

The Minority Training Program in Cancer Control Research: Impact and Outcome Over 12 Years

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Abstract The Minority Training Program in Cancer Control Research (MTPCCR) encourages underrepresented master's level students and professionals in the social, behavioral, and public health sciences to pursue doctoral training and careers in cancer disparities research. This paper reports new data on the program outcome after 12 years. A web-based survey was sent to all 462 program alumni. The questions addressed current academic status and plans, job status and plans, research focus, and influence of the MTPCCR. The survey response rate was 79 %. Overall, 30 % of alumni are enrolled in or have completed doctoral programs; 88 % of whom report involvement in research related to cancer. Scaled and open-ended responses indicate a strong influence of the program on doctoral program enrollment and cancer focus. The MTPCCR model is

successful because it targets underrepresented minorities who are capable of doctoral studies but have not yet chosen that path.

Keywords Diversity training · Cancer disparities

Introduction

An unequal burden of cancer is borne by defined ethnic and socioeconomic communities, and there is broad agreement that cancer disparities researchers should represent those communities. By 2030, cancer incidence is projected to increase by approximately 45 % due to rapid growth among older and ethnically diverse populations. A 67 % increase is projected for older adults, and a 99 % increase, for ethnic “minorities,” compared with 31 % for Whites [1]. These groups, American Indian/Alaska native, African American, Latino/Hispanic, Asian American, and Native Hawaiian and Pacific Islander, will together become the US majority by 2050. While these populations bear an excess burden of cancer, their numbers are disproportionately small among the ranks of social, behavioral, and public health researchers working to understand and alter these inequitable cancer patterns.

Health disparities are complex in nature and origin [2–4] and require investigation across a range of disciplines including epidemiology, health psychology, medicine, health services research, sociology, anthropology, health behavior and communication, genetics, biology, and others. As such, it is difficult to assess the demographics of disparities researchers, and to our knowledge, no one has yet attempted this. There are, however, data showing the demographic imbalance among all NIH-funded investigators [5, 6]. Those engaged in cancer disparities research will likely agree with two observations: that diversity in our field is gradually increasing, but

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there remains a substantial imbalance between the populations who experience disparities and those trained to explain these differences and to intervene. The diversity pipeline in public health and the other cancer-related social and behavioral fields remains only a patchwork of ad hoc investigator-initiated activities that come and go with time-limited funding opportunities, most of which prioritize research first and training second. This is in contrast to the biomedical sciences' diversity training networks that crisscross the nation with intensive and generously funded pipelines from high school to college and beyond [4, 7, 8].

To better understand this academic disparity, we look to schools of public health where many cancer disparities researchers train. Table 1 shows the Association of Schools of Public Health demographic data for 2009 [9] and the distribution for the US population in that year. The most important implication of these data is that the distribution of potential researchers does not parallel that for cancer disparities, which fall most heavily on populations of color and those of limited English proficiency. African Americans who bear the greatest burden of cancer disparities comprise only 12% of master's and 11 % of doctoral students. In addition, Latinos, the fastest growing population in the US, are seriously underrepresented, compared with other groups. While Asian Americans appear over-represented at 14 % and 13 % compared with the US Census for the same period (4 %), these students concentrate in epidemiology and biostatistics and are under-represented in health education and behavioral science. Native Americans comprise less than 1 % of all graduate students.

This academic disparity was the impetus for the National Cancer Institute R25 grant, *Increasing Diversity in Cancer Control Research* (1998–2001, 2001–2006, and 2006–2012), which established the Minority Training Program in Cancer Control Research (MTPCCR) at the University of California, San Francisco (UCSF), and University of California, Los Angeles (UCLA), to encourage underrepresented minority

master's level students and professionals in the social, behavioral, and public health sciences to go on to the doctorate and to pursue careers in cancer disparities research [10, 11]. The purpose of this paper is to report MTPCCR's main outcomes in doctoral enrollments and cancer focus from inception in 1998 through 2010.

