group; some of those publications were cited more often than benchmark publications and some were highly cited publications, but also these publications in the aggregate dampen the average citations and journal impact factor associated with the alumni group.

Table A-1. Exploring the impact of outlier removal on CPFP alumni bibliometrics

Bibliometric	Bibliometric before removing outlier	Bibliometric after removing outlier
Publication count	6,541	5,521
Average number of citations	13	15
Average journal impact factor	4.83	5.17
Number of publications with greater number of citations than benchmark publications	2,864	2,617
Number of highly cited publications	296	266

Appendix B.

Web Survey Instruments

Survey of Alumni

EVALUATION OF THE NATIONAL CANCER INSTITUTE'S
CANCER PREVENTION FELLOWSHIP PROGRAM
SURVEY OF ALUMNI

11/5/2013

The National Cancer Institute (NCI) has contracted with Westat, an independent research firm located in Rockville, Maryland, to conduct a comprehensive evaluation of the NCI's Cancer Prevention Fellowship Program (CPFP). The purpose of the evaluation is to collect information on the careers and experiences of former fellows, and to get suggestions for improving the program.

Participation in the survey is voluntary and the information you provide will be kept private to the extent permitted by law. The survey data will be collected by Westat, and your individual responses to the survey, or any potentially personal identifying information, will not be shared with NCI staff members. The information collected will be published in aggregate form only and will not identify individuals in any reports or presentations. Your participation will help provide valuable information that will assist CPFP in making decisions about future program initiatives to improve postdoctoral training.

We anticipate the survey will take approximately 25 minutes to complete.

If you have any questions or comments, please contact Kimberley Raue at Westat at (800) 937-8281, ext. 3865 or CPFPsurvey@westat.com.

OMB No: 0925- 0690
Expiration Date: 01/31/2015

Collection of this information is authorized by The Public Health Service Act, Section 411 (42 USC 285a). Rights of study participants are protected by The Privacy Act of 1974. Participation is voluntary, and there are no penalties for not participating or withdrawing from the study at any time. Refusal to participate will not affect your benefits in any way. The information collected in this study will be kept private to the extent provided by law. Names and other identifiers will not appear in any report of the study. Information provided will be combined for all study participants and reported as summaries. You are being contacted by email to complete this instrument so that we can evaluate the Cancer Prevention Fellowship Program.

Public reporting burden for this collection of information is estimated to average 25 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. **An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.** Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to NIH, Project Clearance Branch, 6705 Rockledge Drive, MSC 7974, Bethesda, MD 20892-7974, ATTN: PRA (0925- 0690). Do not return the completed form to this address.

EMPLOYMENT INFORMATION

The first section of the survey asks questions about your work history and the type of work you are currently doing.

1. For the following question, please include your participation in the Cancer Prevention Fellowship Program. Which statement represents your postdoctoral or fellowship experience? *(Please select one answer.)*

   Completed **one** postdoctoral or fellowship program or position ..... ☐ 1
   Completed **multiple** postdoctoral or fellowship programs or positions ..... ☐ 2

2. In what year did you complete your most recent postdoctoral or fellowship position?

   — — — —

3. Do you **currently** hold a postdoctoral or fellowship position?

   Yes ..... ☐ 1
   No ..... ☐ 2

4. Including self-employment, what is your **current** employment status? *(Please select one answer.)*

   Employed full-time ..... ☐ 1
   Employed part-time ..... ☐ 2
   Retired ..... ☐ 3 *(Go to question 16.)*
   Not currently employed ..... ☐ 4 *(Go to question 16.)*

5. Which **one** of the following best describes your **primary** employer? *(Please select one answer.)*

   National Cancer Institute (NCI) ..... ☐ 1 *(Go to question 8.)*
   National Institutes of Health (NIH) other than NCI ..... ☐ 2 *(Go to question 8.)*
   Government agency other than NIH ..... ☐ 3 *(Go to question 7.)*
   University or some other academic institution ..... ☐ 4 *(Go to question 6.)*
   Independent cancer research center or some other health research institution ..... ☐ 5 *(Go to question 7.)*
   Health care clinic or hospital ..... ☐ 6 *(Go to question 7.)*
   A foundation or professional association ..... ☐ 7 *(Go to question 7.)*
   Private company ..... ☐ 8 *(Go to question 7.)*
   Self-employed ..... ☐ 9 *(Go to question 8.)*

6. What is your tenure status? *(Please select one answer.)*

   Tenured ..... ☐ 1
   On the tenure track ..... ☐ 2
   Not on the tenure track ..... ☐ 3

7. What is the name of your primary employer?

   _____

8. How long have you been at your **current** job?

   __ __ year(s) __ __ month(s)

9. In what discipline(s) does your current work primarily fall? *(Please select all that apply.)*

   Behavioral or social sciences ..... ☐ 1
   Biological or biomedical sciences..... ☐ 2
   Epidemiology and/or public health ..... ☐ 3
   Mathematical sciences ..... ☐ 4
   Medicine..... ☐ 5
   Nutrition sciences..... ☐ 6
   Physical sciences..... ☐ 7
   Other *(Please specify.)* ..... ☐ 8

   _____

10. For this question, please exclude time spent on cancer treatment or cancer treatment research. **Approximately** what percentage of your current work is done **in cancer prevention and control?** *(Please select one answer.)*

    None ..... ☐ 1 *(Go to question 11.)*
    A small percentage (1%–25%)..... ☐ 2 *(Go to question 12.)*
    A moderate percentage (26%–50%) ..... ☐ 3 *(Go to question 12.)*
    A large percentage (51%–75%) ..... ☐ 4 *(Go to question 12.)*
    A very large percentage (76%–100%) ..... ☐ 5 *(Go to question 12.)*

11. What are the reasons you are **not** currently working in the field of cancer prevention or control? *(Please select all that apply and then go to question 13.)*

    A suitable job in the field was not available ..... ☐ 1
    A better opportunity outside of the field was available..... ☐ 2
    My career or professional interests changed..... ☐ 3
    Personal reasons..... ☐ 4
    Other *(Please specify.)* ..... ☐ 5

    _____

12. **Approximately** what percentage of your time in your current job is spent on **research and research support activities in cancer prevention and control?** Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

    None ..... ☐ 1
    A small percentage (1%–25%)..... ☐ 2
    A moderate percentage (26%–50%) ..... ☐ 3
    A large percentage (51%–75%) ..... ☐ 4
    A very large percentage (76%–100%) ..... ☐ 5

13. **Approximately** what percentage of your time in your current job is spent on **all research and research support activities, not just those in cancer prevention and control**? Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

14. **Approximately** what percentage of your time in your current job is spent on teaching and advising students? *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

15. **Multidisciplinary** activities are activities that involve several academic disciplines or professional specializations. To what extent do you currently engage in the following collaborative and multidisciplinary activities with other professionals? *(Please select one answer in each row.)*

Professional activity	**Not at all**	**A small extent**	**A moderate extent**	**A large extent**	**A very large extent**
a. Incorporate research from multiple fields/disciplines in your work	☐1	☐2	☐3	☐4	☐5
b. Collaborate with professionals from multiple disciplines.....	☐1	☐2	☐3	☐4	☐5
c. Manage and/or lead professionals from multiple disciplines.....	☐1	☐2	☐3	☐4	☐5
d. Present at multidisciplinary conferences or meetings	☐1	☐2	☐3	☐4	☐5
e. Publish in multidisciplinary journals or publications.....	☐1	☐2	☐3	☐4	☐5
f. Publish with professionals from multiple disciplines	☐1	☐2	☐3	☐4	☐5

CAREER ACTIVITIES

This section asks more detailed information about the types of activities you engage in as part of your work.

16. To what extent have you had a role in the following professional activities **during your career?** *(Please select one answer in each row.)*

Professional activity	Not at all	A small extent	A moderate extent	A large extent	A very large extent	Not applicable
a. Pursued a new theoretical direction or addressed a topic previously unexplored in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
b. Made a significant contribution to a scientific breakthrough in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
c. Made a significant contribution to advancing innovative ideas in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
d. Addressed key knowledge gaps in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
e. Developed funding initiatives to address knowledge gaps in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6

17. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following publication activities? *(Please select one answer on each row.)*

Publication activity	None	Once	Two or three times	Four or five times	Six or more times
a. Authored or co-authored a paper in a published peer-reviewed journal.....	☐1	☐2	☐3	☐4	☐5
b. Authored or co-authored a chapter in a published book.....	☐1	☐2	☐3	☐4	☐5
c. Authored or co-authored a published book ..	☐1	☐2	☐3	☐4	☐5
d. Authored or co-authored a technical report or white paper	☐1	☐2	☐3	☐4	☐5

18. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work and exclude presentations given by your students, if applicable. **During the past five years,** how many times have you personally engaged in the following presentation activities? *(Please select one answer on each row.)*

Presentation activity	None	Once	Two or three times	Four or five times	Six or more times
a. Presented at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
b. Chaired a session or workshop at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
c. Organized a session or workshop at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
d. Organized a professional conference or scientific meeting.....	☐1	☐2	☐3	☐4	☐5

19. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following community service activities? *(Please select one answer on each row.)*

Community service activity	None	Once	Two or three times	Four or five times	Six or more times
a. Advised or presented information to a patient advocacy or support group.....	☐1	☐2	☐3	☐4	☐5
b. Translated cancer research information for a lay audience	☐1	☐2	☐3	☐4	☐5
c. Served on a local health advisory board, panel, or committee	☐1	☐2	☐3	☐4	☐5
d. Served on a national health advisory board, panel, or committee	☐1	☐2	☐3	☐4	☐5

20. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. During **the past five years,** how many times have you engaged in the following other professional activities? *(Please select one answer on each row.)*

Other professional activity	None	Once	Two or three times	Four or five times	Six or more times
a. Established or appointed to a working group on cancer research	☐1	☐2	☐3	☐4	☐5
b. Served as a reviewer for a journal	☐1	☐2	☐3	☐4	☐5
c. Served as an editor of a journal or served on a journal review board	☐1	☐2	☐3	☐4	☐5
d. Led or co-led a clinical trial	☐1	☐2	☐3	☐4	☐5
e. Received a competitive grant, contract, or subcontract for your work	☐1	☐2	☐3	☐4	☐5
f. Filed or received a patent	☐1	☐2	☐3	☐4	☐5
g. Developed a prototype, technology, or marketable product	☐1	☐2	☐3	☐4	☐5
h. Other professional activity *(Please specify.)*	☐1	☐2	☐3	☐4	☐5

21. What is your current annual salary, including any bonuses you have received? *(Please select one answer.)*

Less than $50,000 ☐1
$50,000–$74,999 ☐2
$75,000–$99,999 ☐3
$100,000–$124,999 ☐4
$125,000–$149,999 ☐5
$150,000–$174,999 ☐6
$175,000–$199,999 ☐7
$200,000–$224,999 ☐8
$225,000 or more ☐9
Not applicable ☐10

22. Do you feel that your salary is generally competitive with others in similar positions?

Yes ☐1
No ☐2
Not applicable ☐3

23. Have the following occurred in your career since completing your doctoral degree and postdoctoral work, if applicable? *(Please select one answer on each row.)*

	Yes	No
Advanced to a more senior-level position	☐1	☐2
Assumed a role as a project leader (e.g., technical group leader)	☐1	☐2
Assumed leadership or management responsibilities (e.g., section chief)	☐1	☐2
Served as a mentor to others in your organization	☐1	☐2
Assumed other leadership roles (e.g., led a committee)	☐1	☐2

24. How satisfied are you with the progression of your career to this point? *(Please select one answer.)*

Not at all ☐1
A little satisfied ☐2
Somewhat satisfied ☐3
Very satisfied ☐4
Extremely satisfied ☐5

PROFESSIONAL ASSOCIATIONS AND AWARDS

This section asks about your participation in professional associations and awards you may have received for your work.

25. How many professional associations (e.g., American Association for Cancer Research, American Medical Association) are you **currently** a member of? *(Please select one answer.)*

None ☐1
One ☐2
Two ☐3
Three ☐4
Four or more ☐5

26. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you held either a volunteer or elected leadership position in a professional association? *(Please select one answer on each row.)*

	Yes	No
A volunteer leadership position	☐1	☐2
An elected leadership position	☐1	☐2

27. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you received a professional award related to your work?

Yes *(Please specify.)*..... ☐1
No ..... ☐2

_____

PROGRAM BENEFITS

This section asks questions about benefits you received from participating in the Cancer Prevention Fellowship Program.

28. **While a fellow,** how beneficial was the Cancer Prevention Fellowship Program to your knowledge, skills, and research in the following areas? *(Please select one answer on each row.)*

Area	Not at all beneficial	A little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial
a. Scientific subject matter knowledge/expertise.....	☐1	☐2	☐3	☐4	☐5
b. Knowledge/expertise in public health	☐1	☐2	☐3	☐4	☐5
c. Research skills and/or techniques.....	☐1	☐2	☐3	☐4	☐5
d. Experience using specialized equipment and/or technology.....	☐1	☐2	☐3	☐4	☐5
e. Confidence in performing research	☐1	☐2	☐3	☐4	☐5
f. The overall quality of your research...	☐1	☐2	☐3	☐4	☐5
g. The specific direction of your research	☐1	☐2	☐3	☐4	☐5
h. The progress of your research	☐1	☐2	☐3	☐4	☐5
i. Your ability to conduct independent research	☐1	☐2	☐3	☐4	☐5
j. Contacts who advised or collaborated with you on your research.....	☐1	☐2	☐3	☐4	☐5

29. **While a fellow,** how beneficial was the Cancer Prevention Fellowship Program in the following areas pertaining to other professional-related knowledge and skills? *(Please select one answer on each row.)*

Skill	Not at all beneficial	A little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial
a. Publication skills	☐1	☐2	☐3	☐4	☐5
b. Presentation skills.....	☐1	☐2	☐3	☐4	☐5
c. Grant and/or contract writing skills....	☐1	☐2	☐3	☐4	☐5
d. Mentoring skills	☐1	☐2	☐3	☐4	☐5
e. Leadership and/or management skills	☐1	☐2	☐3	☐4	☐5

30. How beneficial was the Cancer Prevention Fellowship Program to you in terms of providing the following career-related benefits? *(Please select one answer on each row.)*

Benefit	Not at all beneficial	A little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial	Not applicable
a. Securing your first position after the fellowship	☐1	☐2	☐3	☐4	☐5	☐6
b. Securing subsequent positions following your first position after the fellowship	☐1	☐2	☐3	☐4	☐5	☐6
c. Providing you with contacts that have helped you find employment	☐1	☐2	☐3	☐4	☐5	☐6
d. Positively influencing your ability to obtain funding for your work.....	☐1	☐2	☐3	☐4	☐5	☐6
e. Helping you achieve your career goals	☐1	☐2	☐3	☐4	☐5	☐6
f. Influencing the specific direction of your current research.....	☐1	☐2	☐3	☐4	☐5	☐6
g. Influencing the progress of your current research	☐1	☐2	☐3	☐4	☐5	☐6

31. Looking back on your career thus far, would you make the same decision to participate in the Cancer Prevention Fellowship Program?

