

Engagement Quality, Partnership Processes, and Network Characteristics of a Community-Academic Collaboration to Advance Health Equity

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ABSTRACT

Objective: To assess engagement quality, partnership processes, and network characteristics of a community-academic research collaboration.

Methods: We surveyed community and academic members of a community advisory board (CAB) in Baltimore, MD, USA (December 2019-August 2020) to assess demographics, health equity work experiences, quality of community engagement and partnership, and collaborative networks among members.

Results: Fifty-four members completed the survey (77% response rate). Members reported a median of 10 years of health equity work experience and 2 years serving on the CAB.

Community (non-academic) members rated the quality of community engagement and most domains of partnership, except quality of decision-making, as high (~4/5). CAB members reported collaborative ties, on average, with 16-17 other members. Academic members had nearly twice the ties of community members. Community members' number of ties and engagement ratings were not associated.

Conclusions: In this CAB, collaborative ties were numerous. Although community members rated the CAB's engagement and partnership quality favorably on several dimensions, additional efforts to enhance decision-making processes and members' influence and outreach within the network could further promote achievement of the CAB's goals.

KEYWORDS: Community-Academic Partnerships, Community-Based Participatory Research, Community Engagement, Health Equity, Social Networks

INTRODUCTION

For community health interventions to be effective and sustainable, experts believe institutions must engage in authentic collaborations steeped in equity and commitment to the community of interest.^{1,2} This is especially true for communities that experience health disparities due to structural racism and adverse social determinants of health (SDOH).³ Community-engaged research (CEnR), is the predominant approach adopted by community-academic partnerships. It aims to facilitate the active involvement of those most affected by health disparities in interrogating the pathways between social and structural determinants of health and the emergence of health inequities.^{4,5} It is widely regarded as essential for advancing health equity research and practice.⁶ However, CEnR exists along a continuum from outreach on the lower-end of community involvement and influence, to shared decision-making on the higher-end. Community-academic partnerships, particularly those on the lower-end of the engagement continuum, are vulnerable to replicating systems of marginalization and disenfranchisement that contribute to disparate health outcomes among systematically disadvantaged communities. Thus, experts have called for researchers in partnerships to advance health equity to acknowledge and relinquish the amount of power they assert in these partnerships.^{7,8,9} Moreover, a lack of common definitions and indicators of the characteristics and processes of community-academic collaborations hinders efforts to evaluate their effectiveness for enhancing research implementation and dissemination and advancing community transformation and health equity.¹⁰

Few attempts to systematically review the evidence on the impact of initiatives that aim to engage communities have been made.^{11,12,13,14} Two reviews of the literature on community-

academic collaborations have identified trust building, respectful relationships, and power sharing among partners as facilitating interpersonal factors, and excessive time commitment as a hindering operational factor, in achieving sustainable community-based participatory research and solutions to complex public health concerns.^{12,13} To strengthen the evidence base for stronger community-academic partnerships, these reviews recommend including the use of longitudinal data,¹¹ creating a systematic reporting structure of methods and characteristics,¹² implementation of evaluation mechanisms, and inclusion of explicit statements about the goals of collaboration in evaluation designs.¹⁰ To address the aforementioned gaps, the National Academy of Medicine's Organizing Committee for Assessing Meaningful Community Engagement in Health and Health Care Programs and Policies published a conceptual model to identify concepts and metrics that assess the extent, process, and impact of community engagement.¹⁵ The model starts with operationalization of core engagement principles and identification of key indicators of partnership, and the desired outcome is health equity through transformed systems for health.

This paper describes the assessment of engagement quality, partnership processes, and network characteristics of the collaboration between the Johns Hopkins Center for Health Equity (JHCHE) and its Community Advisory Board (CAB) through self-reported survey assessment of CAB members. Because health equity is our long-term vision, a primary goal of the survey was to identify where our collaboration lies on the community engagement continuum, understand how community and academia, as groups, interact with each other, and to interrogate the power balance between these groups as a part of our mission to reach the zenith of community engagement, where power and decision-making are shared equitably. Data emerging from these

efforts may help inform approaches to evaluate similar community-academic collaborations, identify new indicators and metrics of meaningful community engagement for the field, and enhance collaborations' effectiveness for advancing health equity.