The Minority Training Program in Cancer Control Research

An initial 3-year grant was designed to develop and pilot test the MTPCCR four-part model: (1) recruitment, partnerships with local universities that have diverse student bodies and which offer master's training in public health or related disciplines, fostering recruitment of an ethnically diverse cohort of 20–25 master's level students- faculty liaisons identify eligible students and encourage them to apply; (2) summer institute, wherein, the core of the program is a 5-day summer institute, “careers in cancer control research,” featuring approximately 25 role model “minorities” and/or cancer disparities researchers who showcase the need and potential across the spectrum of cancer disparities research from prevention through survivorship. Also included in the summer institute are underrepresented doctoral students and admissions faculty who explain the application process and provide guidance on successful applications, an expert on financing a doctoral education, a writing workshop geared to application statements and written feedback on each individual's statement submitted as part of the MTPCCR application, and sensitive, frank, and in-depth discussions of the challenges facing graduate students of color—all presented in a variety of formats that emphasize interaction among participants and with faculty. Didactic presentations are interspersed with interactive exercises that enable students to express the meaning of their cultures, to share achievements and challenges, and to relate to one another at a surprisingly deep level given the brevity of the program; (3) internships, wherein, every year in each location, 4–8 participants are selected for paid summer internships with cancer disparities researchers based on preceptor–intern matches. A match consists of compatible mentor–intern research interests and the extent to which intern's skills are appropriate for the project, and/or the prospective internship offers the training desired by the student. MTPCCR internships must be associated with a study that focuses on cancer disparities and/or where the preceptor is a “role model” (minority) researcher. In addition to the requirement for the match and the specific disparity/diversity criteria, the number of available internships is limited by stringent guidelines which are designed to ensure that interns have a meaningful research experience; (4) doctoral incentive awards, wherein, need-based doctoral application support awards (DASA) of up to \$2,000 each are awarded annually to alumni who are in the

Table 1 Race/ethnicity of US population, and graduate students in US Schools of Public Health 2009

	US population (n=301,461,533) (%)	Master's students (n=14,766) (%)	Doctoral students ^a (n=4,694) (%)
African American	12.1	12.2	10.9
American Indian	0.7	0.7	0.5
Asian American	4.3	13.9	12.7
Latino	15.1	10.6	6.9
White	65.8	62.5	68.8

^a Among US citizens for whom race is known (Association of Schools of Public Health, 2009 US Census)

process of applying to doctoral programs. Funded by each program's institution, the DASA is intended to help offset costs such as graduate record examination (GRE) preparation, campus visits, and application fees. Eligibility criteria include prior MTPCCR participation (any year), commitment to apply to a health science doctoral program during the coming application cycle, and demonstration of financial need. To date, 45 alumni have received awards totaling \$60,192.

The MTPCCR model also includes a multifaceted evaluation plan to closely track participants and to document implementation of all components (process evaluation using multiple data collection tools, procedures, and data bases), initial impact (participant satisfaction and change in intention to apply to a doctoral program), and main outcomes (actual doctoral program enrollment and pursuit of a cancer research career). Eligibility criteria for participation in the MTPCCR are: minority (defined as those communities who experience an excess or unknown burden of cancer and who are underrepresented in the field of cancer control research) student in a master's level health program (must complete first year of master's program by the start of the summer institute) or master's trained health professional, good academic standing (minimum "B" average), and strong verbal, written, interpersonal, and organizational skills. Current doctoral students or those already accepted into doctoral programs are not eligible.

The initial expectations that there would be a few participants in each class with the ability and willingness to go on for the doctorate were far exceeded in the pilot phase, and participants have consistently responded with an outpouring of emotion and appreciation for the program [10]. To assess the sustainability of the model, the first competing 5-year renewal (2001–2006) sought to establish and test a replication at UCLA and to maintain the original program. The replicability of the program was subsequently demonstrated in that all components were faithfully implemented at UCLA, achieving the same magnitude of impact [11]. This was an initial step in a phased process of dissemination: the setting was new, but the two programs operated together under one grant, and members of the original faculty were involved with the new program. Since 2001, the two programs have operated in parallel with all components in place in both locations. The second 5-year renewal (2006–2011) sought to test the robustness of the model by disseminating it further from the original program, with a new team and independent funding. Because MTPCCR results showed that, among the major ethnic groups participating in the program, African Americans and Asian Americans consistently went on to the doctorate at higher rates than did Latinos; a partnership was established with experts in Latino cancer disparities at the University of Texas Health Science Center in San Antonio (UT). The UT team obtained funding for an adaptation of the model exclusively targeting Latinos, *Éxito! Latino Cancer Research Leadership Training* (2010–2015, A. Ramirez, PI).

Methods

Records of doctoral acceptances, enrollments, and graduations were maintained over the years from prior surveys and direct communication with individual alumni. This information was combined with data from the 2011 survey to yield the current total number of participants who went on to the doctorate, our main outcome. All MTPCCR alumni from class years 1999 through 2010 were sent emails asking them to complete the web-based survey.

