

# Advancing Health Equity: An Innovative Program for Building Community Engagement in Research

Alycia Santilli, Katherine LaMonaca, Kendra Carr, Bailee Rue, Karen D'Angelo, Jackson Higginbottom, Sofia Morales, Marquita A. Taylor, Genesis A. Vicente, Anna Lin-Schweitzer, Kathleen O'Connor Duffany

Alycia Santilli, MSW<sup>1</sup>, Katherine LaMonaca, MPH<sup>2</sup>, Kendra Carr, MPH<sup>2</sup>, Bailee Rue, MPH<sup>2</sup>, Karen D'Angelo, PhD<sup>1</sup>, Jackson Higginbottom, MPH<sup>2</sup>, Sofia Morales, MPH<sup>2,3</sup>, Marquita A. Taylor, PhD<sup>2,3</sup>, Genesis A. Vicente, BS<sup>1,3</sup>, Anna Lin-Schweitzer, BA<sup>2</sup>, Kathleen O'Connor Duffany, PhD<sup>2</sup>

1. College of Health and Human Services, Southern CT State University, New Haven, CT
2. Yale School of Public Health, Yale University, New Haven, CT
3. Alumni of the Community Research Fellow program

*Submitted 7 January 2022, revised 20 June 2022, accepted 18 July 2022.*

**ABSTRACT:**

**Background.** The Community Research Fellows (CRF) program seeks to mobilize New Haven residents with lower incomes or from communities of color who are educated and equipped to engage as equal partners in health research at Yale University. The training program combines curriculum-based information with ‘on-the-ground’ experience with Yale research projects, while building relationships between CRFs and researchers. CARE launched 2 consecutive cohorts of the program in 2018-2020.

**Objectives.** To assess the effect of the Community Research Fellows program on participants’ knowledge of the research process and confidence to engage in research and participants’ satisfaction and perspectives on the program.

**Methods.** The evaluation of the CRF program included four components: 1) Pre- and post-Program Surveys to assess change in confidence and self-reported knowledge. 2) Curriculum Feedback Satisfaction Survey to gauge satisfaction and make program improvements after each training session. 3) Post-Program CRF Interviews to explore their CRF experiences. 4) Research Team Surveys to assess program satisfaction and areas for improvement.

**Results.** CRFs reported increased confidence and knowledge, personal and professional growth, and interest in community-engaged research. Overall, participants were very satisfied with each training module.

**Conclusions.** The CRF program demonstrated that community members are well-suited, well-positioned, and eager to engage in and inform public health research. CRFs bring capacity and valuable perspective to research teams. The CRF training program offers an innovative approach to address power imbalances in research and to move towards more equitable community-university partnerships for improved health outcomes.

**KEYWORDS:** Community health partnerships, Community-Based Participatory Research, Health disparities, New England, Urban Health, Curriculum

## **Introduction**

New Haven, Connecticut is a small, diverse city of 130,000 residents with enduring economic and social disparities influenced by systemic racism and other structural barriers, resulting in consequent health disparities. In its lower-income neighborhoods, predominantly Black and Latinx communities, rates of chronic disease, like asthma and diabetes, exceed state and national rates.<sup>1,2</sup> Rates of chronic disease are higher among Black and Latinx and those living in extreme poverty.<sup>1</sup> While poverty drives poor health outcomes, the root causes include more complex sociological factors. Poverty among White residents is comparable to Black and Latinx residents in New Haven's low-income neighborhoods; yet, people of color continue to have worse health outcomes when compared to their White counterparts.<sup>1</sup>

Home to Yale University, a world-renowned research enterprise, the context of persistent health disparities in New Haven cannot be ignored alongside Yale's history resources in clinical and population health research. In 2020, Yale was awarded \$551 million in research funding and ranked 8<sup>th</sup> nationally in the number of grants from the National Institutes of Health.<sup>3</sup> Despite these resources, chronic and acute health conditions continue to disproportionately affect low-income communities of color near its campus.<sup>1,4,5,6</sup>

To better understand and address health disparities, the Patient-Centered Outcomes Research Institute posits that community members be more involved in health research.<sup>7</sup> Community-academic partnerships provide communities the opportunity to inform research priorities; equip community members with access to funds, knowledge, and/or jobs; and enable researchers to disseminate relevant findings more clearly with increased potential for sustainability.<sup>8,9,10,11</sup>

Because these partnerships challenge existing research culture, they require patience and time to address historical mistrust that often exists between universities and local communities.<sup>12</sup>