METHODS

Setting

The JHCHE is a transdisciplinary research center, established in 2010 with funding from the National Institutes of Health, to reduce cardiovascular disease morbidity and mortality and improve experiences of health care for African Americans and others affected by disparities in Baltimore.¹⁶ Cultivating, advancing, and evaluating the impact of the full spectrum of community engagement strategies has been a hallmark of JHCHE since its inception. We established the Center's CAB in 2010 to respond to local community needs, engage with and use the input of community members, foster bidirectional learning and capacity-building for academic and community members, and ensure that the Center's research stayed true to its vision of eliminating health disparities.¹⁷ Early in the CAB's development, we adapted Wallerstein et al.'s logic model of community-based participatory research to reflect our approach to community engagement and CAB-Center collaboration.¹⁸ The conceptual model emphasizes the contexts in which collaborations are formed to address specific health issues affecting communities, factors that influence partnership processes, such as characteristics of individuals involved in research, relationships, and partnership structures; the influence of these processes on interventions and research, and the influence of the partnerships, interventions, and research on outcomes such as sustained interventions and collaborations, shared power, individual agency and capacity of partners, as pathways to health equity. This conceptual model both reflects and

informs the collaborative effort between the academic JHCHE and its non-academic community partners that is the JHCHE CAB. JHCHE uses “community partners” broadly to include community-based organizations, patients, patient advocates, clinicians, health system administrators, payors, government officials, non-governmental organizations, and policy makers. In the 14 years since the establishment of the CAB, the CAB has jointly refined its mission, vision, and goals to reflect the current health priorities of its members during full- and half-day retreats. In September 2018, the CAB identified three new goals: 1) help JHCHE provide education and outreach to the community regarding the conduct and results of research; 2) work in collaboration with JHCHE in all phases of research from planning, implementation, and evaluation to translation and dissemination; and 3) represent the Baltimore community. Additionally, members identified the CAB’s vision statement, “to create a healthy community free of disparities.” In September 2019, the CAB revisited these three goals, agreed that they should endure and identified its current mission, “to promote health equity in communities locally and globally through strong community-academic partnerships.”

We used these conceptual model domains as well as the CAB’s goals and mission to develop an evaluation of the collaboration and inform instrument selection. The current study describes the partnership processes that must be developed as a first step towards our ultimate vision of health equity in our surrounding communities. The Johns Hopkins Medicine Institutional Review Board has approved all study procedures [JHMIRB 00218639] and all participants gave informed consent for their participation.

Study Participants

Current and former CAB members who had attended two or more quarterly CAB meetings occurring between November 2015 and September 2019 (n=103) were eligible for this study. All CAB members are adults (≥ 18 years of age).

Recruitment

The study principal investigator and CAB co-chair (a community representative) provided an oral invitation to participate in the survey to CAB members who attended the in-person December 11, 2019, CAB meeting. Those eligible former or current CAB members not in attendance were invited by email to participate.

Survey Development

The research team developed a 114-item survey to assess participant experience as a CAB member, satisfaction with the CAB and the community-academic collaboration that is the foundation of the CAB, social networks that may be related to their participation as a CAB member, and member demographics. The survey captures individual characteristics of CAB members, including their demographic characteristics, time served on the CAB, role on the CAB, organizational affiliation, experience and expertise related to health equity, and perceived contributions to the Center's research, training, and community engagement.

The survey included ratings on CAB goal achievement. These goals were collaboratively developed with all members of the CAB (3 items).¹⁶ The survey also included items from the Program for the Elimination of Cancer Disparities (PECaD) community engagement survey (48 items assessing 11 engagement principles)¹⁹ and the Partnership Self-Assessment Tool (PSAT) (37 items assessing partnership).²⁰ These items capture engagement principles established in the

literature as well as other factors with a potential influence on success of the collaboration (e.g., leadership, administration, decision-making, synergy).

We also included a social network analysis in the survey. A social network analysis consists of a set of people or organizations connected by a set of social ties.²¹ We assessed social network ties of CAB members to understand how participants interact with one another, as research suggests that patterns of collaboration between partners is important for collaboration development and network functioning.^{22,23} We used a roster-based approach to elicit collaborative network ties,²⁴ in which participants were presented with a matrix listing of all CAB members' names and photos and asked to identify whether and how they collaborated with other CAB members since joining the CAB. Participants could identify 8 types of collaborative ties: community education, community outreach, training, advocacy, service delivery, research, grant funding, and others.