The survey was tailored according to five academic and career stages: (1) currently enrolled as a student in a master's degree program; (2) graduated with a master's degree; (3) currently enrolled as a student in a doctoral degree program; (4) enrolled, but did not complete (dropped out) doctoral degree program; and (5) graduated with a doctoral degree. Current master's students were asked about their intention to apply to doctoral programs;¹ current doctoral students responded to questions about their program and planned or current research, and doctoral graduates were asked about their dissertation topic and current work. (The survey instrument is available electronically).

The survey also included the following domains: influence of the MTPCCR on academic choices, cancer focus of work or research, and a list of presentations and publications on which alumni have served as author or coauthor. The instrument consisted of quantitative scaled items and open-ended elaboration of numerical responses. For example, alumni were asked: "How much did your participation in the MTPCCR Summer Institute influence your decision to apply to a doctoral program?" with response options on a ten-point, Likert-type scale (1=negative influence and 10=positive influence) followed by "Please explain." Cancer focus among master's or doctoral graduates currently employed was measured by this question: "Your job [or research] may pertain to cancer either directly (e.g., tobacco control, mammography, and cancer patient navigation) or indirectly (e.g., promotion of fitness or nutrition, end of life care, health literacy, language access, social determinants, etc). How much of your job/research would you say pertains to cancer? All, Most, Some, None." This was followed by the question, "How much did the MTPCCR affect your interest in cancer-related work?" (1=negative influence, 5=neutral, and 10=positive influence) and "Please explain." Frequencies were computed for all study variables, and means were computed for numeric variables. Associations between categorical variables were

¹ We previously validated our measure of intention to apply among all alumni who were 5 years past their summer institute ($n=130$). Testing their post-institute rating of intention to apply to a doctoral program (1–10 scale, 10 being strongly intend to apply), comparing those who enrolled and those who did not, the mean score of those who entered a doctoral program within 5 years was 9.4 vs. 8.0 for those who did not ($p=0.0003$).

assessed using chi-square tests. All evaluation methods were reviewed and approved by the committees on human research at UCSF and UCLA.

Results

In all, 367 out of 462 alumni completed the alumni survey, a 79 % response rate. Every class dating back to the first year, 1999, was represented with 30 % responding from the first class.

Participant Diversity and Doctoral Enrollment

The race/ethnic diversity of participants in the combined UCSF–UCLA programs for all years, taken from initial applications, is shown in Table 2. Asian Americans constitute the largest group in Northern California; African Americans, Asian Americans, and Latinos are equally represented in Southern California.

Considerable diversity is evident among the Asian American subgroups: Asian Indian, 23; Bangladeshi, 2; Burmese, 2; Chinese, 45; Filipino, 40; Hmong, 6; Japanese, 7; Korean, 11; Laotian, 2; Nepalese, 3; Sri Lankan, 2; Taiwanese, 7; Thai, 2; and Vietnamese, 15. Those who reported their background as “Other” were African, African French/Black, Guyanese/Black, Armenian (2), Assyrian, Bangladeshi, Palestinian, Persian, Middle Eastern (2), Paraguayan/Ukrainian, and Iranian. Also, meeting the eligibility criteria are gays and lesbians of any ethnicity (3). Subgroup data are important because, while Asians are not considered underrepresented in biomedical research, members of Asian American subgroups are underrepresented in the social and behavioral sciences compared with epidemiology and biostatistics [5].

Table 2 also shows our main outcome: overall, 139 alumni (30 %) went on to doctoral programs including 36 % of African American, 33 % of Asian American, and 12 % of Latino alumni.

All alumni participated in the summer institute. Table 3 shows the proportion who took part in the other two components, the internships and receipt of the DASA, as well as the level of doctoral enrollment associated with each category of participation. These include: (1) summer institute (SI) only, (2) SI plus internship (no DASA), (3) SI plus all internships (with and without the DASA), (4) SI plus DASA (no internship), (5) SI plus all DASAs (with and without internships), and (6) SI plus internship and DASA. Among participants in the SI only, the largest proportion of all alumni, 22 % went on to the doctorate compared with 43 % for those who also had internships ($p=0.0003$).