Community advisory boards are a common model for disrupting traditional power dynamics, with community members serving as advisors.<sup>13,14</sup> Newer approaches take this relationship further by training community members on research. However, these programs typically offer comprehensive training without opportunity to put skills into practice,<sup>15,16</sup> or provide research experience that utilizes administrative skills without training on the full scope of public health topics and research methods.<sup>17</sup>

The Community Alliance for Research and Engagement (CARE), co-housed at Southern Connecticut State University and Yale School of Public Health, developed the Community Research Fellows (CRF) program to mobilize New Haven residents with lower incomes or from communities of color to engage as equal partners in research at Yale. The program aligns with CARE's mission to improve the health in New Haven among people most impacted by health disparities, including Black and Brown communities and low-income populations, through collaborative research, practice, and engagement. While CARE's CRF program covers curriculum similar to other programs, the program incorporates paid research experience into the curriculum so that participants can apply their training.

The goal of the CRF program is to educate and equip a sustained network of community members to engage in health research in New Haven. The objectives of the CRF program are to:

- 1) Train residents from communities of color and residents with lower incomes in research, including principles of Patient-Centered Outcomes Research (PCOR) and Community-Based Participatory Research (CBPR).
- 2) Cultivate Resident-Yale research teams to identify and address community priorities with residents providing expertise and guidance in Yale-based research activities.

The aim of the evaluation was to assess the effect of the program related to change in CRF's self-reported knowledge of the research process and confidence to engage in research, and participants' and researchers' satisfaction and perspectives on the program.

The theory of change posits that increased knowledge of and confidence in research will increase community residents' ability to engage with and contribute to research teams as well as increase investigators' satisfaction with engaging community on studies, ultimately leading to continued community engagement in research. Improved community engagement in research achieved through strategies like the CRF program will lead improved focus on the concerns and priorities of communities.

The 8-10-month program combines curriculum-based information with 'on-the-ground' experience with Yale research projects. CARE launched 2 consecutive cohorts in 2018-2020.

Participants were recruited through CARE's community network, led by CARE staff.

Recruitment included meetings with and announcements to community partners, neighborhood groups, and leaders; flyer distribution; email and social media posts; and promotion by partners.

CARE staff screened and interviewed applicants to provide a detailed explanation of the program

and answer questions, assessing fit. Twenty-four total residents were trained, the majority of whom were Black or Latinx and many lived in neighborhoods designated as lower-income (Table 2). Each participant received a monthly stipend (\$250 in Cohort 1, \$2,000 total; \$300 in Cohort 2, \$3,000 total). Participants were expected to commit five hours/week in program sessions and activities with their research teams. As most participants worked, program sessions took place in evenings. Research teams were also informed that they needed to have flexibility to meet during evenings and weekends.

CARE conducted a small pilot of this program in 2017 with 2 community residents. One resident was retained as an advisor as we continued to develop the program and evaluation in 2018. The program was designed with 3 intensive curriculum sessions (3 hours each) in the first month, followed by 8 months of engagement with Yale researchers and monthly cohort meetings with CARE (2 hours/meeting). The curriculum covered topics in public health and research. (See Table 1.) Topics were added based on cohorts' needs. In Cohort 2, the curriculum was adapted to space the 3 curriculum sessions throughout the first 4 months of the program (2 hours/monthly meeting). Additionally, adaptations were made due to COVID-19 (online meetings, program extension, and training to develop a COVID-19 survey). In both cohorts, participants were matched to a Yale research project to contribute community perspectives, such as providing input on research design, reviewing tools, advising on recruitment methods, collecting data, and forming Community Advisory Boards. Research topics focused on chronic disease disparities, housing insecurity, social determinant of health, mental health, among others. Research teams were recruited through email announcements to the Yale community (e.g., Yale Schools of Public Health and Medicine; Yale Center for Clinical Investigation) and outreach by CARE

Directors who have worked extensively with Yale researchers. Researchers were chosen based on research taking place in New Haven and willingness and interest to engage with community residents on studies.

Researchers' readiness and capacity varied; some had previous CPBR experience and others had limited experience. While the primary focus of the program was on community residents due to limited funding, in Year 1, we offered a program orientation to researchers, providing an introduction to CBPR and guidance for working with community members. We checked in periodically with researchers to assess progress. Identifying that researchers needed additional support, in Year 2, we clarified expectations with researchers, expanded the researcher training by offering a mid-program meeting, and recruited a colleague who specializes in community engaged research to offer formal support and troubleshoot issues.

## **Methods**

The evaluation included 4 components, outlined below. Instruments were designed based on the theory of change and input from prior PCOR studies. The pilot CRF advisor provided input and reviewed instruments. Surveys went through expert review, were piloted and assessed with verbal probing.