Yes..... ☐1
No ..... ☐2

32. Have you ever encouraged someone else to apply for the Cancer Prevention Fellowship Program?

Yes..... ☐1
No ..... ☐2

REFLECTIONS AND RECOMMENDATIONS

This section asks a few open-ended questions about significant accomplishments in your career, your opinion about the most valuable aspect of the program, and your recommendations for program improvements.

33. What do you consider to be the two or three most important accomplishments in your career?

34. What was the single most valuable aspect of the Cancer Prevention Fellowship Program to you?

35. What is the single most important improvement you would like made in the Cancer Prevention Fellowship Program?

36. If you could make other improvements to the Cancer Prevention Fellowship Program, what would they be?

DEMOGRAPHICS

The last section of the survey asks about demographic information, including your education.

37. What is your gender?

Male ..... ☐ 1
Female ..... ☐ 2

38. Are you Hispanic/Latino?

No, not Hispanic/Latino ..... ☐ 1
Yes, Hispanic/Latino ..... ☐ 2

39. What is your race? *(Please select all that apply.)*

American Indian or Alaska Native ..... ☐ 1
Asian ..... ☐ 2
Black or African American ..... ☐ 3
Native Hawaiian or Other Pacific Islander.. ..... ☐ 4
White ..... ☐ 5

40. What is your birth year?

— — — —

41. Which of the following doctoral degrees have you received and in what year did you receive them? *(Please select all that apply.)*

		Year of most recent degree
PhD	☐ 1	_____
ScD	☐ 2	_____
MD	☐ 3	_____
DO	☐ 4	_____
DrPH	☐ 5	_____
DDS	☐ 6	_____
DMD	☐ 7	_____
JD	☐ 8	_____
DVM	☐ 9	_____
Other (*Please specify.*)_____	☐ 10	_____

42. Which of the following other degrees or certifications do you have?

MS	☐ 1
MA	☐ 2
MPH	☐ 3
MBA	☐ 4
NP	☐ 5
RD	☐ 6
RN	☐ 7
Other (*Please specify.)* _____	☐ 8

Survey of Applicants

EVALUATION OF THE NATIONAL CANCER INSTITUTE'S
CANCER PREVENTION FELLOWSHIP PROGRAM
SURVEY OF APPLICANTS

11/5/2013

The National Cancer Institute (NCI) has contracted with Westat, an independent research firm located in Rockville, Maryland, to conduct a comprehensive evaluation of the NCI's Cancer Prevention Fellowship Program (CPFP). This includes a comprehensive assessment of the career experiences of people who applied to CPFP. One component of the evaluation is a survey of program applicants.

Participation in the survey is voluntary and the information you provide will be kept private to the extent permitted by law. The survey data will be collected by Westat, and your individual responses to the survey, or any potentially personal identifying information, will not be shared with NCI staff members. The information collected will be published in aggregate form only and will not identify individuals in any reports or presentations. Your participation will help provide valuable information that will assist the NCI and other institutions in making decisions about future program initiatives to improve postdoctoral training.

We anticipate the survey will take approximately 20 minutes to complete.

If you have any questions or comments, please contact Kimberley Raue at Westat at (800) 937-8281, ext. 3865 or CPFPsurvey@westat.com.

OMB No: 0925- 0690
Expiration Date: 01/31/2015

Collection of this information is authorized by The Public Health Service Act, Section 411 (42 USC 285a). Rights of study participants are protected by The Privacy Act of 1974. Participation is voluntary, and there are no penalties for not participating or withdrawing from the study at any time. Refusal to participate will not affect your benefits in any way. The information collected in this study will be kept private to the extent provided by law. Names and other identifiers will not appear in any report of the study. Information provided will be combined for all study participants and reported as summaries. You are being contacted by email to complete this instrument so that we can evaluate the Cancer Prevention Fellowship Program.

Public reporting burden for this collection of information is estimated to average 20 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. **An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.** Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to NIH, Project Clearance Branch, 6705 Rockledge Drive, MSC 7974, Bethesda, MD 20892-7974, ATTN: PRA (0925- 0690). Do not return the completed form to this address.

EMPLOYMENT INFORMATION

The first section of the survey asks questions about your work history and the type of work you are currently doing.

1. Which statement represents your postdoctoral or fellowship experience? *(Please select one answer.)*

   Completed **one** postdoctoral or fellowship program or position ..... ☐1
   Completed **multiple** postdoctoral or fellowship programs or positions ..... ☐2
   Have not completed a postdoctoral or fellowship program or position ..... ☐3 *(Go to question 3.)*

2. In what year did you complete your most recent postdoctoral or fellowship position?

   — — — —

3. Do you **currently** hold a postdoctoral or fellowship position?

   Yes ..... ☐1
   No ..... ☐2

4. Including self-employment, what is your **current** employment status? *(Please select one answer.)*

   Employed full-time ..... ☐1
   Employed part-time ..... ☐2
   Retired ..... ☐3 *(Go to question 16.)*
   Not currently employed ..... ☐4 *(Go to question 16.)*

5. Which **one** of the following best describes your **primary** employer? *(Please select one answer.)*

   National Cancer Institute (NCI) ..... ☐1 *(Go to question 8.)*
   National Institutes of Health (NIH) other than NCI ..... ☐2 *(Go to question 8.)*
   Government agency other than NIH ..... ☐3 *(Go to question 7.)*
   University or some other academic institution ..... ☐4 *(Go to question 6.)*
   Independent cancer research center or some other health research institution ..... ☐5 *(Go to question 7.)*
   Health care clinic or hospital ..... ☐6 *(Go to question 7.)*
   A foundation or professional association ..... ☐7 *(Go to question 7.)*
   Private company ..... ☐8 *(Go to question 7.)*
   Self-employed ..... ☐9 *(Go to question 8.)*

6. What is your tenure status? *(Please select one answer.)*

   Tenured ..... ☐1
   On the tenure track ..... ☐2
   Not on the tenure track ..... ☐3

7. What is the name of your primary employer?

   _____

8. How long have you been at your **current** job?
   __ __ year(s) __ __ month(s)

9. In what discipline(s) does your current work primarily fall? *(Please select all that apply.)*

   Behavioral or social sciences ..... ☐ 1
   Biological or biomedical sciences..... ☐ 2
   Epidemiology and/or public health ..... ☐ 3
   Mathematical sciences ..... ☐ 4
   Medicine..... ☐ 5
   Nutrition sciences..... ☐ 6
   Physical sciences..... ☐ 7
   Other *(Please specify.)* ..... ☐ 8

   _____

10. For this question, please exclude time spent on cancer treatment or cancer treatment research. **Approximately** what percentage of your current work is done **in cancer prevention and control?** *(Please select one answer.)*

    None ..... ☐ 1 *(Go to question 11.)*
    A small percentage (1%–25%)..... ☐ 2 *(Go to question 12.)*
    A moderate percentage (26%–50%) ..... ☐ 3 *(Go to question 12.)*
    A large percentage (51%–75%) ..... ☐ 4 *(Go to question 12.)*
    A very large percentage (76%–100%) ..... ☐ 5 *(Go to question 12.)*

11. What are the reasons you are **not** currently working in the field of cancer prevention or control? *(Please select all that apply and then go to question 13.)*

    A suitable job in the field was not available ..... ☐ 1
    A better opportunity outside of the field was available..... ☐ 2
    My career or professional interests changed..... ☐ 3
    Personal reasons..... ☐ 4
    Other *(Please specify.)* ..... ☐ 5

    _____

12. **Approximately** what percentage of your time in your current job is spent on **research and research support activities in cancer prevention and control?** Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

    None ..... ☐ 1
    A small percentage (1%–25%)..... ☐ 2
    A moderate percentage (26%–50%) ..... ☐ 3
    A large percentage (51%–75%) ..... ☐ 4
    A very large percentage (76%–100%) ..... ☐ 5

13. **Approximately** what percentage of your time in your current job is spent on **all research and research support activities, not just those in cancer prevention and control**? Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

14. **Approximately** what percentage of your time in your current job is spent on teaching and advising students? *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

15. **Multidisciplinary** activities are activities that involve several academic disciplines or professional specializations. To what extent do you currently engage in the following collaborative and multidisciplinary activities with other professionals? *(Please select one answer in each row.)*

Professional activity	**Not at all**	**A small extent**	**A moderate extent**	**A large extent**	**A very large extent**
g. Incorporate research from multiple fields/disciplines in your work	☐1	☐2	☐3	☐4	☐5
h. Collaborate with professionals from multiple disciplines	☐1	☐2	☐3	☐4	☐5
i. Manage and/or lead professionals from multiple disciplines	☐1	☐2	☐3	☐4	☐5
j. Present at multidisciplinary conferences or meetings	☐1	☐2	☐3	☐4	☐5
k. Publish in multidisciplinary journals or publications	☐1	☐2	☐3	☐4	☐5
l. Publish with professionals from multiple disciplines.....	☐1	☐2	☐3	☐4	☐5

CAREER ACTIVITIES

This section asks more detailed information about the types of activities you engage in as part of your work.

16. To what extent have you had a role in the following professional activities **during your career?** *(Please select one answer in each row.)*

Professional activity	Not at all	A small extent	A moderate extent	A large extent	A very large extent	Not applicable
a. Pursued a new theoretical direction or addressed a topic previously unexplored in cancer research	☐1	☐2	☐3	☐4	☐5	☐6
b. Made a significant contribution to a scientific breakthrough in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
c. Made a significant contribution to advancing innovative ideas in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
d. Addressed key knowledge gaps in cancer research	☐1	☐2	☐3	☐4	☐5	☐6
e. Developed funding initiatives to address knowledge gaps in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6

17. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following publication activities? *(Please select one answer on each row.)*

Publication activity	None	Once	Two or three times	Four or five times	Six or more times
e. Authored or co-authored a paper in a published peer-reviewed journal	☐1	☐2	☐3	☐4	☐5
f. Authored or co-authored a chapter in a published book	☐1	☐2	☐3	☐4	☐5
g. Authored or co-authored a published book	☐1	☐2	☐3	☐4	☐5
h. Authored or co-authored a technical report or white paper	☐1	☐2	☐3	☐4	☐5

18. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work and exclude presentations given by your students, if applicable. **During the past five years,** how many times have you personally engaged in the following presentation activities? *(Please select one answer on each row.)*

Presentation activity	None	Once	Two or three times	Four or five times	Six or more times
e. Presented at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
f. Chaired a session or workshop at a professional conference or scientific meeting ..	☐1	☐2	☐3	☐4	☐5
g. Organized a session or workshop at a professional conference or scientific meeting ..	☐1	☐2	☐3	☐4	☐5
h. Organized a professional conference or scientific meeting.....	☐1	☐2	☐3	☐4	☐5

19. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following community service activities? *(Please select one answer on each row.)*

Community service activity	None	Once	Two or three times	Four or five times	Six or more times
e. Advised or presented information to a patient advocacy or support group	☐1	☐2	☐3	☐4	☐5
f. Translated cancer research information for a lay audience.....	☐1	☐2	☐3	☐4	☐5
g. Served on a local health advisory board, panel, or committee.....	☐1	☐2	☐3	☐4	☐5
h. Served on a national health advisory board, panel, or committee	☐1	☐2	☐3	☐4	☐5

20. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following other professional activities? *(Please select one answer on each row.)*

Other professional activity	None	Once	Two or three times	Four or five times	Six or more times
i. Established or appointed to a working group on cancer research	☐1	☐2	☐3	☐4	☐5
j. Served as a reviewer for a journal	☐1	☐2	☐3	☐4	☐5
k. Served as an editor of a journal or served on a journal review board	☐1	☐2	☐3	☐4	☐5
l. Led or co-led a clinical trial	☐1	☐2	☐3	☐4	☐5
m. Received a competitive grant, contract, or subcontract for your work	☐1	☐2	☐3	☐4	☐5
n. Filed or received a patent	☐1	☐2	☐3	☐4	☐5
o. Developed a prototype, technology, or marketable product	☐1	☐2	☐3	☐4	☐5
p. Other professional activity *(Please specify.)*	☐1	☐2	☐3	☐4	☐5

21. What is your current annual salary, including any bonuses you have received? *(Please select one answer.)*

Less than $50,000 ☐1
$50,000–$74,999 ☐2
$75,000–$99,999 ☐3
$100,000–$124,999 ☐4
$125,000–$149,999 ☐5
$150,000–$174,999 ☐6
$175,000–$199,999 ☐7
$200,000–$224,999 ☐8
$225,000 or more ☐9
Not applicable ☐10

22. Do you feel that your salary is generally competitive with others in similar positions?

Yes ☐1
No ☐2
Not applicable ☐3

23. Have the following occurred in your career since completing your doctoral degree and postdoctoral work, if applicable? *(Please select one answer on each row.)*

	Yes	No
Advanced to a more senior-level position	☐ 1	☐ 2
Assumed a role as a project leader (e.g., technical group leader)	☐ 1	☐ 2
Assumed leadership or management responsibilities (e.g., section chief)	☐ 1	☐ 2
Served as a mentor to others in your organization	☐ 1	☐ 2
Assumed other leadership roles (e.g., led a committee)	☐ 1	☐ 2

24. How satisfied are you with the progression of your career to this point? *(Please select one answer.)*

Not at all ☐ 1
A little satisfied ☐ 2
Somewhat satisfied ☐ 3
Very satisfied ☐ 4
Extremely satisfied ☐ 5

PROFESSIONAL ASSOCIATIONS AND AWARDS

This section asks about your participation in professional associations and awards you may have received for your work.

25. How many professional associations (e.g., American Association for Cancer Research, American Medical Association) are you **currently** a member of? *(Please select one answer.)*

None ☐ 1
One ☐ 2
Two ☐ 3
Three ☐ 4
Four or more ☐ 5

26. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you held either a volunteer or elected leadership position in a professional association? *(Please select one answer on each row.)*

	Yes	No
A volunteer leadership position	☐ 1	☐ 2
An elected leadership position	☐ 1	☐ 2

27. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you received a professional award related to your work?