Since 1999, the annual MTPCCR rate of alumni doctoral enrollment has risen steadily from 3.8 to 30 %. Currently, there are 95 enrolled doctoral students and 44 doctoral graduates. The greatest concentration of doctoral alumni is in health promotion/health education/health behavior/community health (18.3 %), and second is epidemiology (14.7 %). This is notable because participants who came from master's programs in health promotion were significantly less likely to be planning a career in research when they entered their master's program compared with those in epidemiology and biostatistics (health promotion 30 %, epidemiology/biostatistics 53 %, and other 51 %; $p=0.007$).

Other fields represented are community nursing, health services research, psychology, anthropology, and a wide range of social science and health fields. Also included in these numbers are six alumni who went to a medical school and one who went to a dental school. MTPCCR alumni attend universities all over the country including UCLA,

Table 2 MTPCCR participants and doctoral students/graduates by program site and race/ethnicity 1999–2011

	Participants				Doctoral students/graduates			
	Program site		Total					
	Northern California		Southern California					
	1999–2010		2003–2010					
	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)
African American	27	71	32	62	29	133	36	50
American Indian	2	5	3	6	2	11	3	4
Asian American	43	114	30	59	37	173	33	46
Pacific Islander	1	2	2	4	1	6	1	2
Latino	18	47	27	52	21	99	12	17
Other/mixed ethnicity	10	27	7	13	9	40	14	20
Total	100	266	100	196	100	462	100	139

Table 3 Enrollment in doctoral programs by participation in MTPCCR components

	All alumni (<i>n</i>)	Entered doctorate (<i>n</i>)	(%)
All alumni	462	139	30
Summer institute only	325	70	21.5
SI+internship (no DASA ^a)	89	31	34.8
SI+all internships (with/without DASA)	109	47	43.1
SI+DASA only (no internship)	28	19	67.8
SI+all DASAs (with/without internship)	48	35	73
SI+DASA+internship	20	16	80

^a While the availability of the DASA could be one of many factors in the decision to apply, it is not a primary impetus, because eligibility for the DASA requires proof of doctoral program application and expenses. The DASA eliminated financial barriers to applying among those who already wanted to do so and also affected the number of applications an individual could submit, increasing prospects for acceptance

24; UCSF, 11; University of California (UC) in Berkeley, 10; Harvard, 7; University of Washington in Seattle, 7; USC, 5; University of North Carolina at Chapel Hill, 5; UC Davis, 3; and University (U) of Michigan, 3. Other schools with two alumni are Columbia, UC San Diego, U of Hawaii, U of S. Florida, Loma Linda, Tulane, U of Michigan, and Claremont Graduate University.

Of the 44 alumni who have graduated with their doctorate, 33 completed the survey (75 %); 24 of them (73 %) reported a current job that involves research including university faculty (7), postdoctoral fellows (10), and other positions such as research scientist at independent research or health care organizations as well as health departments (25). An additional nine alumni (1.9 %) started, but did not complete doctoral programs.

Among current master's students and master's graduates, 122 (56 %) reported that they intend to apply to doctoral programs. In fact, while some participants go from the summer institute directly into the doctoral application process, others take many years to get to this point. The majority of doctoral matriculants (69 %) enrolled within 2 years of completing the program; eight alumni took 5 or more years, and the longest period was 9 years. Still, this last individual strongly attributed her decision to participation in the program.

In addition to motivating many to go on for the doctorate, it has been clear that the program also assists some participants to determine that the doctorate is not the right path for them. Of the 25 master's graduates who reported that they are certain they will not go on to the doctorate, the reasons given included cost and loss of income, the burden of existing student loan debt acquired in the course of their master's studies, disruption to family, and satisfaction with

their current work. Several, nevertheless, indicated that the program piqued their interest in research and that they would pursue opportunities to engage in cancer disparities studies as project coordinators and research associates.

Program Impact

Overall, 81 % of current doctoral students reported that the program had a strong influence on their decision to do so (8 or higher on a scale of 1–10). Program impact was also vividly illustrated by qualitative responses such as these:

- “I was so inspired and educated by this incredible program! I was not really considering a doctorate when I entered, and left knowing that, as a doctoral researcher, I can really be a change-maker.”
- “MTPCCR has shown me that I'm worthy and capable of pursuing a doctoral degree. I feel more equipped now than ever with the skills and tools needed to be successful in applying for a doctoral degree.”