*Pre- and post- Program Surveys:* To assess change in confidence and self-reported knowledge, a 15-item survey was administered. Participants responded to 15 statements on a 5-point Likert scale from *strongly disagree* (1) to *strongly agree* (5). For the first cohort, the survey was



administered before and after the initial 3 consecutive weekly training sessions (Time 1 and 2) and at the end of the program (Time 3), after CRFs worked with Yale research teams for 8 months. For the second cohort, as the 3 consecutive weekly sessions were distributed throughout the length of the program, there was no equivalent Time 2 (post curriculum); the surveys were administered at Time 1 and 3.

*Curriculum Feedback Survey:* An anonymous survey was administered after each training session to gauge satisfaction and make program improvements. Participants responded to 7 statements on a 5-point Likert scale [*strongly disagree* (1) to *strongly agree* (5)]. All statements were positively stated. Three open-ended items queried about successes, challenges, and areas for improvement. Results were regularly reported for program improvement.

*CRF Interviews:* At end-of-program (Time 3), participants completed interviews exploring their experiences. Questions addressed reasons for participation, experiences with research teams, perspectives, and recommendations.

*Research Team Survey:* To assess program satisfaction and areas for improvement, research teams, including investigators and/or staff, responded to an end-of-program survey. The survey contained items related to satisfaction and experience with the program, including benefit to their research; level of CRF engagement and preparation; level of support from CARE; and program successes, challenges, and recommendations. Closed-ended items were on a 5-point Likert scale [*not at all* (1) to *extremely* (5)].

*Analysis Plan:* Mean, standard deviation (SD), and range were calculated for each Likert scale item for each cohort. Paired t-tests were conducted to assess change in confidence and knowledge items from baseline to end-of-program with significance set at 0.05. Open-ended items were thematically coded. All interviews were recorded, transcribed, de-identified, and thematically coded. A Cohort 1 CRF participated in conducting interviews and reviewing Cohort 2 results. Two coders analyzed two interviews and deliberated to establish codes and reliability before coding the remaining interviews. Cohort 1 codebook was applied for coding of Cohort 2 interviews with a similar process. Statistical analyses were conducted using Excel, SAS, and Dedoose.

The study received Institutional Review Board approval from Southern Connecticut State University, with a Yale University reliance agreement.

## **Results**

Twenty-two CRFs (92%) responded to both baseline and end-of-program surveys; 21 (88%) responded to the interview. (See Table 2.)

### **Program Impact on CRFs**

By end-of-program, both cohorts reported increased satisfaction, knowledge, and confidence, personal and professional growth, and interest in community-engaged research.

### *CRF Satisfaction*

Overall, participants were very satisfied with all training curriculum, with a majority *agreeing or strongly agreeing* with each positive statement in the Curriculum Feedback Survey; 100% of CRFs reported that they *agreed or strongly agreed* that they were satisfied with the training [module] and would recommend the session to others.

Based on feedback, program improvements included additional discussion time, slower pace, and larger training space. Participants valued discussion, particularly learning from peers. The sessions provided a space to share successes, challenges, and support. Participants cited most valuable components of the curriculum: learning CBPR and PCOR principles, collecting and analyzing data, and researching existing data.

One CRF described their experiences with monthly meetings:

*...the monthly meetings was really a little bit of CARE sharing education. So out in the field, you were at the table getting the experience...they did presentations on those things that I just talked about, and they had community people come in. And they helped to get us settled into what type of organizations we were going to be placed with. So the monthly meetings I really enjoyed because...the participants were able to share what they were doing and then also being able to learn a little bit about some of the processes that occur when you're a part of community research projects. (CRF)*

Participants highlighted the camaraderie with their cohort and CARE staff. CRFs in both cohorts spoke highly of the program and its purpose.

*CRF Self-reported Knowledge and Confidence* Cohort 1 reported significantly increased knowledge about social determinants of health, health disparities, the process for conducting a research study, data collection tools, the difference between qualitative and quantitative data, ways residents can be involved in research, and increased knowledge about CBPR and PCOR. Cohort 2 showed similar changes, with the exception of knowledge of data collection tools or the difference between quantitative and qualitative data. Though scores on these items also increased, the differences were not significant, likely because participants reported high levels of knowledge at baseline. (See Table 3).

At end-of-program (Time 3), participants in Cohort 1 showed significantly increased confidence in self-reported abilities to be leaders, contribute to a research study, work with their community to prioritize health issues based on data, and engage with researchers. Among Cohort 2 participants, although confidence scores increased for all items, a significant difference between baseline and end-of-program scores was only seen for the increase in confidence in ability to engage with researchers. (See Table 4). While the training itself increased confidence, data from Cohort 1 indicate the partnership with research teams led to additional increases in confidence (Time 2 to 3:  $p=0.055$ ), supporting the benefits of pairing curriculum training with experiential training. (Data not shown.)