Yes *(Please specify.)*..... ☐[1]
No ..... ☐[2]

_____

SIGNIFICANT CAREER ACCOMPLISHMENTS

28. What do you consider to be the two or three most important accomplishments in your career?

DEMOGRAPHICS

The last section of the survey asks about demographic information, including your education.

29. What is your gender?

Male ..... ☐[1]
Female..... ☐[2]

30. Are you Hispanic/Latino?

No, not Hispanic/Latino..... ☐[1]
Yes, Hispanic/Latino..... ☐[2]

31. What is your race? *(Please select all that apply.)*

American Indian or Alaska Native..... ☐[1]
Asian ..... ☐[2]
Black or African American ..... ☐[3]
Native Hawaiian or Other Pacific Islander.. ..... ☐[4]
White..... ☐[5]

32. What is your birth year?

— — — —

33. Which of the following doctoral degrees have you received and in what year did you receive them? *(Please select all that apply.)*

		Year of most recent degree
PhD	☐ 1	_____
ScD	☐ 2	_____
MD	☐ 3	_____
DO	☐ 4	_____
DrPH	☐ 5	_____
DDS	☐ 6	_____
DMD	☐ 7	_____
JD	☐ 8	_____
DVM	☐ 9	_____
Other (*Please specify.*)_____	☐ 10	_____

34. Which of the following other degrees or certifications do you have?

MS	☐ 1
MA	☐ 2
MPH	☐ 3
MBA	☐ 4
NP	☐ 5
RD	☐ 6
RN	☐ 7
Other (*Please specify.*) _____	☐ 8

Survey of F32 Awardees

EVALUATION OF THE NATIONAL CANCER INSTITUTE'S
CANCER PREVENTION FELLOWSHIP PROGRAM
SURVEY OF F32 AWARDEES

11/5/2013

The National Cancer Institute (NCI) has contracted with Westat, an independent research firm located in Rockville, Maryland, to conduct a comprehensive evaluation of the NCI's Cancer Prevention Fellowship Program (CPFP). This includes a comprehensive assessment of the career experiences of former postdoctoral fellows who received grant support funding from the NCI to support cancer prevention- and control-oriented research projects.

Participation in the survey is voluntary and the information you provide will be kept private to the extent permitted by law. The survey data will be collected by Westat, and your individual responses to the survey, or any potentially personal identifying information, will not be shared with NCI staff members. The information collected will be published in aggregate form only and will not identify individuals in any reports or presentations. Your participation will help provide valuable information that will assist the NCI and other institutions in making decisions about future program initiatives to improve postdoctoral training.

We anticipate the survey will take approximately 20 minutes to complete.

If you have any questions or comments, please contact Kimberley Raue at Westat at
(800) 937-8281, ext. 3865 or CPFPsurvey@westat.com.

OMB No: 0925- 0690
Expiration Date: 01/31/2015

Collection of this information is authorized by The Public Health Service Act, Section 411 (42 USC 285a). Rights of study participants are protected by The Privacy Act of 1974. Participation is voluntary, and there are no penalties for not participating or withdrawing from the study at any time. Refusal to participate will not affect your benefits in any way. The information collected in this study will be kept private to the extent provided by law. Names and other identifiers will not appear in any report of the study. Information provided will be combined for all study participants and reported as summaries. You are being contacted by email to complete this instrument so that we can evaluate the Cancer Prevention Fellowship Program.

Public reporting burden for this collection of information is estimated to average 20 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. **An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.** Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to NIH, Project Clearance Branch, 6705 Rockledge Drive, MSC 7974, Bethesda, MD 20892-7974, ATTN: PRA (0925- 0690). Do not return the completed form to this address.

EMPLOYMENT INFORMATION

The first section of the survey asks questions about your work history and the type of work you are currently doing.

1. For the following question, please include your participation in the National Research Service Awards Postdoctoral Fellowship. Which statement represents your postdoctoral or fellowship experience? *(Please select one answer.)*

   Completed **one** postdoctoral or fellowship program or position ..... ☐ 1
   Completed **multiple** postdoctoral or fellowship programs or positions ..... ☐ 2

2. In what year did you complete your most recent postdoctoral or fellowship position?

   — — — —

3. Do you **currently** hold a postdoctoral or fellowship position?

   Yes ..... ☐ 1
   No ..... ☐ 2

4. Including self-employment, what is your **current** employment status? *(Please select one answer.)*

   Employed full-time ..... ☐ 1
   Employed part-time ..... ☐ 2
   Retired ..... ☐ 3 *(Go to question 16.)*
   Not currently employed ..... ☐ 4 *(Go to question 16.)*

5. Which **one** of the following best describes your **primary** employer? *(Please select one answer.)*

   National Cancer Institute (NCI) ..... ☐ 1 *(Go to question 8.)*
   National Institutes of Health (NIH) other than NCI ..... ☐ 2 *(Go to question 8.)*
   Government agency other than NIH ..... ☐ 3 *(Go to question 7.)*
   University or some other academic institution..... ☐ 4 *(Go to question 6.)*
   Independent cancer research center or some other health research institution ..... ☐ 5 *(Go to question 7.)*
   Health care clinic or hospital ..... ☐ 6 *(Go to question 7.)*
   A foundation or professional association ..... ☐ 7 *(Go to question 7.)*
   Private company ..... ☐ 8 *(Go to question 7.)*
   Self-employed ..... ☐ 9 *(Go to question 8.)*

6. What is your tenure status? *(Please select one answer.)*

   Tenured ..... ☐ 1
   On the tenure track ..... ☐ 2
   Not on the tenure track ..... ☐ 3

7. What is the name of your primary employer?

   _____

8. How long have you been at your **current** job?

   __ __ year(s) __ __ month(s)

9. In what discipline(s) does your current work primarily fall? *(Please select all that apply.)*

   Behavioral or social sciences ..... ☐ 1
   Biological or biomedical sciences..... ☐ 2
   Epidemiology and/or public health ..... ☐ 3
   Mathematical sciences ..... ☐ 4
   Medicine..... ☐ 5
   Nutrition sciences..... ☐ 6
   Physical sciences..... ☐ 7
   Other *(Please specify.)* ..... ☐ 8

   _____

10. For this question, please exclude time spent on cancer treatment or cancer treatment research. **Approximately** what percentage of your current work is done **in cancer prevention and control?** *(Please select one answer.)*

    None ..... ☐ 1 *(Go to question 11.)*
    A small percentage (1%–25%)..... ☐ 2 *(Go to question 12.)*
    A moderate percentage (26%–50%) ..... ☐ 3 *(Go to question 12.)*
    A large percentage (51%–75%) ..... ☐ 4 *(Go to question 12.)*
    A very large percentage (76%–100%) ..... ☐ 5 *(Go to question 12.)*

11. What are the reasons you are **not** currently working in the field of cancer prevention or control? *(Please select all that apply then go to question 13).*

    A suitable job in the field was not available ..... ☐ 1
    A better opportunity outside of the field was available..... ☐ 2
    My career or professional interests changed..... ☐ 3
    Personal reasons..... ☐ 4
    Other *(Please specify.)* ..... ☐ 5

    _____

12. **Approximately** what percentage of your time in your current job is spent on **research and research support activities in cancer prevention and control?** Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

    None ..... ☐ 1
    A small percentage (1%–25%)..... ☐ 2
    A moderate percentage (26%–50%) ..... ☐ 3
    A large percentage (51%–75%) ..... ☐ 4
    A very large percentage (76%–100%) ..... ☐ 5

13. **Approximately** what percentage of your time in your current job is spent on **all research and research support activities, not just those in cancer prevention and control**? Please include time spent conducting research yourself, as well as time spent supporting the research of others through activities such as research management, monitoring, reviewing, funding, analysis, dissemination, and other research support activities. *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

14. **Approximately** what percentage of your time in your current job is spent on teaching and advising students? *(Please select one answer.)*

None ..... ☐1
A small percentage (1%–25%)..... ☐2
A moderate percentage (26%–50%) ..... ☐3
A large percentage (51%–75%) ..... ☐4
A very large percentage (76%–100%) ..... ☐5

15. **Multidisciplinary** activities are activities that involve several academic disciplines or professional specializations. To what extent do you currently engage in the following collaborative and multidisciplinary activities with other professionals? *(Please select one answer in each row.)*

Professional activity	**Not at all**	**A small extent**	**A moderate extent**	**A large extent**	**A very large extent**
m. Incorporate research from multiple fields/disciplines in your work	☐1	☐2	☐3	☐4	☐5
n. Collaborate with professionals from multiple disciplines	☐1	☐2	☐3	☐4	☐5
o. Manage and/or lead professionals from multiple disciplines	☐1	☐2	☐3	☐4	☐5
p. Present at multidisciplinary conferences or meetings	☐1	☐2	☐3	☐4	☐5
q. Publish in multidisciplinary journals or publications	☐1	☐2	☐3	☐4	☐5
r. Publish with professionals from multiple disciplines.....	☐1	☐2	☐3	☐4	☐5

CAREER ACTIVITIES

This section asks more detailed information about the types of activities you engage in as part of your work.

16. To what extent have you had a role in the following professional activities **during your career?** *(Please select one answer in each row.)*

Professional activity	Not at all	A small extent	A moderate extent	A large extent	A very large extent	Not applicable
a. Pursued a new theoretical direction or addressed a topic previously unexplored in cancer research	☐1	☐2	☐3	☐4	☐5	☐6
b. Made a significant contribution to a scientific breakthrough in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
c. Made a significant contribution to advancing innovative ideas in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6
d. Addressed key knowledge gaps in cancer research	☐1	☐2	☐3	☐4	☐5	☐6
f. Developed funding initiatives to address knowledge gaps in cancer research.....	☐1	☐2	☐3	☐4	☐5	☐6

17. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following publication activities? *(Please select one answer on each row.)*

Publication activity	None	Once	Two or three times	Four or five times	Six or more times
i. Authored or co-authored a paper in a published peer-reviewed journal.....	☐1	☐2	☐3	☐4	☐5
j. Authored or co-authored a chapter in a published book.....	☐1	☐2	☐3	☐4	☐5
k. Authored or co-authored a published book	☐1	☐2	☐3	☐4	☐5
l. Authored or co-authored a technical report or white paper.....	☐1	☐2	☐3	☐4	☐5

18. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work and exclude presentations given by your students, if applicable. **During the past five years,** how many times have you personally engaged in the following presentation activities? *(Please select one answer on each row.)*

Presentation activity	None	Once	Two or three times	Four or five times	Six or more times
i. Presented at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
j. Chaired a session or workshop at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
k. Organized a session or workshop at a professional conference or scientific meeting	☐1	☐2	☐3	☐4	☐5
l. Organized a professional conference or scientific meeting.....	☐1	☐2	☐3	☐4	☐5

19. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following community service activities? *(Please select one answer on each row.)*

Community service activity	None	Once	Two or three times	Four or five times	Six or more times
i. Advised or presented information to a patient advocacy or support group	☐1	☐2	☐3	☐4	☐5
j. Translated cancer research information for a lay audience	☐1	☐2	☐3	☐4	☐5
k. Served on a local health advisory board, panel, or committee	☐1	☐2	☐3	☐4	☐5
l. Served on a national health advisory board, panel, or committee	☐1	☐2	☐3	☐4	☐5

20. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** how many times have you engaged in the following other professional activities? *(Please select one answer on each row.)*

Other professional activity	None	Once	Two or three times	Four or five times	Six or more times
q. Established or appointed to a working group on cancer research	☐1	☐2	☐3	☐4	☐5
r. Served as a reviewer for a journal	☐1	☐2	☐3	☐4	☐5
s. Served as an editor of a journal or served on a journal review board	☐1	☐2	☐3	☐4	☐5
t. Led or co-led a clinical trial	☐1	☐2	☐3	☐4	☐5
u. Received a competitive grant, contract, or subcontract for your work	☐1	☐2	☐3	☐4	☐5
v. Filed or received a patent	☐1	☐2	☐3	☐4	☐5
w. Developed a prototype, technology, or marketable product	☐1	☐2	☐3	☐4	☐5
x. Other professional activity *(Please specify.)*	☐1	☐2	☐3	☐4	☐5

21. What is your current annual salary, including any bonuses you have received? *(Please select one answer.)*

Less than $50,000 ☐1
$50,000–$74,999 ☐2
$75,000–$99,999 ☐3
$100,000–$124,999 ☐4
$125,000–$149,999 ☐5
$150,000–$174,999 ☐6
$175,000–$199,999 ☐7
$200,000–$224,999 ☐8
$225,000 or more ☐9
Not applicable ☐10

22. Do you feel that your salary is generally competitive with others in similar positions?

Yes ☐1
No ☐2
Not applicable ☐3

23. Have the following occurred in your career since completing your doctoral degree and postdoctoral work, if applicable? *(Please select one answer on each row.)*

	Yes	No
Advanced to a more senior-level position	☐1	☐2
Assumed a role as a project leader (e.g., technical group leader)	☐1	☐2
Assumed leadership or management responsibilities (e.g., section chief)	☐1	☐2
Served as a mentor to others in your organization	☐1	☐2
Assumed other leadership roles (e.g., led a committee)	☐1	☐2

24. How satisfied are you with the progression of your career to this point? *(Please select one answer.)*

Not at all ☐1
A little satisfied ☐2
Somewhat satisfied ☐3
Very satisfied ☐4
Extremely satisfied ☐5

PROFESSIONAL ASSOCIATIONS AND AWARDS

This section asks about your participation in professional associations and awards you may have received for your work.

25. How many professional associations (e.g., American Association for Cancer Research, American Medical Association) are you **currently** a member of? *(Please select one answer.)*

None ☐1
One ☐2
Two ☐3
Three ☐4
Four or more ☐5

26. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you held either a volunteer or elected leadership position in a professional association? *(Please select one answer on each row.)*

	Yes	No
A volunteer leadership position	☐1	☐2
An elected leadership position	☐1	☐2

27. For this question, please answer only for activities that occurred after completing your doctoral degree and postdoctoral work, if applicable. **During the past five years,** have you received a professional award related to your work?

Yes *(Please specify.)*..... ☐1

No ..... ☐2

PROGRAM BENEFITS

This section asks questions about benefits you received from participating in the National Research Service Awards Postdoctoral Fellowship.