To assess whether participants took part in the MTPCCR because they were already planning to go on for the doctorate, we asked all alumni: “What was your objective when you first entered your master's program? (career in public health practice, career in research, and other career objective),” and of current doctoral students, “How much did your participation in the MTPCCR Summer Institute influence your decision to apply to a doctoral program?” (One, negative influence; five, neutral; and ten, positive). Fifty-nine percent ($n=210$) of all alumni entered master's program for a career in public health practice, and 30 % ($n=108$), for careers in research. Of those who did plan to pursue research, we asked, “At that time, were you planning to go on to the doctorate?” Twenty-nine percent of those (31) said no, and 71 % (76) said yes. Importantly, even among those who were intending to go on, qualitative responses showed that many had doubts about their ability to go on, and that the program gave them the confidence and the tools to successfully apply.

Among those who reported intending to go on to the doctorate from the time they started their master's program ($n=76$), qualitative responses showed that the program gave many the confidence and the tools to follow through on those plans. Typical of those responses are these:

- “I have always loved school and learning. I always thought about going to the highest level of education in my field, but no one in my family nor anyone in my closest social circle had reached such level. Therefore, I had a lot of questions about what a doctorate truly was, what it would allow you to do and how to go about it.”
- “While I was already thinking about doctoral work before attending the MTPCCR, it gave me the

framework and structural concept to feel confident in applying. The experience highlighted and acknowledged a lot of the concerns that I had already raised to myself; it showed me that my concerns were both legitimate and not uncommon. The commitment to doctoral studies still feels like a very large life decision, but meeting others at the MTPCCR and those who already hold their doctorates helped to define the picture more clearly.”

Qualitative responses revealed other ways the MTPCCR helped doctoral matriculants including the fact that many could not have applied without the DASA (financial support for campus visits, GRE test preparation, application fees, etc): “Having the opportunity to apply for the DASA Award was a major determining factor for my applying to doctoral programs as I was in no position to do so, otherwise. I am glad to have been a successful applicant and I will be starting the DrPH in Preventive Care.... in the fall.” Among 48 DASA recipients, 35 (73 %) enrolled in doctoral programs.

Engagement in Cancer Research

About 60 % of current doctoral students reported that their interest in cancer increased, following the summer institute. The average change was a 1.5-point increase on a ten-point scale ($p < 0.001$; zero and negative changes are included in the average). The extent to which the research of doctoral students and graduates pertained to cancer was rated as “some” by 88 % and “most” or “all” by 62 %. For current master's students and graduates who are employed ($n = 185$), 43 % chose “most” or “all” (Table 4).

Another important indicator of cancer focus is publications and presentations by alumni related to cancer. A total of 244 cancer-related publications were written by 45 alumni from 2006 to 2011. In addition, alumni were authors on

207 cancer presentations, and 37 of these talks were given by the reporting alumnus/alumna.

Discussion

While the original intent was to serve master's level students in the local regions, the MTPCCR has become a national program, drawing 30 % of participants from outside California and sending doctoral students to high-ranking schools all over the country. The Minority Training Program in Cancer Control Research taps an ethnically diverse segment of the academic pipeline that is not otherwise encouraged toward doctoral preparation and careers in research. The MTPCCR model targets underrepresented master's level minorities to instill confidence that they can succeed in doctoral work and to fuel their interest in cancer disparities research by demonstrating how they themselves fit into the picture as part of the solution to the health disparities.

Our main outcome, the rate of matriculation of doctoral programs, has risen steadily over the last 13 years. The quantitative and qualitative data from the 2011 alumni survey demonstrate the strong influence of the program on participants' plans for careers in cancer research. However, in the absence of a randomized controlled trial, which is not feasible in this situation, we cannot claim with certainty that the successful outcome is a direct result of program's components.

Through a broad literature review on diversity training, we believe that there are no programs similar to MTPCCR that exclusively target underrepresented master's level students/professionals in the social/behavioral sciences and public health to encourage doctoral enrollment and careers in research. This “short course” model evokes highly positive responses from participants because it supports minorities who are capable of doctoral studies, but have not yet chosen that path. The success of the MTPCCR replication at the UCLA and the recent implementation at UT suggest that wherever there is diversity at master's level, this program could be conducted with the potential to motivate underrepresented master's level students on to the doctorate.

Table 4 Proportion of job/research pertaining to cancer MTPCCR Alumni Survey 2011

	Frequency	(%)	Cumulative	
			Frequency	(%)
Master's students and graduates' jobs				
All	46	25.0	46	25.0
Most	33	17.9	79	42.9
Some	69	37.5	148	80
None	36	19.6	184	100
Doctoral students and graduates' research				
All	47	42.3	47	42.3
Most	22	19.8	69	62.2
Some	29	26.1	98	88.3
None	13	11.7	111	100

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