Qualitative data from CRF interviews underscored quantitative findings.

*...I was really lucky because my PIs were very open... they expected so much from us. I appreciated that they respected us and our opinions and our knowledge of the community...*

*through that improved my confidence in being in that environment. And removed a little bit of that imposter syndrome, where I feel like ... I'm not really knowledgeable about that stuff.*

(CRF)

*You are made to feel just as important for your lived experience as they are for their academic experience. (CRF)*

### *CRF Perspectives*

**Personal and Professional Growth:** Participants emphasized confidence gained in their research roles. Participants gained skills in project development related to CBPR and PCOR and reported growing as communicators and advocates. Several quotes demonstrate this experience:

*I felt [my contributions] were well received. Initially, I was kind of like, wow, me, really? ...sometimes you think that you might not be 100% ready for what is being handed to you...But as it progressed...a little bit of that change to have more confidence about.. (CRF)*

*I would say one thing that I got out of it was like my confidence in myself.... Just like realizing that I do have...knowledge that's important to this work. (CRF)*

**Interest in community-centered approaches:** Both cohorts emphasized the need for representation in community-based research projects, highlighting community as a vital resource for research, which should be respected and not underestimated.

*... just how to make sure every member of your team is involved in learning about how to be in the community. I think that was lacking from a lot of the research teams in the program. And I think in my future career, I want to make sure ...everyone is involved in talking to community members about the work we're doing. (CRF)*

*There is a community appetite and desire to be involved with no longer hav[ing] Tuskegee experiments reduplicated, but rather, having true public health translation of research benefits. (CRF)*

*I also learned the importance of those conducting the research to include persons from the community ... to avoid any cultural blind spots they may have. (CRF)*

Several CRFs discussed the importance of research ethics. Participants described a new understanding of the history of ethical violations in marginalized communities, motivating participants to ensure ethical conduct in research.

*... I learned the importance of having an independent review board to monitor research ...to ensure that the research is ethical, beneficial, and does not cause harm to those who participate... (CRF)*

#### *CRF Perspective of Research Teams*

While some CRFs noted challenges, most participants reported positive experience with research team. One participant discussed how this program is breaking barriers between research and

community by considering, “*how can we start really building new relationships between – and not having relationships based on assumptions...breaking down those barriers, breaking down those doors.*”

Challenges included lack of role clarity in the beginning of the partnership, need for greater transparency in research, including access to data, and perpetuating processes that limit engagement. One CRF noted: “*They [research teams] were so bound by the constructs of ‘this is how we do things’.*”

#### *CRF Perspective on Program Overall*

When asked how they would describe the program to others, one CRF stated:

*...if they really wanted to learn how research works...if you have any reservation about research, sign up...This gives you the opportunity to see some of these research projects behind closed doors. I think it would give a better understanding of the inner workings and the ... difficulties are there. And I think this is like a starting platform for people in the community to gain awareness...and have the opportunity to voice their concern...*

Others noted:

*...I would just tell them, “Do you care about the community that you’re around? Do you feel like there are public health needs that haven’t been addressed? Do you feel like there is a lack of communication, or a lack of relationship, between researchers and the community? Do you think that we will ever learn from the lessons of Tuskegee and Henrietta Lacks?”...I think this program is a step in the right direction. (CRF)*

*If you believe that you can be the voice – that you can ...be that liaison that the community needs, and that the researchers need, and you want to build on those skills... join this program... you're not the only person that believes in the research, that believes in the community. (CRF)*

Of the 24 CRFs, 14 remained engaged in some capacity with research projects or with CARE's health initiatives after the program.

#### *Researcher Perspectives*

The majority of researchers who partnered with CRFs reported positive experiences and improvements to their studies, further indicating the impact of community involvement in research processes. Across both cohorts, 18 of 25 researchers completed the investigator survey. At least 1 researcher responded for each project. While many Cohort 1 researchers (60-69%) reported that they would be *very* or *extremely* likely to involve a CRF again or recommend a CRF to a colleague, 100% of Cohort 2 researchers reported that they were *very* or *extremely* likely to do so. Program improvements were implemented prior to Cohort 2, which may help explain higher scores provided by Cohort 2 researchers. (See Table 5).

Researchers indicated that CRF input improved data collection instruments.

*[O]ur survey became much more practical with their input, as they were always thinking about how the community would receive information, rather than [how] a researcher*



*would write it...they were very attuned to how people might think about questions or might feel when answering them. (Researcher)*

Most researchers were interested in continued engagement with CRFs; 69% (n=11) in Cohort 1 and 100% (n=5) in Cohort 2 were interested in connecting with the CRF alumni network and in other PCOR/CBPR learning opportunities.