28. **While a fellow,** how beneficial was the National Research Service Awards Postdoctoral Fellowship to your knowledge, skills, and research in the following areas? *(Please select one answer on each row.)*

Area	Not at all beneficial	A little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial
k. Research skills and/or techniques.....	☐1	☐2	☐3	☐4	☐5
l. The specific direction of your research	☐1	☐2	☐3	☐4	☐5
m. The progress of your research	☐1	☐2	☐3	☐4	☐5
n. Your ability to conduct independent research	☐1	☐2	☐3	☐4	☐5

29. How beneficial was the National Research Service Awards Postdoctoral Fellowship to you in terms of providing the following career-related benefits? *(Please select one answer on each row.)*

Benefit	Not at all beneficial	A little beneficial	Somewhat beneficial	Very beneficial	Extremely beneficial	Not applicable
h. Securing your first position after the fellowship	☐1	☐2	☐3	☐4	☐5	☐6
i. Securing subsequent positions following your first position after the fellowship	☐1	☐2	☐3	☐4	☐5	☐6
j. Providing you with contacts that have helped you find employment.....	☐1	☐2	☐3	☐4	☐5	☐6
k. Positively influencing your ability to obtain funding for your work	☐1	☐2	☐3	☐4	☐5	☐6
l. Helping you achieve your career goals.....	☐1	☐2	☐3	☐4	☐5	☐6
m. Influencing the specific direction of your current research.	☐1	☐2	☐3	☐4	☐5	☐6
n. Influencing the progress of your current research.....	☐1	☐2	☐3	☐4	☐5	☐6

SIGNIFICANT CAREER ACCOMPLISHMENTS

30. What do you consider to be the two or three most important accomplishments in your career?

DEMOGRAPHICS

The last section of the survey asks about demographic information, including your education.

31. What is your gender?

Male	☐ 1
Female	☐ 2

32. Are you Hispanic/Latino?

No, not Hispanic/Latino	☐ 1
Yes, Hispanic/Latino	☐ 2

33. What is your race? *(Please select all that apply.)*

American Indian or Alaska Native	☐ 1
Asian	☐ 2
Black or African American	☐ 3
Native Hawaiian or Other Pacific Islander..	☐ 4
White	☐ 5

34. What is your birth year?

— — — —

35. Which of the following doctoral degrees have you received and in what year did you receive them? *(Please select all that apply.)*

		Year of most recent degree
PhD	☐ 1	_____
ScD	☐ 2	_____
MD	☐ 3	_____
DO	☐ 4	_____
DrPH	☐ 5	_____
DDS	☐ 6	_____
DMD	☐ 7	_____
JD	☐ 8	_____
DVM	☐ 9	_____
Other (*Please specify.*)_____	☐ 10	_____

36. Which of the following other degrees or certifications do you have?

MS	☐ 1
MA	☐ 2
MPH	☐ 3
MBA	☐ 4
NP	☐ 5
RD	☐ 6
RN	☐ 7
Other (*Please specify.*) _____	☐ 8

Appendix C.

Excerpt from the In-Depth Interviews Report—Methods and Findings

II. Methodology

Sampling

The deputy director of CPFP provided Westat with an Excel file of alumni and current fellows of the program, which was used to draw a stratified random sample for participation in the phone interviews. Stratified random sampling was used to select alumni from three broad career sectors based on their current place of employment on record—government (primarily NIH), academia, and private sector/other, which included for-profit companies, nonprofit organizations, medical practices, and cancer centers. Alumni for whom no current place of employment was listed were traced on the Internet through websites such as Google and LinkedIn. Current CPFP fellows, the deputy director of CPFP who is an alumnus of the program, and five alumni listed in the Excel file as deceased were excluded from the sampling frame. The resulting sampling frame comprised 205 alumni.

Using the Excel RAND function, a random number was assigned to each alumnus in the spreadsheet. These random numbers were then reviewed to ensure that Excel had assigned each alumnus a unique number. Within each of the three career sectors, the alumni assigned the 18 lowest numbers were selected for recruitment. As a result, a total of 54 alumni were sampled with the goal of interviewing 27 alumni equally distributed across the three career sectors. Oversampling in this way was used to facilitate recruitment by allowing Westat to schedule interviews with the first nine alumni in a career sector to agree to participate.

Recruitment

All alumni for whom Westat had an email address were sent an announcement on CPFP letterhead on December 5, 2012, explaining the purpose of the CPFP program evaluation, the interview component of the evaluation, and the process for sample selection for the interviews. The email included an assurance of confidentiality and encouraged alumni's participation should they be selected. Alumni for whom we had a mailing address were also sent a hard copy of the email announcement on CPFP letterhead. Westat traced contact information for sampled alumni whose information was not current (i.e., based on undeliverable emails), and a second email was sent on December 5 and 6, 2012, to alumni for whom we found a new email address.

Phone recruitment began within a couple of days of the emails and letters being sent. Experienced Westat staff were used to recruit participants and schedule interviews with 27

alumni, nine from each career sector. Recruitment staff were versed on the evaluation in general and the interview component more specifically, and were provided a frequently asked questions guide that covered topics such as how alumni were selected for participation, how long the interviews were expected to last, and the types of questions alumni would be asked.

Recruitment staff began recruitment calls by confirming that alumni received the initial evaluation announcement to ensure that they were aware of the evaluation and the interview component. Alumni who indicated that they did not receive or see the initial announcement were sent a new email after staff confirmed or obtained their email address. Recruitment staff also confirmed alumni's current place of employment. If an alumnus was found to be working in a career sector different from the one for which he or she was sampled, the alumnus was counted in his or her confirmed current career sector. One alumnus who had transitioned from the academic to the private sector was recategorized accordingly.

Alumni were asked if they were willing and able to participate in an interview about the program within the next few weeks, with the understanding that their participation was voluntary and that their data from the interview would be confidential. Staff scheduled interviews with alumni who consented to participate and had time available during the specified timeframe.

Interview Protocol Development and Administration

Interview protocols were developed in consultation with CPFP staff and covered the following topics:

- Information about alumni's current job;
- CPFP as a community of cancer prevention researchers;
- The mentorship alumni received during the program;
- How the fellowship prepared alumni for a career in cancer prevention;
- How the fellowship affected alumni's career path and development;

- How the fellowship affected alumni's professional identity in the field of cancer prevention;
- Metrics for measuring career productivity and success in alumni's current job;
- Benefits of participation in the program; and
- Recommendations for program improvement.

Interviews were conducted in December 2012 and January 2013 by the authors of this report. Interview protocols were structured but allowed for prompts and follow-up questions to invite more detailed and comprehensive responses. Alumni currently in the government sector (n=9) were asked all of the questions on the interview protocol. Alumni currently working in the academic and private sectors (n=18) were asked a subset of the full interview protocol. At a minimum, each question was asked of 18 of the interviewed alumni.

The abbreviated protocols were alternated among alumni in the academic and private sectors so as to elicit responses from alumni in all three sectors for all questions in the protocol. All three protocols used are included in Appendix A. Interviews were conducted by phone and lasted, on average, just over 30 minutes. Each interview began with a reminder that participation in the interviews was voluntary and the data from the interviews would be confidential. Interviews were recorded with participant consent to ensure the accuracy of the interviewers' notes.

After the first five interviews were conducted, Westat sent CPFP a summary of preliminary findings. Westat and CPFP staff then discussed the findings, the average length of the interviews, whether the protocols were working as intended, and recruitment progress. Because major themes from alumni's fellowship experience were woven throughout the interviews (e.g., the value of the MPH, the importance of mentoring), several questions were found to elicit similar information, but from different viewpoints. Westat and CPFP decided that no modifications to the interview protocols were needed and data collection proceeded with the remaining 22 alumni.

Alumni Characteristics

Table 2-1 provides descriptive data on the 27 interviewed alumni, as well as the 211 alumni in the study population as a whole. Interviewed alumni were very similar to the overall alumni population in terms of gender and race/ethnicity. Among the interviewed alumni, 67

percent were female and 70 percent were white, compared to 72 percent and 68 percent, respectively, in the overall population. While the interviewed alumni were purposefully divided evenly across the three career sectors, 50 percent of alumni are listed as currently working in government, 26 percent in academia, and 24 percent in the private sector.[1] The majority of interviewed alumni entered the program between 1990 and 2004 (89 percent), a higher percentage than those in the overall study population (71 percent). This is largely due to the fact that no interviewed alumni entered the program in the 1980s (compared to 6 percent in the overall population) and only 7 percent entered the program between 2005 and 2009 (compared to 21 percent in the overall population).

Table 2-1. Sample and population characteristics of alumni

Characteristic	Interviewed alumni		Alumni population	
	Number (n=27)	Percent	Number (n=211)	Percent
Gender				
Female	18	67	152	72
Male	9	33	59	28
Race/ethnicity				
White	19	70	144	68
Asian	5	19	32	15
Hispanic	2	7	13	6
Black	1	4	18	9
Other	0	0	2	1
Missing	0	0	2	1
Current career sector[1]				
Government	9	33	103	50
Academic	9	33	54	26
Private industry/other	9	33	49	24
Program entry date				
1985–89	0	0	13	6
1990–94	6	22	34	16
1995–99	7	26	42	20
2000–04	11	41	74	35
2005–09	2	7	45	21
2010–12	1	4	3	1
Program exit date				
1985–89	0	0	3	1
1990–94	2	7	25	12
1995–99	7	26	34	16
2000–04	6	22	53	25
2005–09	9	33	52	25
2010–12	0	0	3	1
Missing	3	11	41	19

[1] Excludes alumni who are deceased.

NOTE: Percents may not add to 100 because of rounding.

[1] At this stage of the evaluation, tracing was not conducted on the entire population of alumni. As a result, current career sector reflects what is known about alumni at the time and may need to be updated.

Analyses

NVivo 9 qualitative data analysis software was used to analyze the data. Analyses began with the development of a set of broad descriptive coding categories aligned with the nine protocol themes noted above and other key issues that emerged during the interviews. Additional codes were then developed to reflect more detailed themes or constructs, thereby creating levels of specificity beyond the initial descriptive coding categories. Quotes from alumni are provided throughout the report to illustrate the themes that emerged from the interviews. Quotes were sometimes edited for clarity and readability without modifying the speaker's point of view.

While we have made an effort in the course of this report to provide counts of alumni who supported one view or another, the reader is cautioned that such counts are not always exact as is typical of qualitative research. In this particular report, we encountered frequent overlap in responses provided by respondents across various interview questions. We have done our best to avoid repetition and duplication of output in our analysis and reporting, but some of the latter is inevitable given the nature of the questions asked. Even though only a subset of our sample—18 alumni—were asked the majority of interview questions, as we report on findings from each question throughout this report, we draw upon information from all interviews since alumni frequently addressed topics related to the question at hand, although not specifically asked.

The reader should also keep in mind that aside from all personal and programmatic reasons that account for differences in opinions presented in this report, historical factors are also at play. Alumni interviews span more than 20 years of CPFP history, and during that time the program has undergone multiple structural, leadership, and programmatic changes.

III. Findings

Current Employment

Interviews began with alumni briefly describing their current employment. The majority of alumni are still working in the cancer field; 21 of the 27 interviewed alumni described doing work that still has a connection to cancer and cancer prevention, primarily through research. Alumni's current research covers an array of topics that include the effects of lifestyle factors on cancer risk, the use of chemopreventatives, and the etiology of various cancers and their risk factors. Three of the 27 alumni are practicing in the medical field, and while two of the three do not conduct research, they are involved with cancer prevention, diagnosis, and/or treatment. Additionally, one alumnus is leading a cancer prevention program primarily geared toward underserved populations, while two alumni are developing cancer prevention and treatment technologies.

Some of the alumni who no longer work directly on cancer prevention are still employed in the fields of nutrition and epidemiology. One alumnus mentioned that this work is not wholly unrelated to cancer prevention given that much of cancer prevention research has a nutritional component. As to why their careers have diverged from cancer prevention, alumni most commonly cited personal life circumstances (e.g., family relocation, work/life balance decisions) that led them to take a position outside of the field. To a lesser extent, a couple of alumni cited difficulty finding job opportunities in cancer prevention. One recent alumnus who still works in cancer prevention suggested that there is greater focus and funding on cancer treatment than on prevention, a sentiment echoed by at least one other alumnus. Although she indicated that the skills and knowledge gained during the fellowship are transferrable, she wondered whether potential employers would readily know that.

Participation in a Community of Cancer Prevention Researchers

All interviewed alumni were asked about the extent to which the fellowship provided them with an opportunity to participate in a community of cancer prevention researchers. Alumni were also asked about the extent to which contacts made in the course of the

fellowship have been maintained since leaving the program and the effect of those contacts on their career.

General Perceptions. Alumni were overwhelmingly positive in their assessment of the way in which the fellowship brought them into the fold of a diverse community of cancer prevention professionals, often describing it as a hallmark feature of the program. More than half of the interviewed alumni noted that exposure to many types of research and researchers in the course of the fellowship gave them the background to be able to participate in a variety of scientific discussions outside of their own narrow field of expertise, a recurring theme throughout the interviews and one way in which alumni distinguished CPFP from other postdoc programs.

> *It was very much a supportive environment overall, with experts from all different disciplines in cancer prevention looking at all different types of exposures and angles within sort of the broad field of cancer prevention. So there were way more opportunities than I could take advantage of to participate in a community of cancer prevention researchers.*

A few alumni interviewed also expressed appreciation for having a peer group with whom they went through the program, another distinctive feature of the fellowship as identified by alumni. Fellows entered the program from a variety of backgrounds and pursued a wide range of research interests while at NCI. Regular meetings with their peers gave fellows a window into other work being conducted in the field.

> *There was a definite sense of community, whether it was participating in activities that happened within the branch where I was primarily working or, I think, also there was a big sense of community from the activities of the fellowship. We met either weekly or biweekly to see fellows present on their research, and there were other regularly scheduled fellowship events that definitely fostered an important sense of community and an important sense of multidisciplinary thinking. So even though my research has, since my time in the fellowship, been focused on cancer survivorship, you know, I was always exposed to the research that other fellows were doing in basic science or preclinical science or in epidemiology or exercise physiology—it all ran the gamut and that was important.*

> *I think that part of the program was excellent because it brought in individuals with diverse backgrounds who had training in other areas or other areas of cancer research, and then brought them all together under a common umbrella of cancer prevention. So we were both exposed to the other fellows, as well as their mentors who were working at the NCI in different areas of cancer prevention… Through [the other fellows], you got to see what was happening across the NCI or, like I said, if they were working with people outside the Institute, then that as well.*

As the quote above indicates, the community of cancer prevention researchers to whom fellows had access extended beyond NCI's walls. Alumni frequently mentioned their access to

researchers outside of NCI through guest speakers, collaborative projects, conferences, and connections made through NCI and NIH networks. One alumnus described NCI as "the locus" for research activity in the field, while another alumnus explained that being a CPFP fellow gave him the "green light" to initiate contact with professionals in the field.