The CAB's jointly identified mission and goals informed survey item selection, but, to avoid the introduction of bias in participants' responses, item selection and survey development did not directly involve non-academic CAB members. However, CAB members participated in focus groups that discussed a CAB evaluation during a strategic planning retreat on September 18, 2019. During these focus groups, CAB members affirmed the importance of evaluating their relationships with one another and were aware that the academic team was planning an evaluation. We view the survey development as a co-creation process because the themes raised in the focus groups provided formative content and principles that guided the selection of instruments and some survey items. We planned in advance to share the results with the CAB at

the end of the study, to obtain their reactions, interpretation of the findings, and recommended next steps.

Data Collection Procedures

On December 11, 2019, we invited in-person attendees of the regularly scheduled quarterly CAB meeting to complete a paper version of the survey during the meeting time. Trained research assistants entered data from the paper surveys into a REDCap (Research Electronic Data Capture) database.^{25,26} Remote attendees and absent CAB members were emailed a letter of invitation from the community and academic CAB co-chairs to complete the survey via a REDCap survey link. Between February and August 2020, nine reminder emails were sent to non-responders. Reminder emails increased in frequency from monthly to every week in June 2020. Surveys received by June 30, 2020, were included in the database.

Analysis

Demographics

CAB member demographics were summarized using means and standard deviations or counts and percentages and compared across type of member, i.e., academic or community, using a two-sample t-test, Jonckheere-Terpstra tests, or Fisher's exact tests. We defined "community" as all non-academic partners. We conducted descriptive analyses to describe CAB members' experience and self-reported level of expertise related to health equity.

Quality of Community Engagement within the Collaboration and Dimensions of Partnership

We conducted descriptive analyses to describe CAB members' own individual perceived contributions to the Center's research, training, and community engagement activities. For the

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items measuring the extent to which the collaboration demonstrated specific community engagement principles, we summarized responses into engagement principle-specific mean scores on the quality scale, overall community engagement quality scores, and ratings of various dimensions of partnership.

Social Network Characteristics

Data on social network ties was used to construct network measures of *cohesion* and *centrality*. To describe the properties of the CAB network, we calculated (1) *network density* (a *measure of cohesion*),²⁷ the ratio of actual ties to the total possible ties in the network (possible range 0-1), and (2) *centralization*, the degree to which connections in a network are centralized around one or more nodes.²⁸ We also assessed the centrality of individual CAB members within the network using (1) *in-degree centrality* (ties received by others), indicating influence or prestige; and (2) *out-degree centrality* (ties sent to others),²⁸ indicating a tendency toward outreach. We used NetDraw,²⁹ an open-source program for visualizing social networks, to create a network map called a sociogram, in which individual CAB members are depicted as points and the relationship ties (e.g., community education, community outreach) are depicted as lines connecting the points.

To understand whether network position enhanced perceptions of engagement, we limited the analytic sample to community (non-academic) members, dichotomized their ratings of overall engagement quality of the collaboration at the mean value, and tested the association of both in-degree and out-degree centrality with their ratings of engagement, using two-sample t-tests.

We used UCINET version 6.665³⁰ to conduct the social network analysis. The continuous variables of age and in-degree and out-degree centrality were assessed for normality using the Shapiro-Wilk test³¹ prior to testing for differences using two-sample t-tests. All reported p values are two-sided and significance was set at $p < 0.05$.

RESULTS

Seventy-six of 103 CAB members (43 community members, 33 faculty/staff) were eligible to complete the survey. Of those 76, two community members were deemed ineligible (one member died and one member's email was invalid/inactive, and their organization had withdrawn from JHCHE involvement at the end of 2017). Of the remaining 74, 54 completed the survey (73% response rate overall, 88% for faculty and staff, 63% for community members). Twenty-nine of 35 eligible members in attendance (83%) completed the survey in-person at the December 11, 2019, CAB meeting, and 45 CAB members were emailed the survey in REDCap. 25 of the 45 CAB members completed the survey online (52%).