## **Discussion**

Participants in both cohorts reported increased confidence for engaging in research and increased knowledge of ways residents can be involved in research. Both cohorts evidenced significantly increased knowledge scores, including social determinants of health, health disparities, the process for conducting research, CBPR, and PCOR. Participants were very satisfied with the training curriculum.

The continued engagement of CRFs in Yale research studies, or indirectly in other community-based research or health-related opportunities, is an additional indicator of program success.

The CRF training program offers an innovative approach to address power imbalances in research and create more equitable community-university partnerships for improved health outcomes, expanding on other similar programs by offering an experiential component paired with a robust research and health equity curriculum. The CRF program demonstrated that community members are well-suited, well-positioned, and eager to engage in co-learning about CBPR/PCOR to inform health research. With appropriate training and support, residents are able

to build their confidence in and understanding of research. CRFs have unique abilities and lived experiences to address community-based concerns to inform and impact research design and implementation, bringing capacity and valuable perspectives to research teams. Researchers reported high levels of CRF engagement and benefit to their research, indicating the value that CRFs brought to the teams.

Limitations of the program included limited researcher training, due to funding constraints. The initial program design was focused on building knowledge, confidence, and power of community residents and did not allow for designing a full training program aimed at researchers. CARE staff was intentional about having a separate training space exclusively for residents.

Additionally, the program was adapted for Cohort 2 due to COVID-19, with many research studies pausing and meetings converting to remote settings. Positive changes in confidence and knowledge were still identified, despite these impacts.

While a robust evaluation was conducted, limitations remain. The study assessed 2 cohorts of residents from 1 city; findings cannot be generalized. Dissemination and assessment in other locations is warranted. Knowledge assessment was self-reported and not concrete; our community advisor and staff indicated that knowledge assessments created a dynamic in which we appeared to be assessing residents' competence from an elitist perspective. Creating an equitable culture was prioritized over using knowledge-based items. Prior research indicates self-reflection and self-assessment to be appropriate methods for assessing learning.<sup>18,19</sup> Future studies should assess alternative options including scenario-based assessments. While we report change immediately after program completion, sustained change could be assessed. Lastly, this

study focused on short-term impact on participants. Future studies should assess the depth and breadth of influence on research.

There is perceptible movement toward inclusion of community members in research; yet, there are limited programs that provide community members with the capacity, skills, support, and language they need to level the playing field in research institutions. Research institutions across the US can continue to integrate community consultants into research by implementing and institutionalizing similar programs, prioritizing hiring of local residents who reflect the study population, and securing funding for community consultation, including further evaluation of these approaches. Community engagement practices should be institutionalized and embedded in research with “top-down” support. Additionally, this program focused mostly on training and supporting community residents; more formal training in community-engaged research targeting research teams is needed, including funding and infrastructure. More robust community engagement in research with residents from communities of color and lower-income populations has the potential to leverage resources of research institutions to create responsive research agendas, reduce health disparities, and improve health outcomes.

## **References**

1. Santilli A, O'Connor Duffany K, Ickovics J. 2015 New Haven Health Survey Updated Findings: April 2016 [Internet]. New Haven: Community Alliance for Research and Engagement; 2016 [cited 2021 Aug 2]. Available from: [https://static1.squarespace.com/static/5d66946c19efcd0001719bbe/t/5e99ad35c6f8c1542ea475f3/1587129657555/2015+CARE+Survey+Results+April+2016+update\\_246216\\_284\\_45455\\_v4.pdf](https://static1.squarespace.com/static/5d66946c19efcd0001719bbe/t/5e99ad35c6f8c1542ea475f3/1587129657555/2015+CARE+Survey+Results+April+2016+update_246216_284_45455_v4.pdf)
2. Data Dashboard: New Haven Neighborhood Profiles, 2016 [Internet]. New Haven (CT): DataHaven; 2017 [cited 2018 April 9]. Available from: <http://www.ctdatahaven.org/data-dashboard>
3. NIH Awards by Location & Organization - NIH Research Portfolio Online Reporting Tools (RePORT) [Internet]. District of Columbia: U.S. Department of Health & Human Services. 1992- [cited 2021 Jul 26]. Available from: <https://report.nih.gov/award/index.cfm>
4. 2018 DataHaven Community Wellbeing Survey: New Haven Crosstabs [Internet]. New Haven (CT): DataHaven and Siena College Research Institute; 2018 [cited 2021 Dec 8]. Available from: <https://www.ctdatahaven.org/reports/datahaven-community-wellbeing-survey>
5. 2021 DataHaven Community Wellbeing Survey: Statewide Crosstabs Summer 2021 [Internet]. New Haven (CT): DataHaven and Siena College Research Institute; 2021 [cited 2021 Dec 8]. Available from: <https://ctdatahaven.org/reports/datahaven-community-wellbeing-survey#2021survey>