> *There's a way in which the program allows different disciplines to fuse their past experience with their future experience in cancer prevention… [The program] is not rigid in how you go about achieving your goals. At least when I was there, it allows you to network with, like I said, nonconventional research actors that are doing different things from what you are doing. Or if you had, you know, interests outside of your expertise, it allows you an opportunity to venture out, outside of NCI, into the surrounding research community that is out there.*

> *The fellowship by itself, for me, was like a trampoline because being a fellow and being affiliated with the National Cancer Institute helped me to contact other people in the country that were working on cancer prevention and control.*

Only two alumni expressed mixed feelings with respect to the communal aspect of the program. These alumni indicated that although the fellowship was a good opportunity and they learned a great deal during the program, they feel that their connection to the broader cancer prevention community *through the fellowship* was limited. One alumnus described feeling detached from the fellowship community due to her location off of the main campus and away from other fellows. The second alumnus indicated that the majority of her network connections came through her projects in the lab and as a result of her own initiative; she did not attribute those connections to the fellowship itself.

Maintained Connections. The majority of alumni have maintained email, phone, and/or Internet contact (e.g., Facebook and LinkedIn) with at least a few individuals from the program, such as their mentor or members of their fellowship cohort. Only one alumnus indicated that he has no contact with anyone related to the program, while one other alumnus indicated that his only contact is through emails he receives from the program; both of these alumni finished the fellowship more than a decade ago.

Many alumni noted that their CPFP connections are both professional and personal in nature. One alumnus, in particular, mentioned that she and four other members of her cohort formed strong bonds during their MPH program and have since maintained very close ties, regularly turning to each other for support and advice. In general, alumni indicated that they commonly connect with former fellows and NCI staff through conferences, mutual membership in professional associations, and research collaborations. The majority feel that they can still contact fellow alumni and program staff if they have a question or issue with which they need assistance, and this is particularly advantageous given the range of expertise these individuals have.

I think one of the most important aspects of [the CPFP community] was that I still feel to this day that I can pick up the phone and talk to any one of my class members or any one from the few years ahead of me or behind me that I would have known well and ask their advice on something, whether it's the technical aspects of epidemiology or whether it's something entirely different like putting together questionnaires or social science research or anything else that covers the broad spectrum of expertise that the fellowship represents.

Effect of Connections. Alumni overwhelming spoke about the way in which connections made through the fellowship have benefited them throughout their career. Only two alumni indicated that connections made through the fellowship have had a limited effect on their research or career. For one of these alumni, this was due to her post-fellowship career moving in a direction away from cancer prevention.

Just over a third of interviewed alumni cited the fellowship community's direct influence on career opportunities. Several alumni indicated that they learned about a position or were hired by an employer as a result of their NCI connections. For some, these connections continue to have an impact several years down the road. One alumnus indicated that the connections she has made through the fellowship have carried her through all her subsequent positions in the government, academic, and private sectors. In addition, seven alumni spoke to the way in which being a part of the NCI community either expanded their professional horizons, opening up a range of career possibilities they did not know existed, or helped them transition into the field of cancer prevention or from one methodology (e.g., basic science) to another (e.g., population sciences).

It taught me a great deal about networking and reaching out and also about not looking so myopically at certain situations. So with that said, it broadened my horizons in a number of different ways. One is networking; two is the ability to learn how to collaborate; and three is how to build a project and create a team with a number of different individuals that don't necessarily ordinarily travel in the same circles.

I think [the connections] have been really helpful. I did this really unique thing where I transitioned from a laboratory scientist to an epidemiologist; I mean, that's a pretty big leap in your career. And I don't think I would be able to do that without the Cancer Prevention Fellowship colleagues because you need that kind of colleague base to ask questions of, to look at their coding, to kind of figure out what they're doing, to talk with them. So that transition period, going from one type of scientist to another, that group of people was invaluable to me. After the fact, they're just some brilliant people, which is really nice to still talk to all those people because they're really brilliant in doing what they do.

Several alumni cited the benefits of an ongoing network of support in terms of advice, recommendations, and resources. For example, one alumnus mentioned that she was recently

contacted by a former NCI colleague about a funding opportunity, while another alumnus noted that he is still able to obtain most of his lab materials—critical to his research—through contacts in NIH labs made during the fellowship. Two other alumni discussed how the program immerses researchers in the field of cancer research, and while fellows disperse throughout the country after the fellowship, often working in organizations that are not so singularly focused, maintaining connections with NCI-affiliated staff keeps them abreast of the latest developments in the field.

> *I think [these connections] have been very valuable. I think working at the NCI made me attractive to my current employers both substantively and by affiliation or reputation… While being at the NCI, one thing that was helpful is that because it's about cancer all the time, I felt very current and up-to-date about interests and activities in the field. And I found since leaving, because I'm in a broader environment at the university where there's many research interests here including the majority of them being non-cancer, that I sometimes need to actively stay abreast in my field in other ways and one way of doing that is reconnecting either through program communications or, I suppose, sometimes directly with individuals at the NCI to understand what some of the current interests and activities in the field are.*

Alumni cited a wide range of other effects on their research and career that include continuing collaborations and co-publications; exposure to a breadth of knowledge, skills, and expertise that are still highly relevant to their current work; leadership positions they have held, which they attribute to their NCI network connections; and the influence of working with some of the "great thinkers" in the field of cancer research.

Mentorship

The cornerstone of CPFP is mentored research. Eighteen alumni were specifically asked to discuss the mentorship they received during the program, including the balance between autonomy and guidance, and the effect of the mentorship they received on their research and career. The remaining alumni in the sample invariably also discussed their mentoring experience during the fellowship, even though they were not directly asked about it.

General Perceptions. With few exceptions, alumni were overwhelmingly positive in their assessment of the mentorship they received. It was clear from the interviews that the mentoring relationship is a keenly personal one, but several overall themes emerged. The vast majority of interviewed alumni were mentored by multiple individuals, not just their preceptor. They were commonly given a considerable degree of freedom to set and follow a course for

their research, although some alumni indicated needing more or less guidance. Several alumni have kept in frequent touch with their former mentors, and some have ongoing collaborations.

Alumni indicated that the collegial atmosphere at NCI and the structure of the CPFP program facilitated fellows receiving mentorship from a number of individuals. Surrounded by so many researchers with different areas of technical expertise, fellows could direct their questions to individuals in the best position to answer their questions. Many alumni also noted a willingness on the part of NCI staff to provide mentorship, and in general, alumni found the access to multiple projects and perspectives extremely valuable.

> *When you went into a group there, you kind of took on the whole group and everyone mentored you… Everyone was willing; all the different faculty were willing to kind of help you with a project, to get you inspired about a project.*

> *[The program director at the time] was always providing us with opportunities, and guidance, and direction. It was without a doubt, many, many people providing input, even other fellows. There were a couple [of alumni] who had stayed on as staff at NCI and they would come and have lunch with us and talk about opportunities. I think it was just an incredible situation.*

> *I still think of [my mentor] as my mentor... I still actively rely on him for mentoring. There have been many times—not just because we still collaborate—but as I've moved [between positions] and any time I've encountered a professional challenge and even to some extent personal challenges, I really consider [my mentor] someone whose advice I always seek out and I trust and absolutely rely on.*

One alumnus mentioned, however, that being involved with more than one project and mentored by multiple individuals could result in conflicting advice, which posed challenges for her. Although most other alumni did not raise this issue, the point is valid as fellows navigate competing demands on their time and dealing with different personalities.

Most alumni spoke favorably about the autonomy they were given by the program and their mentors. Several noted the significant role of the program and its funding structure in allowing them more freedom in their research than other postdocs who are paid for the lab in which they work. This freedom was important because, as some alumni pointed out, the goal of a postdoctoral program is for postdocs to become independent researchers. They felt their growth as professionals was fostered by their ability to select a mentor whom they thought would be a good fit, identify a topic of interest where they thought they could make a contribution to the field, and conduct their own research.

> *Since I was a Cancer Prevention Fellow, I think I was given more flexibility to kind of craft my own research with my mentor versus ones he hired and was paying out of his own pocket. You're kind of like free fellows for a lot of the people—they don't have to pay your salary—so that gave you a lot more flexibility to kind of do the work you wanted. At*

least, I felt it gave me more say in how I wanted to do things… I think that really was helpful especially for moving up and kind of creating more people to be an independent thinker.

To me, the thing that I value the most about [his mentoring], he did a really good job of bringing me into the branch… He was always supportive of my interests in kind of bringing a new focus to the work that the branch had been doing more broadly. And so he's a very generous mentor in a lot of ways and I think that that's one way that he's been a generous mentor. He was really generous in his flexibility around letting me say well, this is what I want to do.

In addition to technical advice, some, but not all, alumni indicated that they received advice about the direction of their post-fellowship careers. Alumni were advised about career-related matters by their research mentors and/or CPFP program staff. Alumni had differing impressions as to whether this advice steered them toward a particular career path. While some alumni noted that the advice they received was "unbiased" and covered the range of possibilities open to them, others felt that they were encouraged to pursue a career in academia.

Career [advice was] very much more open than what I saw [in other] postdocs. Like when I was doing my Ph.D., the people who were around me who were in their postdocs got, I would say, little, if any, guidance outside of staying in an academic environment. I did not see that at all at NCI. I saw recommendations to other government agencies, to academics, to industry. All kinds of options and none of them, what really pleased me was none of them were better or worse in the way they were presented. They were just options.

Then there was grant-writing training and so we actually would work on what would be an NIH grant because when I was there they wanted to place fellows in academic institutions and have the fellowship influence the field that way.

On the other hand, one alumnus felt that career advice from NCI staff was limited because many of the staff did not have broad career experiences and therefore could not speak knowledgeably about career opportunities outside of NCI and NIH.

Balance Between Autonomy and Guidance. As noted above, a number of alumni noted that the goal of a postdoctoral program is to nurture independent researchers. Consequently, achieving an appropriate balance between guiding a fellow's work and giving that fellow the space to become an independent thinker and researcher is critical. Fifteen of 18 interviewed alumni indicated that the balance between the two during their fellowship was, in fact, appropriate. For almost all of these alumni, that meant that they had a great deal of latitude to forge their own path while still having the benefit of the expertise of their mentors and colleagues.

[The program director at the time] really encouraged people that this should be their only postdoc. That people coming out of this fellowship should be relatively independent and ready to go.

For a few alumni, this balance was achieved by their mentors providing fellows with more direction and less autonomy than other fellows in the program may have had. For example, two alumni explained that this approach made sense for them as they were transitioning from one discipline to another, but they noted they were still encouraged to bring their own ideas to the table. A third alumnus who left the program early explained that while he mainly conducted directed research during his time in the program, his understanding was that he would have been involved in more independent research had he stayed longer.

Some alumni explicitly noted that the structure of CPFP facilitated a balance between autonomy and guidance because CPFP fellows are funded from the program rather than from a particular lab (contrary to the way most postdoctoral programs work). As a result, autonomy of fellows is built into the program. In fact, one alumnus noted that it would not have mattered if her mentor did not encourage her autonomy because autonomy was an expectation of the program and he was obligated to provide her with that experience. This example illustrates how some alumni saw the program as a resource they could call upon if they needed assistance with their preceptor or lab, although that did not seem to be an avenue that most fellows needed to pursue.

On the other hand, three of the alumni with whom we spoke stated that an appropriate balance for them was not achieved. One of these alumni felt that he did not have enough autonomy while he was a fellow and noted that he has much more freedom in an academic environment than he did at NCI. He further explained that while he ultimately worked on great projects that he enjoyed, he had ideas that he wanted to pursue but was unable to because they did not align with the agenda of the branch. The remaining two alumni felt that they had too little guidance, with one describing her situation as "sink or swim." She also noted, though, that she had an idea she wanted to pursue but was unable to because of the constraints imposed by her mentor and his lab. The third alumnus felt that he was "on his own" in terms of selecting a mentor and deciding his future.

I think one of the challenges that I had was there wasn't a lot of autonomy. One thing I've really enjoyed from leaving the NCI was more freedom to pursue what I'd like. I had a lot of ideas that I wanted to pursue at the NCI, but it just didn't quite fit in the agenda of the branch, or the unit, and I didn't pursue those.

Different people may have different experiences. I felt almost like thrown into—okay, you decide who you're going to take as your mentor. You're around, talk to people, see who has space for you to come and do research with them. So I felt a little bit on my own. I don't know if this has changed, you know, I'm talking about ten years ago. So, it felt like I was left on my own to figure out what direction to go.

Interestingly, one alumnus wondered if being encouraged to develop and follow her own ideas, even if they did not align with the work already being done by her branch, would have disadvantaged her had she wanted to continue her employment in that branch after her fellowship.

Effect on Research. The most commonly cited impact of the mentorship was the way in which it shaped the focus and direction of alumni's work both in terms of their specific topic and methodologies and also in terms of their commitment to the field of cancer prevention and cancer research.

> *I think if I didn't have that opportunity to develop my own independent research, I wouldn't be doing what I'm doing. [The work I did during the fellowship] ended up being my whole career. I came to my mentor with that's what I want to study and with support of the fellowship, I was able to develop research that other people weren't doing, including my mentor.*

> *I think that the mentorship during the program just supported me to be more productive than I think I ever thought I could have been. And since then [the mentoring] has given me a focus, or a sense of focus, or a sense of mission in my work … Their mentoring was so principle-driven, [and] committed to helping people affected by cancer, and no matter what else is going on, that is the kind of bottom line. That's always the benchmark. That's always the touchstone. How do I make a decision about whether I'm going to do this or not? Well, is it going to make a difference for people who are affected by cancer?*

Alumni frequently mentioned career opportunities that were influenced by their work with their mentors, including subsequent jobs, leadership positions, and publications during and after the fellowship. Several alumni also commented on how the breadth of knowledge, skills, and expertise to which they were exposed benefited their work and careers. They included technical expertise in different content areas and methodologies, practical information on how to approach publishing their work, valuable lessons about data collection management, and exposure to public speaking and leadership seminars in the list of benefits.