Characteristics of the Study Sample

Table 1 presents characteristics of CAB members who completed the survey and stratified by whether they were community members or faculty/staff members. Community members were older than faculty/staff, were more likely to self-report being Black, and had lower levels of formal education. Member groups did not differ on sex, ethnicity, or years working to improve health equity or serving on the CAB. Ninety percent of faculty and staff named research as their primary area of work. Over half (52%) of community members named service delivery as their primary area of work.

Community Member Ratings of the Collaboration's Effectiveness in Meeting CAB Goals

Sixty-two percent of CAB community members either agreed or strongly agreed with the statement, “The CAB has helped JHCHE provide education and outreach to the community regarding the conduct and results of research;” 67% agreed or strongly agreed with the statements, “The CAB has worked in partnership with JHCHE in all phases of research from planning, implementation, and evaluation to translation and dissemination,” and “The CAB has represented the Baltimore community – which includes local residents, patients, health care providers, researchers, students, faith-based organizations, community-based organizations, educational institutions, business leaders, and local and state government officials.”

Community Member Ratings of the Quality of Community Engagement within the Collaboration

Community members rated the quality of community engagement in collaborations as good or very good (>3.6 out of 5) on all eleven dimensions. The following three dimensions received the highest ratings: 1) focus on local relevance and social determinants of health, 2) acknowledge the community, and 3) integrate and achieve a balance of all partners. Slightly lower ratings were given to 1) disseminate findings and knowledge gained to all partners and 2) build on strengths and resources within the community. (Table 2)

Community Member Ratings of Various Dimensions of Partnership

Community members rated all the dimensions of partnership measured in the study as good or very good (scores ranging from 3.21-4.20). Leadership and overall satisfaction rated highest, followed by synergy, and administration. The only dimension rated lower than 3.5 was

decision-making, which was measured with three questions querying members' ratings of comfort with, support for, and inclusion in decision-making within the partnership. (Table 2).

Social Network Characteristics of the CAB

On average, participants reported having collaborative ties with 16.63 other CAB members (Table 3), with the most common collaborative relationships in research, followed by training, community outreach, and grant funding. The least common collaborative relationships were community education, service delivery, advocacy, and other relationships. The overall network density of the CAB was 0.22.

Centralization of the network was high (degree centralization = 0.68), suggesting that the connections between CAB members are highly centralized around the most influential nodes. Faculty and staff from JHCHE tended to occupy more central positions in the network compared to community members (Figure 1). The mean in-degree centrality (influence) of faculty and staff was 24.7 ties, versus 13.25 ties for community members, and the mean out-degree centrality (outreach) of faculty and staff was 30.9 ties, versus 14.04 ties for community members. Thus, for both measures of centrality, faculty and staff had nearly twice the number of ties of community members. The most central members of the CAB (as measured by in-degree centrality) represented both newer-serving members (with 2 years or less on the CAB) and longer-serving members (with 3 or more years on the CAB).