6. COVID-19 Vaccinations by Race/Ethnicity and Age [Internet]. Connecticut Department of Public Health. 2021- [cited 2022 Jan 6]. Available from: <https://data.ct.gov/Health-and-Human-Services/COVID-19-Vaccinations-by-Race-Ethnicity-and-Age/4z97-pa4q>
7. Sheridan S, Schrandt S, Forsythe L, Hilliard TS, Paez KA. The PCORI Engagement Rubric: Promising Practices for Partnering in Research. *Ann Fam Med*. 2017; 15(2): 165-170.
8. Tandon R, Hall B, Lepore W, Singh W. Training the next generation of community based researchers: A guide for trainers. *PRIA and University of Victoria*; 2016. Accessed 13 June 2022.  
[https://www.researchgate.net/publication/309763910\\_Training\\_the\\_Next\\_Generation\\_of\\_Community\\_Based\\_Researchers\\_A\\_Guide\\_for\\_Trainers](https://www.researchgate.net/publication/309763910_Training_the_Next_Generation_of_Community_Based_Researchers_A_Guide_for_Trainers)
9. George S, Vassar SD, Norris K, Coleman B, Gonzalez C, Ishimori M, Morris D, Mtume N, Shapiro MF, Lucas-Wright A, Brown AF. Researcher perspectives on embedding community stakeholders in T1–T2 research: A potential new model for full-spectrum translational research. *Journal of Clinical and Translational Science*. 2019; 3, 120-124.
10. McDavitt B, Bogart LM, Mutchler MG, Wagner GJ, Green HD, Lawrence SJ, Mutepfa KD, Nogg KA. Dissemination as Dialogue: Building Trust and Sharing Research Findings Through Community Engagement. *Preventing chronic disease*, 2016; 13, E38.  
<https://doi.org/10.5888/pcd13.150473>
11. Santilli A, Carrol-Scott A, Ickovics JR. Applying Community Organizing Principles to Assess Health Needs in New Haven, Connecticut. *Am J Public Health*. 2016; 106: 841-847. doi:10.2105/ AJP.2016.303050

12. Wang KH, Ray NJ, Berg D, Greene AT, Lucas G, Harris K, Carrol-Scott A, Tinney B, Rosenthal MS. Using community-based participatory research and organizational diagnosis to characterize relationships between community leaders and academic researchers. *Preventive Medicine Reports*, 2017; 7: 180-186. doi: 10.1016/j.pmedr.2017.06.007
13. Folta S, Hudson LB, Cohen B, Catala A. *Leveling the Playing Field for Community Stakeholders: Examining Practices to Improve Engagement and Address Power Dynamics*. Springer International Publishing; 2022, 97-105.
14. Black KZ, Hardy CY, De Marco M, Ammerman AS, Corbie-Smith G, Council B, Ellis D, Eng E, Harris B, Jackson M, Jean-Baptiste J, Kearney W, Legerton M, Parker D, Wynne M, Lightfoot A. Beyond Incentives for Involvement to Compensation for Consultants: Increasing Equity in CBPR Approaches. *Progress in Community Health Partnerships: Research, Education, and Action*. 2013; 7(3): 263-270.
15. Komaie G, Goodman M, McCall A, McGill G, Patterson C, Hayes C, and Sanders Thompson V. Training Community Members in Public Health Research: Development and Implementation of a Community Participatory Research Pilot Project. *Health Equity*. Dec 2018; 2(1): 282-287. <http://doi.org/10.1089/heq.2018.0043>
16. Battaglia TA, Pamphile J, Bak S, Spencer N, Gunn C. Connecting Community to Research: A Training Program to Increase Community Engagement in Research. *Progress in Community Health Partnerships: Research, Education, and Action*. 2019; 13(2):209-217.

17. Arietta MI, Wells NK, Parker LL, Hudson AL, Crook ED. Research Apprenticeship and Its Potential as a Distinct Model of Peer Research Practice. *Progress in Community Health Partnerships: Research, Education, and Action*. 2018;12(2): 199-214.
18. Bertoni M, Bertoni A. Measuring Experiential Learning: An Approach Based on Lessons Learned Mapping. *Education Sciences*. 2020; 10(1):11.  
<https://doi.org/10.3390/educsci10010011>
19. Warren, JL. Does Service-Learning Increase Student Learning? A Meta-Analysis. *Michigan Journal of Community Service Learning*. 2012;18(2): p56-61.