Career Preparation

Eighteen alumni were specifically asked how participation in the program prepared them for a career as a researcher or leader both in cancer or cancer prevention and more generally. Alumni were also asked whether they thought the fellowship had prepared them differently than other professionals.

Preparation as Researchers and Leaders. Alumni most commonly cited broad exposure to the field, the skills and knowledge they received, the freedom they had to pursue their interests, and connections they made as a result of the fellowship as integral aspects of their training as researchers and leaders. Individual alumni also cited the passion and confidence the program instilled in them, their immersion in cancer prevention and control, and the range of research and career possibilities that participation opened up to them. Entering the fellowship, most alumni had a vision of the direction they wanted to take their career, but many indicated that they did not yet have the knowledge or skills that they needed to realize that vision, knowledge and skills they learned and refined during the fellowship.

> *It gave me a broader view of cancer in general and the very different aspects that contribute to the problems. Coming in, you're very focused on one small aspect of it so it gave me a much broader view. And it allowed me to make contact with people that I wouldn't ordinarily work it.*

> *I think that the most important thing that I got from the fellowship was it ignited a passion for science that I had when I was a grad student and then I lost it. And then in the program, essentially they allowed me to see things that before I was not able to see with the training that I was taking. So I think that the most important thing for me was passion for what I was doing. And then after that, I got the tools to feel like I would be able to be a successful academic researcher. I didn't want to be a professor. So then during the fellowship I felt like I had the tools to be competitive in terms of writing grants, in terms of doing science and writing manuscripts. Before I didn't feel like I had that ability.*

In addition, a handful of alumni mentioned leadership-related training they received such as professional development on public speaking and management skills although the availability of leadership training seems to have varied depending on when alumni were in the program. More commonly, alumni spoke about general aspects of the fellowship that gave them the ability to become leaders in the field including access to innovative research and "thought leaders" during the fellowship and opportunities to take a leadership role, for example, by organizing workshops. Those who did not see themselves as leaders in the field often expressed the belief that they could get there, in time, as their career progresses.

> *I think that to be a true leader in one's field, content expertise, and advanced skills, and advanced research skills are what will truly distinguish leaders. And I think those are all provided by the program.*

> *I think more so than any other fellowship could have, and I mean this is obviously based on conversations with other friends doing other fellowships, I would say it definitely prepared me as best as it could because there is such a focus on leadership and career development; not just in the work you do, which naturally helps prepare you, but also in the different workshops and events. Would I call myself a leader in the field? No. But is it something I feel as though it's a goal and a reasonable goal, and I have the skills to help get me there, definitely.*

Preparation Compared to Others. The majority of alumni described the fellowship as distinctive, often for reasons echoing the ways in which they felt the program prepared them to be researchers and leaders in the field. Several alumni cited the structure of the program as exceptional—the MPH, introductory summer course, weekly meetings with a cohort of fellows, the ability of fellows to interview and choose their own mentor, and the funding structure of the fellowship, i.e., through CPFP funds rather than individual lab budgets. Because of the program, alumni earned a degree that they frequently cited as invaluable to their career, became conversant about a scope of research beyond just their own particular research area, and were afforded more autonomy than one would expect in a typical postdoctoral program. As noted above, these program characteristics played an important role in preparing alumni for their post-fellowship career, regardless of whether they stayed in the field of cancer prevention.

> *Because the fellowship is so interdisciplinary in terms of the makeup, you definitely get a better appreciation of different areas of research. So even though I came in with a particular background, I had to sit through talks that were completely not in my area, didn't really know what they were talking about, but you get a better appreciation of what your colleagues are doing. It gives you that opportunity above and beyond a regular postdoc at NCI.*

To a lesser extent, a small number of alumni noted leadership training and grant-writing experiences as characteristics that set the CPFP apart.

Career Path and Development

Eighteen alumni were asked a series of questions about the path their career had taken, from their pre-fellowship expectations to their post-fellowship realization of their career plans, and how the fellowship played a role in their professional trajectory.

Pre- and Post-Program Career Expectations. Alumni's expectations for their careers and how those expectations were realized or transformed are almost as unique as the alumni themselves. Alumni included a physician who took a leap of faith and transitioned from treating cancer to studying how to prevent it; a bench scientist for whom the death of a parent from cancer had a profound effect on her career plans; and a behavioral scientist who wanted a career where she could meld her interests in clinical practice, epidemiology, statistics, and research. Despite personal differences, several themes emerged from alumni's interviews. First, almost half of these alumni thought that they would pursue an academic career. Second, alumni were often looking for an avenue to transition into a new field or area of research,

commonly from bench to population science. Finally, many of these alumni noted a sense of uncertainty before the fellowship about where to take their careers.

As discussed in more detail below, alumni credited the fellowship and the MPH as enabling their career transition through training, connections, and exposure to a range of research and professional opportunities in the field. Ten of the 18 alumni asked about career expectations indicated that they are currently in the line of work they expected when they left the fellowship. For those who are not, three had personal life circumstances steer them in a new, although not necessarily unwelcome, direction; two did not expect to be in the position they are in now, but are content with the direction their careers took; one was offered an opportunity outside of cancer prevention that was too good to pass up; one was not able to merge his professional interests as he had expected; and the remaining alumnus had no firm expectations.

Rethinking of Career. Ten alumni indicated that the fellowship did, in fact, lead them to rethink their career, although in one instance, the alumnus realized that he would not be able to merge disciplines as easily as he had hoped and left the program early to pursue his original career path. But the rest of these alumni saw the fellowship as enabling them to shift their research focus and thus change their career trajectory. It also opened an array of possibilities that alumni had not previously considered or knew existed.

Many of the alumni who stated that the fellowship did not cause them to rethink their career expressed similar views about the fellowship's influence on their thinking as those who did, but they framed their responses differently. For example, they noted that the fellowship helped them transition from one career focus to another or reinforced decisions they made about their career before entering the program. Most of the alumni we interviewed applied to the program because it was an opportunity for them to pursue their interests and realize goals they had in mind, regardless of how specific those goals were. Whether they defined that as leading to a rethinking of their career or not, the tangible results of participation were often the same.

Effect of MPH. A predominant theme throughout the interviews was the importance of the MPH in terms of alumni's research interests and career plans. All but two of the 18 alumni to whom we posed this question had received their MPH through the fellowship. Those alumni who received the degree described the effect of the MPH on their work and career as "critical," "profound," and "transformative."

> *Profound. Profound effect. I think that's one of the most important things not only during the fellowship, but in my life. That MPH degree gave me the opportunity to really understand public health and to really understand that there is much more than just*

treating one patient, one person. That for me was extremely important. I would say it's one of the nicest features of the fellowship program.

[The MPH] definitely gave me a different view of how research could be done. I had done vaccine research as a grad student, but this was, again, very basic science and I was frustrated with the research because I wanted to know how it was going to affect people… It was definitely a huge motivation for me to want to go into public health because at least, I thought, well, if I do any kind of research, I want it to be something where it's relevant to human health. So I think that's the biggest change in direction for me and the MPH definitely helped with that.

I think the MPH had a big effect. My first faculty position was in the department of epidemiology and although there were basic science Ph.D.s, I think having an MPH and having an MPH from a prestigious institution has helped me. It has helped me also for my current position in the department of epidemiology. I am teaching cancer epidemiology right now so the whole background from the MPH and NCI [has been useful]. The MPH has helped tremendously. I think also from the whole way I am looking at research has helped me focus more on research that is geared toward making a difference rather than being nailed down by basic research focused on understanding the various mechanisms.

They explained that the MPH provided them with a strong foundation in epidemiology and a broad perspective on research and methods in the field of public health. The benefits of this training included enabling several alumni the ability to fill a gap in their skillset and transition from one area of research—often bench work—to population studies. It also gave alumni the ability to speak "a common language" with researchers from different backgrounds, therefore facilitating interdisciplinary collaboration. One alumnus noted that having the MPH credential provides "credibility" and advantages her in grant applications.

Effect on Interest in Cancer Prevention. More broadly, when asked about the effect of the fellowship on their interest in cancer research and cancer prevention, alumni were overwhelmingly positive about the experience and the way in which the fellowship both broadened and deepened their interest in the field. Alumni indicated that the program generated an excitement about new areas of research and discoveries in cancer prevention and solidified their passion for and commitment to cancer prevention. For example, one alumnus recounted how, six months into a private sector job in which she was conducting research on a range of topics, she realized her commitment to cancer prevention research and found her way back into a position where it would once again before the focus of her career.

You get a very broad education about things that you wouldn't hear about every day, And maybe there're not directly impacting what you do, but you're aware of the consequences of what happens in other fields and other disciplines and how that affects cancer research. It gives you a very well-rounded education what's important and what's impactful in the field, outside of your own small niche.

[The fellowship] definitely broadened my interest not only in my specialty, but in other cancers. I think also just, again, in traditional medical training, there are certain aspects

that you are not taught to think critically like you would if you had a much broader statistical or epidemiological background. So I think it definitely improves that. And when I actually give lectures to clinicians, primarily primary care physicians, it probably drives them nuts, but I try to bring in studies to get them to think why we establish the guidelines that we do. I'm trying to disseminate that type of thinking to people that you know haven't had any training or are disinterested in it. It's one of my passions in life.

I think I always had a passion for cancer research and cancer prevention. What I was doing in the laboratory was very mechanical. There was no people involved; there was animals involved. I was doing a lot of animal work. But it wasn't until the Cancer Prevention Fellowship where I started to see our work can span from the lab to the computer to a person. That, I think, the Cancer Prevention Fellowship allows you to kind of think about populations and preventing cancer. I was so focused on treatment and these molecules and how do I make this drug. It's a totally different perspective on cancer and really, biomedical research, in general.

Alumni also noted that the fellowship provided them with valuable knowledge and skills that they apply to their work today. For example, alumni specifically referenced the MPH, the summer course that kicked off the fellowship, and the exposure to a high caliber of researchers conducting research in a vast array of areas. However, while alumni often indicated increased interest in cancer prevention, not all felt that the fellowship increased their opportunities in the field; three alumni mentioned that employment in cancer prevention was (or is) limited and that prevented two alumni from continuing in the field.

Cancer prevention is not necessarily the best-funded area because I think that the focus is still on therapy, but as somebody who's really interested in public health, prevention—this is what we love, right? So you want to do it, but will you get funding for it is the question. And if I don't get an academic position or if I don't succeed in an academic position, if I need to look at a different industry, will prevention even be valued?

Professional Identity

Because CPFP fellows enter the fellowship from a variety of backgrounds, and some may not have had prior experience in cancer prevention, 18 alumni were asked to discuss the extent to which the fellowship affected their sense of identity as a professional in the cancer field, as well as their sense of identity as a leader or change agent in cancer prevention.

Identity in the Field of Cancer Research. Most interviewed alumni came into the fellowship already having an identity as a cancer researcher. Consequently, 11 alumni indicated that the fellowship did not necessarily *change* their sense of self; rather, it deepened or solidified the identity they already had. These fellows described developing a greater sense of confidence

in cancer prevention and cancer research, a broader understanding of the work being done in the field, and a better sense of their place in the field.

> *I think it probably changed the breadth of what it means to be a cancer researcher… So, for me, I always identified myself as a cancer researcher, but now I have a much broader sense of what that means—a different definition, a broader definition of that.*

> *The program has made my identity as a cancer researcher stronger than before. I had some idea before, but the program helped solidify it. I now have the background and the language needed to communicate my work to scientists from various disciplines and even the general public. The program helped me feel more comfortable with who I am.*

> *I think there's a very strong sense, as I said, or certainly I feel a very strong sense of belonging to the program. And because the program now influences so many of the high-level cancer prevention professionals, I think you belong to the program and therefore you belong to the field.*

Four alumni indicated that the fellowship changed their professional identity in a profound way. The two quotes below are from alumni who described how the fellowship shaped their career and therefore their professional identity. The first quote is from one of the alumni who was transitioning from one career focus to another when she entered the program. For such fellows, the program supported them during this transition. The second quote highlights a theme woven throughout the interviews—the way in which the fellowship involved alumni in a community of cancer prevention professionals.

> *I'd say [the fellowship] definitely moved me from what I considered a researcher in statistics to a researcher in cancer because that's how I would describe myself now.*

> *I think it's contributed greatly [to my sense of identity as a cancer researcher]. I think without that fellowship, I don't know that I would identify as much with it. I mean, forever, I am a cancer prevention fellow. I can't even imagine what other path I would have taken… I think you very quickly started to identity with the field and feel to be part of the field [after entering the program].*

The three remaining alumni indicated that the fellowship had a limited or no effect on their professional identity in cancer research. For two of these alumni, it was because they entered the program already having a strong background in cancer research. The third alumnus indicated that while she has an abiding interest in cancer research, opportunities for her to continue working in the field have not presented themselves during her career. Because she has done very little in terms of cancer prevention and cancer research since the fellowship, she feels it has had no impact on the way she or others view her as a professional.

Identity as a Leader or Change Agent. Answering the extent to which the fellowship affected their identity as a leader or change agent in cancer prevention seemed to be more difficult for alumni. Some felt that they are too early in their careers to assess whether they are a leader or change agent in the field, although they see the potential to be. Other alumni who are no longer in the field felt that while they may have been a leader at one time, that is no longer the case. Overall, though, only one alumnus who no longer works in the field indicated the program did not affect her identity as a change agent or leader in cancer prevention in any way. The remaining alumni indicated that the program provided fellows with essential knowledge and skills to be at the forefront of cancer prevention. The strength of the program, in this regard, includes the connection of the program to a large, diverse, and influential community of cancer prevention professionals; the reputation for excellence of NIH, NCI, and CPFP; and the training fellows received in leadership, cancer prevention, and research.

> *Tying back to this notion of when you're at the NCI, there's this large network of researchers and universities and otherwise who rotate or circulate around the NCI, that the NCI, that program, in particular—Division of Cancer Control and Population Sciences—does tend to be a place where priorities are set and provides guidance to the field and so if one stays abreast and in tune with that guidance to the field it can be very valuable wherever you are. I mean, you can't stop there—you have to innovate on your own—but I think it's a leading program for the field and so the extent that you align or you are aware of their priorities it's really empowering because sometimes it takes those priorities longer to work their way out to the periphery. But people who don't stay up to date in that manner can get marginalized doing research in the field.*

> *[At the time of the fellowship], I felt like a door was opening to a huge range of opportunities and if I wanted to be a leader, I could be. And they certainly encouraged that within the program. They would like to believe that they are training leaders and when you look back at leaders in the field, they have trained a lot of them.*

> *One of the big things that I have done in terms of affecting people is in my lab. I have given a lot of undergraduates an opportunity to do research. My background, I feel like it really has an impact on how I train them. Some of the people, they have never had, how shall I say it, an idea of what research is, especially cancer. So when I open my door to them, I tell them okay, these are my expectations, these are the tools you need… and I help them to obtain the skills so that they can function in my lab. The fellowship has a summer program where they teach you basic skills like how do you obtain DNA, how do you run a working lab, so those actually gave me some ideas on how to train my students and how to approach the whole process of mentoring of my students. A lot of my grad students in my lab are working in the same areas that I am currently working on in some way or somehow.*

Benefits to Alumni

Eighteen alumni were asked about the ways in which the program has benefited their career. Specifically, they were asked what they considered to be the most significant impact of the fellowship on their career to date, and whether the fellowship provided them with career opportunities that might not have been available otherwise.

Most Significant Impact. Interviewed alumni most commonly identified the skills and knowledge they gained through participation in the program, frequently as a result of the MPH, as having the most significant impact on their career. Eight of these alumni referenced the ways in which the fellowship broadened and enhanced their knowledge in terms of the field itself and, for some alumni, in terms of learning about government and having an inside view of the grant process.

> *I think it made me much more knowledgeable, and it made me much more knowledgeable about the field of cancer control. I mean that's the goal of science—to increase knowledge... I came away from the program with a much greater knowledge in the field of cancer control.*

Six alumni specifically mentioned the skills and knowledge gained during their MPH program as the most significant benefit from participation. Alumni who received their MPH as part of the fellowship universally praised the training they received through prestigious universities, the benefits of the degree to their career, and the fact that the MPH distinguishes CPFP from other fellowships and postdocs.

> *I think the greatest impact was actually the ability to pursue the MPH degree and then also apply the skills I learned from that in a safe environment.*

> *The training in epidemiology, [the MPH], without a doubt. It was absolutely critical. There's no way I could be where I am without that.*

Several alumni described how the fellowship played an important role in getting them a job, either directly, through the NCI network, or indirectly, by advantaging them on the job market. In the case of three alumni, the program facilitated their transition from one field or type of research to another.

> *I think, in all honesty, in no small part did I get a faculty position the way that I did because of it. I think certainly coming out Hopkins School of Public Health makes you very attractive. I think you combine that with coming out of a postdoc at NCI, I think that makes you a very attractive job candidate… In that way, it was very important and influential.*

[The greatest impact has been] the network of cancer prevention scientists that you form by being in the fellowship. Something that you will not get from being just a regular postdoc fellow. And then that is an enormous help for any scientist, particularly one who is looking to bridge different fields—physicians wanting to become cancer scientists, mathematicians becoming cancer scientists, basic scientists becoming cancer applied scientists. So every which way that cross-training of individuals that occurs, occurred. And the fellowship is something that I think is very unique, and I hope will never be lost.

Three additional alumni identified the importance of the connections they made while fellows and how the fellowship integrated them into a community of cancer prevention researchers, something that was indicated when alumni were asked about the fellowship's impact on their professional identity.

I'm sure throughout my career it will impact [my professional identity]in different ways and sometimes I'll know it and sometimes I won't recognize it because there's just this process of osmosis when you're around great people. But I would say just the connections and what I anticipate as career-long collaborators, whether that's in the form of mentors or other fellows. I would say that is so impactful. I just think it's a really neat opportunity or environment to meet people from all over, different backgrounds, kind of very roughly defined common goal, something in cancer, helping in some way. I think had I been more isolated at a university I wouldn't have seen that.

Less frequently cited impacts include broadening alumni's interests in the field as a result of the range of disciplines, experts, and research they were exposed to while a fellow; conducting research while a fellow that proved to be foundational in their career; developing an understanding of their place in the field; and finally, noting that the high expectations of program staff and the quality of mentoring that encourages fellows to rise to a level of excellence.

Career Opportunities. The majority of alumni indicated that to some extent, the fellowship provided them with career opportunities that they would not have had otherwise, and for some alumni, unequivocally so. Their reasons included the prestige of the CPFP and NCI, the connections made during the fellowship that often directly led to their next position after the fellowship, and the training they received. Alumni stated that the fellowship increased their attractiveness on the job market, and for some, it opened up opportunities in a variety of career sectors such as academic positions and jobs in pharmaceuticals, nonprofits, and government agencies. As one alumnus noted, "I could have picked any place I wanted to go."

Other alumni were more uncertain what role the fellowship has played in opening doors for them, but they recognized that participation in the fellowship has bestowed certain advantages. For example, one alumnus indicated that while colleagues have come into her

department straight from a background in basic research and presumably she could have done the same, she feels she brings more to the table because of her public health training. Another alumnus indicated that she would have had the same opportunities, but that the fellowship gives fellows "a leg up" because of how it is structured, its uniqueness, and its reputation.

Reflections and Recommendations

Eighteen alumni were asked to offer their general reflections about their experience in the fellowship and their recommendations for future program development. Although this section is primarily based on interviews with these 18 alumni, several additional alumni in the course of responding to other questions provided us with their overall impressions of the program and/or commented on aspects of the fellowship they would like to see changed. Where relevant, their commentary has been included as well. Given that alumni's overall impressions of the program were often a summation of points made earlier in their interview, the discussion that follows presents the highlights from their responses to this question.

For the vast majority of interviewed alumni, their overall impression of the program was that it is outstanding. With just a couple of exceptions, alumni seemed genuinely enthusiastic about their CPFP experience.

> *[CPFP] was so intertwined with how my life went the way it went, I am extraordinarily grateful . It was one of the most important things in my life in many ways. There was not one aspect of the fellowship program that I did not thoroughly enjoy and benefit from.*

> *I think that it was a life changing experience for me. It is probably one of the things I feel most grateful for… I would count it as one of the top five things that have happened to me… They paid for you to get this education… I need to earn that for the rest of my life.*

Reflections on Program Strengths

MPH. Seven alumni explicitly cited the MPH as one of the most valuable aspects of the fellowship. This is not surprising given how positively alumni spoke about the education they received during their MPH program at other points during their interview and how frequently it was identified as having had the most significant impact on their career. As noted earlier, some alumni indicated that the MPH was critical in helping them make the transition from academia to applied research, as well as helping them understand important caveats related to the use of statistics to report research results. Other alumni found the MPH critical

because it helped them develop a "common language" with a very diverse body of fellows from a variety of disciplinary and specialization backgrounds.

> *The Master's degree, I know it was expensive. It allowed people like me from basic science, no public health mentality—and there were several of us. In fact, two came without any background, one was lawyer… The Master's degree program and going through that really leveled us in terms of being able to work and talk with each other because it gave us that solid foundation to be talking about the work we were going to be doing. I know it is an expense, but it is really worth doing. It provides a common language.*

Professional Education. Several alumni praised the various types of instruction they received after their MPH and during their tenure in the fellowship. Five of the 18 alumni who were asked this question made special reference to the grant-writing and grant review workshops. A couple of alumni also mentioned serving on grant application committees, which they found to be an eye opening experience that has stayed with them throughout their career.

> *I find that almost every day I benefit from having this inside view of how funding works at NIH and NCI. It is such a mystery to people. I benefit from that all the time. Knowing the road map for that.*

> *The familiarity with what NIH is and having it not be this very buried thing or monster thing that you cannot navigate is what most people do not have… They took us one day to the Center for Scientific Review where the grant applications would physically come in. That was amazing. If there was anything that gave me a sense of scale and what was going on and how it run, it was that field trip. Those things and experiences you cannot get any place else because NIH is where that happens.*

Alumni also spoke highly about the introductory summer course and workshops on leadership and public speaking. The summer course was praised for providing fellows with a solid foundation in cancer research and cancer prevention, while the grant-writing, leadership, and public speaking workshops were identified as features of the fellowship that set it apart from conventional postdoctoral programs. Although a couple of alumni noted that they could receive such training as junior faculty, one alumnus said that this type of training is typically unavailable to doctoral students and tough to get to as a junior faculty member.

> *The fellowship, when I did it, started with a course. It was pretty intensive. It was all we did for about a month or two and it provided a general introduction to several aspects of cancer and cancer prevention. I remember thinking at the time that it was more than I wanted, but as I look back, it was perfect.*

> *One of the things required in the fellowship program was that we had to take public speaking. We had to learn to speak in front of people. They brought someone in who trained us. I cannot even tell you how much difference that alone made. I was terrified when I had to do my*

dissertation defense. I was standing in front of people I had known for seven years all of whom wanted me to get out of there. It was not a hostile crowd. I ended up making a presentation in the World Tobacco Conference in front of 5000 people and did not think anything of it. That is huge. Being able to speak in front of people as a professional is something that I benefit from all the time … the public speaking aspect was hands down important.

Finally, four alumni referenced regular meetings where senior staff members and fellows presented their work. Such meetings provided fellows with the opportunity to become acquainted with a variety of cancer prevention topics and the research conducted by colleagues around NIH. Moreover, membership in a cohort of fellows, even though they worked on different areas of the field, was viewed as a valuable support system.

Mentorship. Six alumni discussed the high quality of the mentorship and advising they received from mentors and program staff when asked to provide their overall program impressions. Alumni's comments generally reflected a collegial spirit and "open" atmosphere infused throughout the program and NCI, as well as a high value placed on cultivating fellows as independent researchers in the field. For the most part, fellows were able to interview and select their own mentors, labs, and research topics. While some supervision was clearly evident, alumni suggested that the latter was well balanced with the opportunity to freely pursue their interests and exercise their creativity.

. . . being able to work with outstanding leaders in our field. I often look back and just think how grateful I am for that opportunity. The people I worked with were very encouraging and supportive as far as helping me get research ideas and publications and going to conferences and presenting. They were even supportive when I got my academic position. A couple of my colleagues there wrote letters for me. It was a very good experience for me.

Two alumni noted in particular the effectiveness of providing research funding through the program instead of the labs, which facilitates independence among fellows as they are given more freedom to pursue research they are interested in and therefore contribute to the field in their own way.

The way funding is, through the program rather than a lab, it's a competitive edge for fellows.

Recommendations for Program Improvement

Alumni recommendations for improving the program varied considerably. While personal experience and fit with the program certainly may have affected alumni's views on program improvement, the timing of the fellowship may have also played a factor as the program has undergone changes in structure and leadership over time.

Connect Former and Current Alumni. Five alumni recommended establishing more networking opportunities between former and current fellows. All five expressed interest in being more involved with the program and current fellows. Three of these alumni believe that more networking opportunities between former and current fellows existed in the past than they do now. They believe that encouraging this type of connectivity could be beneficial to both alumni and current fellows. For example, one alumnus noted that through one such networking meeting during her time in the fellowship, she connected with a past fellow whom she then contacted years later to seek advice on a research problem she was having.

> *. . .reach out to alumni. Maybe there is another fellow out there interested in working with [my organization] or working with a clinician through the program. Help us get connected.*

Another alumnus suggested that because current program administrators do not personally know alumni the way earlier leaders of the program did, they may be faced with a more difficult task in contacting alumni and connecting them with current fellows. She recommended reinstating networking events, which she believes CPFP no longer holds.

> *What could be improved is how to deal with alumni. There are different fellowship directors now than when I was a fellow. There is this gap. The new directors don't know us at all, the former fellows. They don't know who we are, what we do… I don't know how it could be improved. [The former director] started the program and knew everyone who had gone through it and he was able to connect people because of that. They don't know me and they don't know the other fellows very well so they are not able to connect the current fellows with their predecessors… One thing they used to have that I don't know if they have any more is that when new fellows came they would invite all the former fellows to meet them. I don't know if they have it. I may not be on the list. . .*

Provide Career Assistance. While a few alumni described throughout our interviews how the program opened up career opportunities for them and how mentors and other staff had been instrumental in linking them to future employment, four alumni felt that there was room for improvement in this area. Suggestions include providing a more structured approach to helping fellows transition to their next employment.

> *It would be nice to have structured conversations about career opportunities after the fellowship.*

> *It would have been great to hear about negotiating job offers… I would have liked information about salary, where to go…*

One alumnus noted that fellows transitioning from one discipline to another in the course of the fellowship—a frequent occurrence—find themselves in a particularly precarious situation and may require additional help in finding future employment.

Allow Adequate Time for Research. Four fellows noted that their tenure in the program would have been more productive and their transition to their first job smoother if they had had more time to do research after completing their MPH. One alumnus noted that it is critical that fellows are advised early on to pick projects that are manageable within a short time frame and which will help them transition to their next position by producing publications and enhancing their résumé.

> *I know that the fellowship has changed in the amount of years of support and the focus. If you bring someone in who is not already in epidemiology and you ask them to get an MPH and then you say "Okay, you have one to two more years in the fellowship," I don't know that that's enough time to develop. Some of us were there for four and the maximum was five. You take a year out to do a degree and then you use those skills to write a manuscript using a database or human data already collected at NIH. If you did that along with trying to develop an independent research program that would move when you go, it is awful hard to do that, do a degree and leave… The ability to have enough time, a couple of years if not three after the MPH, to be able to create research that you can take with you and a few manuscripts, it puts you ahead when you land a faculty position because you have published in an area, have preliminary data that you can then write a grant on, and those are all the things they are looking for.*

Interestingly, at the same time that some alumni commented on the need for more time for research after the MPH, two alumni warned against the dangers of staying in the program too long—"this late in their careers, four years is too long."

Facilitate a Broader Range of Placements. Alumni varied in their perception of freedom to work within NCI, NIH, and the wider community possibly because the rules and options have evolved throughout the history of the program. Four alumni suggested that they would have liked to have had greater freedom to choose mentors and labs outside of NCI and even outside of NIH. For these alumni, the ultimate goal is maximum freedom to pursue their research questions and interests. Three alumni specifically mentioned a shortage of labs to pursue clinical research within NIH and therefore the need to enable collaborations with outside organizations.

> *When bringing someone into the program, maybe the program we have does not feel like they can provide the mentorship or needs that individual has, they should bring external resources in/make bridges outside of the NCI enclave. That was definitely lacking… There was a situation where I was trying to do some clinical work outside and it took months to set up, a lot of logistical issues in terms of seeing patients outside of NCI and privileges and malpractice insurance. But once I opened doors, I got into some fantastic clinical studies… It was not handed to me, and it was not in place at the time… Maybe they've improved on this, but there could have been a lot more networking particularly for people coming in who were physicians… They need to strengthen clinical collaboration for people or just mentorship.*

They need more placements in the community. Fellows need to leave the ivory tower of NCI and NIH. Three current fellows are very interested in doing research with my patients here, which is something they do not have. They have their intramural program to do their mentorship but there is a world outside.