<b>Table 1. Community Research Fellows Curriculum Topics</b>	
<i>Public Health Topics</i>	<i>Research Topics</i>
Health Equity	Principles of Community Based Participatory Research
Health Disparities	Principles of Patient-Centered Outcomes Research
New Haven Health Data	Research Ethics
Social Determinants of Health	Introduction to the Research Process
Community-level Interventions	- Research Methods
	- Data Collection (Qualitative and Quantitative)
	- Data Analysis and Interpretation



	<b>Cohort 1 (N = 14)</b>	<b>Cohort 2 (N = 8)<sup>2</sup></b>
<b>Characteristics</b>	N(%)	N(%)
Age (mean, range) <sup>1</sup>	32.2 (23-66)	<b>43.8 (30-63)</b>
Race/Ethnicity		
Black	8 (57.1)	4 (50.0)
Multiple race/ethnicities	2 (14.3)	2 (25.0)
Latino or Hispanic	2 (14.3)	0 (0.0)
White	0 (0.0)	1 (12.5)
Other	1 (7.1)	0 (0.0)
No data	1 (7.1)	1 (12.5)
Gender		
Female	11 (78.6)	3 (37.5.0)
Male	1 (7.1)	1 (12.5)
Non-binary	1 (7.1)	0 (0.0)
No data	1 (7.1)	4 (50.0)
Education level		
Master's Degree+	3 (21.4)	2 (25.0)
Some post-graduate work	1 (7.1)	0 (0.0)
Bachelor's Degree	5 (35.7)	2 (25.0)
Associate's Degree / Some College	3 (21.4)	3 (37.5)
High School/ GED	0 (0.0)	0 (0.0)
No data	2 (14.3)	1 (12.5)

<sup>1</sup> Age missing for Cohort 1 (n = 3) and Cohort 2 (n = 2)

<sup>2</sup> Data included for eight CRFs with baseline and end-of-program data. Three additional CRFs were not included; two CRFs left program early on ; one CRF did not complete the baseline survey.

Knowledge Items	Cohort 1						Cohort 2					
	T1 Pre-training Average (SD)	Range	T3 Post-PROGRAM Average (SD)	Range	Change in mean	p-value*	Pretraining Average (SD)	Range	Post-PROGRAM (SD)	Range	Change in mean	p-value*
8. I am knowledgeable about social determinants of health.	5.50 (1.29)	[3-7]	6.57 (0.51)	[6-7]	1.07	<b>0.006</b>	5.25 (1.04)	[4-7]	6.25 (0.89)	[5-7]	1.00	<b>0.033</b>
9. I am knowledgeable about health disparities in New Haven.	5.57 (0.94)	[4-7]	6.50 (0.76)	[5-7]	0.93	<b>0.002</b>	5.25 (1.28)	[4-7]	6.50 (0.76)	[5-7]	1.25	<b>0.049</b>
10. I am knowledgeable about the process of conducting a research study.	4.86 (1.56)	[2-7]	6.36 (0.93)	[4-7]	1.5	<b>0.008</b>	4.75 (1.28)	[3-7]	6.38 (1.06)	[4-7]	1.63	<b>0.024</b>
11. I am knowledgeable about various data collection tools including surveys, observations, and focus groups.	5.43 (1.28)	[3-7]	6.14 (0.66)	[5-7]	.71	<b>0.045</b>	5.63 (1.41)	[3-7]	6.25 (1.16)	[4-7]	0.63	0.351
12. I am knowledgeable about the difference between qualitative and quantitative data.	5.50 (1.34)	[3-7]	6.57 (0.65)	[5-7]	1.07	<b>0.006</b>	5.63 (1.41)	[3-7]	6.75 (0.71)	[5-7]	1.13	0.065

PROGRESS IN COMMUNITY HEALTH PARTNERSHIPS: RESEARCH, EDUCATION, AND ACTION (PCHP). FORTHCOMING. ALL RIGHTS RESERVED.