Recruit the Best Fellows Possible. Four fellows commented on the effectiveness of the current recruitment process. One alumnus noted that the program's greatest strength is admitting basic scientists and giving them the skills to conduct cancer prevention research. Another alumnus similarly suggested that the program should be focused on getting the best scientists on board, as opposed to seeking students who have already produced cancer-related dissertations. It should be noted that other alumni lauded the program for drawing from a deep pool of professionals that includes clinicians, lab scientists, epidemiologists, and even lawyers, those with and without experience in cancer prevention research.

My fellowship class . . . we had some brilliant people in that class all the way down to "how did these people get into the fellowship?"… It is an interesting process of who to choose to be in the program. They might have ignored some brilliant people because they were feeling that the work had to be prevention-oriented . . . Sometimes when they picked fellows they would err on the side of "we have to pick someone who in their Ph.D. did cancer prevention" as opposed to "here is the brilliance of the person, how can we mold it to be a prevention scientist."

The question is from NCI perspective, where, as part of their mission, do they feel the need or see the need in terms of prevention moving ahead? Better find those goals and then tailor the fellows that they bring to the program. There is a little bit of an impression that there are some people who were there who were perpetual postdocs. They may want to look at that.

Miscellaneous Recommendations. Other less frequently cited recommendations included connecting fellows with mentors before they begin their MPH so they can have conversations about the focus and direction of their work sooner in the program; involve fellows in more presentations around NCI and NIH; guide fellows toward careers as scientists, not administrators; and have strong leaders to guide and advocate for the program.

IV. Summary and Conclusions

Interviews with 27 alumni of CPFP represent the beginning of a comprehensive evaluation of the program that will ultimately include archival research and a survey of all alumni and two comparison groups. The findings from these interviews will inform both program improvement and instrument development for the survey planned for the winter of 2013.

Sampling for the interview component of the evaluation purposefully selected an equal number of alumni from each of three career sectors, but a review of the data on current employment for the population of CPFP alumni indicates that approximately half work in government, while approximately a quarter work in academia and another quarter in the private sector. Within these broad sectors, however, interviewed alumni are researchers, administrators, faculty members, practitioners, and entrepreneurs. Their work spans a range of topic areas and methods, most related to cancer research and cancer prevention.

The fellowship represented a critical juncture of alumni's careers, and consequently, mentorship was an important feature of their fellowship experience. While most alumni had a positive view of the mentorship they received, and many have continuing contact and collaborations with their CPFP mentors and other NCI and NIH staff, a few alumni experienced a more challenging mentoring relationship. In most cases, this was due to a level of autonomy and guidance (either too much or too little) that did not fit the needs of the particular alumnus. One of the unique qualities of CPFP is that fellows from a variety of backgrounds are selected into the program—clinicians, lab scientists, social scientists, individuals with a great deal of experience in cancer prevention research and some with none. Alumni found this interdisciplinary mix of colleagues as extremely valuable, but since some fellows were experiencing a disciplinary shift during the program, they required more guidance as they transitioned into a new phase of their career.

Alumni discussed myriad ways in which the fellowship prepared them for a career in cancer prevention, guided their career path, and shaped their professional identity. A recurring theme was that fellows' involvement in the NCI and NIH community, with wide-ranging exposure to high-quality research and researchers, was a seminal experience in their careers. The training and education alumni received during the fellowship gave them foundational skills and knowledge that alumni still find salient to their work today, regardless of whether their current work is geared toward cancer prevention research. Alumni also commonly spoke of the way that the fellowship broadened their understanding of the field and deepened their commitment to making a contribution to the field.

A key takeaway message from the interviews, across the many topics discussed, is that alumni consider the fellowship to be distinctive from other "traditional" postdoctoral programs. Defining characteristics include access to a highly regarded community of researchers and leaders in the field and the broad exposure to different research that resulted from that access, complete immersion in cancer prevention research, the space and freedom to design and conduct their research, and the opportunity to receive their MPH as part of the fellowship. In the eyes of alumni, these features are a great strength of the program and foster an environment that grooms the next generation of leaders in cancer prevention.

In the eyes of alumni, the freedom to propose their own research ideas and the ability to select a mentor and lab that they thought would best support their research and career development also set CPFP apart from other postdoctoral programs, not just in other organizations, but within NIC and NIH as well. Several alumni explicitly linked this freedom to the funding structure of the fellowship through the program rather than the individual lab budgets. Furthermore, giving fellows a sufficient degree of autonomy while still having supports in place to guide their work as needed cultivates independent researchers who have the experience and feel equipped to become leaders in the field.

NCI was described as being at the forefront of cancer research, and alumni felt well positioned to learn not only from experts in their particular focal area, but also, as a result of fellowship activities, to have access to experts who span the spectrum of research in cancer and cancer prevention. While some alumni felt that during their tenure in the fellowship the program was oriented toward one particular career sector (e.g., training fellows for academia), a greater number of alumni indicated that the expansiveness of the NCI and NIH community broadened their horizons in terms of the direction they could take their career. Several alumni contrasted this environment with the more limited environment alumni would have found in a university postdoctoral program. Complementing the diverse makeup of the NCI and NIH community is CPFP's singular focus on cancer prevention and control. Alumni already had an interest in the field before entering the program, and several were taking a career leap by changing their focus to population-based studies. Immersion in the field through the fellowship served to reinforce alumni's commitment to the work.

Last, but not least, the importance of the MPH to alumni was woven throughout the interviews, and a number of alumni identified it as one of the most significant benefits of the program. CPFP fellows enter the program from a variety of backgrounds and the MPH provides a foundational education for fellows. More than one alumnus referred to the MPH as providing "a common language" and a confidence for fellows to be able to engage in conversations about public health and participate in collaborative activities across disciplines. One alumnus described feeling an obligation to CPFP for the investment in her education that she hopes to pay back through her contributions to the field.

Alumni recommended that the program nurture and protect those features that make it distinctive. That includes ensuring a selection process that continues to value a candidate's overall credentials and potential and passion for the field, rather than focusing solely on experience in cancer-related experience. In order to provide an environment that supports professionals from a range of backgrounds, alumni suggested that program staff consider partnering with organizations outside of NCI, for example, where fellows could have the opportunity to participate in clinical work. Alumni also suggested that research mentors and CPFP program staff actively work with fellows to provide experiences conducive to career development—e.g., making sure that fellows are realistic about the time needed to conduct their research and publish findings in time for their entry into the job market.

Relatedly, unbiased and practical career advice is at a premium for fellows, but only a few alumni indicated that they had had specific post-fellowship career discussions with their mentors. This is particularly relevant considering the experiences of a handful of alumni who found positions in cancer prevention were limited after they finished the fellowship. Toward this end, numerous alumni advocated for CPFP to facilitate more involvement of alumni in a robust support network for current and former fellows. Alumni frequently discussed the value of their CPFP and NCI connections for advice and professional opportunities and expressed interest in providing that support to others.

Appendix D.

In-Depth Interview Protocols

Cancer Prevention Fellowship Program

CPFP Interview Questions

Thank you for agreeing to talk with me today about your experience with the National Cancer Institute's Cancer Prevention Fellowship Program (CPFP). My name is Kimberley Raue and I work for Westat, an independent research organization in Maryland. NCI has contracted with Westat to conduct a comprehensive evaluation of CPFP, which is designed to assess the extent to which the program is meeting its overarching goal of training leaders in the field of cancer prevention and control. As part of the interview, I will be asking you questions about your perceptions of the program, including the mentoring and career preparation you received during your fellowship; the influence of the program on your career; the benefits of participating in the program; and your recommendations for improvements to the program.

Participation in this interview is voluntary and your confidentiality is assured. Westat is collecting and analyzing the interview data and no findings or opinions will be attributed to any specific individual. No names will ever appear in reports or presentations. Do you have any questions before we begin? **May I have your permission to record the interview to ensure the accuracy of my notes?**

Background

1. I'd like to begin the interview by learning a little bit about where you currently are in your career. Please briefly describe the work you're doing now.

Perception of Overall Program Experience

2. To what extent did the fellowship provide you with opportunities to participate in a community of cancer prevention researchers?

3. To what extent have you maintained contact with other CPFP fellows and NCI staff since leaving the program?

PROMPT: How have those connections affected your work and career?

Mentorship

4. The centerpiece of CPFP is mentored research. Tell me about the mentorship you received during the program.

PROMPT: To what extent did you receive mentoring from multiple individuals in CPFP and NCI?

5. How would you describe the balance between the guidance you received from your mentors and the autonomy you had to conduct your research?

6. How did this mentorship affect your research during the program? How has it affected your career since completing the program?

Career Preparation

7. How did participation in the program prepare you for a career as researcher or leader in cancer prevention or cancer prevention research? How did it prepare you for a career as a researcher or leader more generally?

8. Do you feel the program prepared you differently from professionals who did not participate in the fellowship? How so?

Career Path and Development

9. Do you remember your expectations for your career prior to participating in the program? If so, please describe those expectations.

10. What effect has the M.P.H. had on your research interests and career plans?

11. Did the fellowship make you rethink your career? If so, how?

12. How did the fellowship affect your interest in cancer research and cancer prevention?

PROMPT: Are you currently in the career path you expected to be in when you completed CPFP?

Professional Identity

CPFP fellows come from a number of different disciplines and may not have any experience with cancer prevention or research coming into the program. Given that,…

13. To what extent would you say that the fellowship has affected your sense of identity as a cancer researcher or professional?

14. To what extent has it affected your sense of yourself as a change agent or a leader in cancer prevention?

Career Accomplishments and Outcomes

15. CPFP alumni pursue a wide range of career paths. As part of this evaluation, we are trying to better understand the various indicators of career success among these different paths and use this information to develop the survey we'll be administering to all alumni next year. In your work, what are the most salient indicators of accomplishments and productivity?

    PROMPTS: Publications; grants; professional awards; professional organization positions; product development; conference presentations; academic association memberships

Perceived Benefits of the CPFP

16. In your opinion, what has been the greatest impact of the fellowship on your career so far?

17. Do you think that you have been presented with career opportunities that would not have been available to you had you not participated in the fellowship? If so, in what ways?

Recommendations for improvement of CPFP program

18. What general comments and reflections do you have on the overall experience of the fellowship?

19. What recommendations about the fellowship do you have for NCI as they develop the program for future years? What features of the program are important to keep?

Cancer Prevention Fellowship Program

Interview Protocol on Mentorship and Career Development

Thank you for agreeing to talk with me today about your experience with the National Cancer Institute's Cancer Prevention Fellowship Program (CPFP). My name is Kimberley Raue and I work for Westat, an independent research organization in Maryland. NCI has contracted with Westat to conduct a comprehensive evaluation of CPFP, which is designed to assess the extent to which the program is meeting its overarching goal of training leaders in the field of cancer prevention and control. As part of the interview, I will be asking you questions about your perceptions of the program, including the mentoring and career preparation you received during your fellowship; the influence of the program on your career; the benefits of participating in the program; and your recommendations for improvements to the program.

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Background (~ 10 minutes)

1. I'd like to begin the interview by learning a little bit about where you currently are in your career. Please briefly describe the work you're doing now.

Mentorship (~ 8 minutes)

1. The centerpiece of CPFP is mentored research. Tell me about the mentorship you received during the program.

PROMPT: To what extent did you receive mentoring from multiple individuals in CPFP and NCI?

2. How would you describe the balance between the guidance you received from your mentors and the autonomy you had to conduct your research?

3. How did this mentorship affect your research during the program? How has it affected your career since completing the program?

***Career Path and Development (~ 10 minutes)**

1. Do you remember your expectations for your career prior to participating in the program? If so, please describe those expectations.

2. What effect has the M.P.H. had on your research interests and career plans?

3. Did the fellowship make you rethink your career? If so, how?

4. How did the fellowship affect your interest in cancer research and cancer prevention?

PROMPT: Are you currently in the career path you expected to be in when you completed CPFP?

Career Accomplishments and Outcomes (~ 10 minutes)

1. CPFP alumni pursue a wide range of career paths. As part of this evaluation, we are trying to better understand the various indicators of career success among these different paths and use this information to develop the survey we'll be administering to all alumni next year. In your work, what are the most salient indicators of accomplishments and productivity?

   PROMPTS: Publications; grants; professional awards; professional organization positions; product development; conference presentations; academic association memberships

***Recommendations for improvement of CPFP program (~ 10 minutes)**

1. What general comments and reflections do you have on the overall experience of the fellowship?

2. What recommendations about the fellowship do you have for NCI as they develop the program for future years? What features of the program are important to keep?

Cancer Prevention Fellowship Program

Interview Protocol on Career Preparation and Professional identity

Thank you for agreeing to talk with me today about your experience with the National Cancer Institute's Cancer Prevention Fellowship Program (CPFP). My name is Kimberley Raue and I work for Westat, an independent research organization in Maryland. NCI has contracted with Westat to conduct a comprehensive evaluation of CPFP, which is designed to assess the extent to which the program is meeting its overarching goal of training leaders in the field of cancer prevention and control. As part of the interview, I will be asking you questions about your perceptions of the program, including the mentoring and career preparation you received during your fellowship; the influence of the program on your career; the benefits of participating in the program; and your recommendations for improvements to the program.

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3. To what extent have you maintained contact with other CPFP fellows and NCI staff since leaving the program?

PROMPT: How have those connections affected your work and career?

Career Preparation

4. How did participation in the program prepare you for a career as researcher or leader in cancer prevention or cancer prevention research? How did it prepare you for a career as a researcher or leader more generally?

5. Do you feel the program prepared you differently from professionals who did not participate in the fellowship? How so?

Professional Identity

CPFP fellows come from a number of different disciplines and may not have any experience with cancer prevention or research coming into the program. Given that,…

6. To what extent would you say that the fellowship has affected your sense of identity as a cancer researcher or professional?

7. To what extent has it affected your sense of yourself as a change agent or a leader in cancer prevention?

Perceived Benefits of the CPFP

8. In your opinion, what has been the greatest impact of the fellowship on your career so far?

9. Do you think that you have been presented with career opportunities that would not have been available to you had you not participated in the fellowship? If so, in what ways?