13. I am knowledgeable about different ways New Haven residents can be involved in research studies.	4.64 (1.69)	[1-7]	6.29 (0.91)	[5-7]	1.64	<b>0.007</b>		4.63 (1.06)	[3-6]	6.63 (0.74)	[5-7]	2.00	<b>0.001</b>
14. I am knowledgeable about Community-Based Participatory Research (CBPR).	4.50 (1.83)	[1-7]	6.71 (0.83)	[4-7]	2.21	<b>0.002</b>		5.00 (1.31)	[3-7]	6.38 (0.74)	[5-7]	1.38	<b>0.008</b>
15. I am knowledgeable about Patient-Centered Outcomes Research (PCOR).	4.00 (1.84)	[1-7]	6.29 (0.83)	[4-7]	2.29	<b>0.002</b>		4.63 (0.92)	[4-6]	6.25 (1.04)	[4-7]	1.63	<b>0.003</b>
AVERAGE	5.00	[1-7]	6.43	[4-7]	1.43			5.09	[3-7]	6.42	[4-7]	1.33	
<b>Bold indicates p&lt;.05</b>													

PROGRESS IN COMMUNITY HEALTH PARTNERSHIPS: RESEARCH, EDUCATION, AND ACTION (PCHP). FORTHCOMING. ALL RIGHTS RESERVED.

Confidence Items	Cohort 1						Cohort 2					
	T1 Mean (SD)	Range	T3 Mean (SD)	Range	Change in mean	p-value*	T1 Mean (SD)	Range	T3 Mean (SD)	Range	Change in mean	p-value*
1. I am confident in my ability to contribute to a research study.	5.71 (1.20)	[3-7]	6.36 (0.74)	[5-7]	0.64	<b>0.033</b>	6.00 (1.20)	[4-7]	6.38 (0.74)	[5-7]	0.38	0.285
2. I am confident in my leadership abilities.	5.71 (0.83)	[5-7]	6.36 (0.74)	[5-7]	0.64	<b>0.014</b>	6.38 (0.74)	[5-7]	6.75 (0.71)	[5-7]	0.38	0.285
3. I am confident in my ability to understand health-related data.	5.86 (1.41)	[2-7]	6.07 (0.83)	[5-7]	0.21	0.583	5.63 (1.30)	[4-7]	6.38 (0.92)	[5-7]	0.75	0.171
4. I am confident in my ability to share health-related data with my community.	5.71 (1.59)	[2-7]	6.29 (0.91)	[4-7]	0.57	0.218	6.13 (1.25)	[4-7]	6.63 (0.74)	[5-7]	0.50	0.104
5. I am confident in my ability to work with my community to prioritize health issues based on data.	5.64 (1.34)	[2-7]	6.36 (1.01)	[4-7]	0.71	<b>0.027</b>	5.50 (1.69)	[3-7]	6.13 (1.13)	[4-7]	0.63	0.217
6. I am confident in my ability to collect data.	5.86 (0.86)	[4-7]	5.86 (1.10)	[4-7]	0.00	1.000	5.75 (1.75)	[3-7]	6.25 (0.89)	[5-7]	0.50	0.351
7. I am confident in my	5.29 (1.38)	[2-7]	6.50 (0.76)	[5-7]	1.21	<b>0.001</b>	6.00	[4-7]	6.75 (0.71)	[5-7]	<b>0.75</b>	<b>0.048</b>

PROGRESS IN COMMUNITY HEALTH PARTNERSHIPS: RESEARCH, EDUCATION, AND ACTION (PCHP). FORTHCOMING. ALL RIGHTS RESERVED.

ability to engage with research investigators.													
Average	5.68	[2-7]	6.26	[4-7]	0.58			5.91	3-7	6.46	4-7	0.55	
<b>Bold</b> indicates p<.05 for change of scores from T1 to T3													

**Table 5. Investigator Feedback Survey Responses\*: Cohort 1 (n=16) and Cohort 2 (n=5)**

		Cohort 1			Cohort 2		
		mean	range	Percent reporting "very" or "extremely"	mean	range	Percent reporting "very" or "extremely"
1.	How beneficial was the involvement of Health Leaders for your research?	3.1	1.0-5.0	50%	4.2	2.0-5.0	80%
2.	How engaged were the Health Leaders in their assigned projects related to your research?	3.8	1.0-5.0	69%	4.6	3.0-5.0	80%
3.	How prepared were you to engage a Health Leader into your work when the Health Leader started? **	3.0	2.0-5.0	33%	4.0	3.0-5.0	80%
4.	While working with New Haven Health Leaders, how supported by the CARE team did you feel?	3.6	1.0-5.0	63%	4.4	4.0-5.0	100%
5.	How likely are you to involve a Health Leader in a research project in the future? **	3.9	2.0-5.0	60%	4.6	4.0-5.0	100%
6.	How likely are you to recommend the New Haven Health Leaders program to a colleague who is seeking to engage community members in their research?	3.9	2.0-5.0	69%	5.0	5.0	100%
*Scale: 1-not at all, 2-somewhat, 3-moderately, 4-very, 5-extremely							
**Cohort 1: n=15 for noted items							