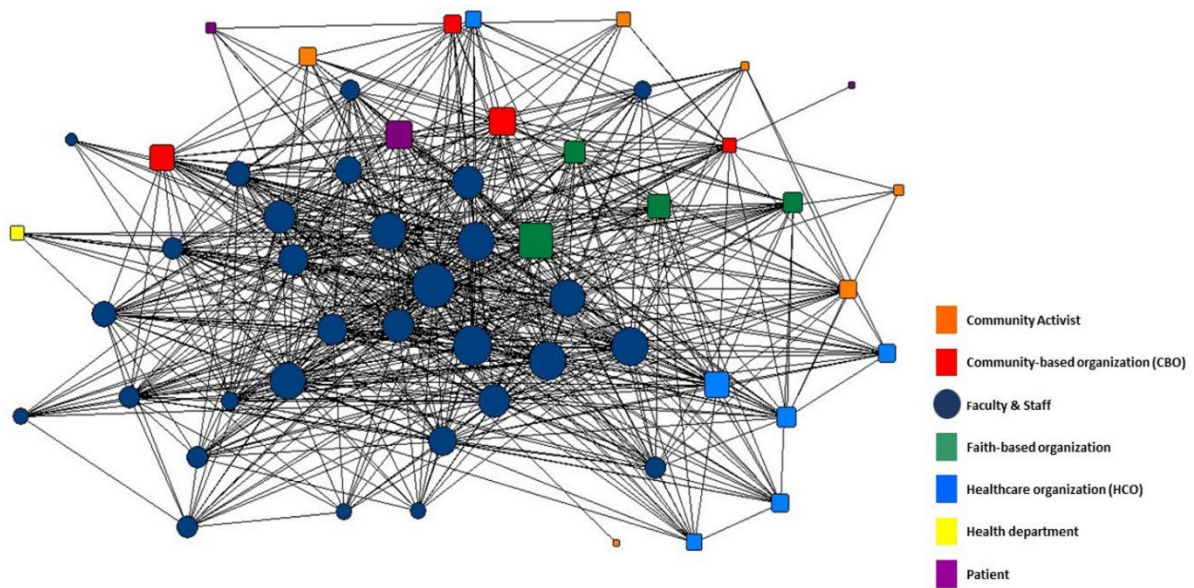


Figure 1. Network Visualization of the Johns Hopkins Center for Health Equity Community Advisory Board

Associations between Community Member Centrality and Ratings of Engagement Quality

Community members with high and low ratings of overall engagement quality had similar levels of in-degree (13.2 vs. 13.3 ties, $p=0.96$) and out-degree centrality (14.6 vs. 13.5 ties, $p=0.85$).

CAB Members' Response to Results

CAB members were invited to discuss these results during regularly occurring CAB meetings on December 13, 2023 and June 18, 2024. Based on the results, CAB members expressed an interest in: 1) learning more about how other community-academic partnerships function, 2) using time during CAB meetings to share their work with each other and increase awareness of resources for personal use and community dissemination, and 3) better

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understanding the distinct neighborhoods and communities CAB members represent to increase intra-CAB member networking and resource sharing.

DISCUSSION

Members of a community-academic collaboration reported many years of experience working to advance health equity. In rating their experience on the CAB, community (non-academic) members rated quality of community engagement, synergy, leadership, administration, and overall satisfaction with the community-academic collaboration as high, with only one sub-domain, decision-making, rated less than good or very good. Members were highly interconnected overall, with academic members of the collaboration having almost twice the number of ties with others than community members. There was no notable association of network position with engagement ratings among community members.

CAB members rated the quality of the partnership's focus on local relevance and SDOH the highest of the engagement principles surveyed. The CAB's mission centers on improving health equity and it is well established that addressing negative SDOH can improve health equity^{32,33}; therefore, this finding is not surprising as SDOH and health equity are the underpinning of all CAB meetings and discussions. These findings also align with CAB members' verbal feedback that JHCHE's research aligns with their community's health-related social needs, including navigating financial stress, unemployment, and lack of access to healthy food.

The high degree of centralization in the CAB suggests the board heavily relies on several key members to facilitate the collaboration, which may be advantageous for certain activities (e.g., efficiently sharing information) but less advantageous for other activities (e.g., promoting

collaborative decision making). The network was also characterized by collaborative ties predominantly focused on research and training. This result was anticipated, as many community members joined the CAB through JHCHE grant-funded research projects either as partners representing community-based organizations, and health systems, or as clinicians, care managers, community health workers, and past study participants. While non-academic CAB members most commonly identified service delivery as the primary area in which they have worked to improve health equity, service delivery was the least common collaborative relationship identified by the social network analysis. Although this may seem paradoxical, the JHCHE CAB focuses on research and thus research focused on service delivery may still be considered and reported as a research activity rather than traditional service delivery.

The high centrality of research team members was also expected, since research team members play administrative roles in the CAB as part of their jobs, for example, requesting CAB members' availability to meet, conducting CAB meeting reminder calls and emails, and coordinating meetings and events with CAB members. The current network structure succeeds in achieving high ratings in several areas (in the domains of satisfaction, synergy, leadership, and administration) and creating ties related to research.

Our findings also showed a relatively low overall network density of 0.22 across all relationships, when compared to other studies focused on social network analysis, which show an average density of 0.4-0.6.³⁴ One explanation for this finding could be the threshold for inclusion in the study (attendance at two or more meetings in the preceding four years). Newer members would have had fewer opportunities to engage with other members or to contribute to more than one study or area of the Center's work. However, most central members of the CAB

represented both newer members and longer-serving members, suggesting that members' influence stems from more than just time spent on the CAB. Another potential explanation for the relatively low overall cohesion or group density is the relatively large size of the CAB. Given that there is no previous research to interpret whether or how, in the context of a community-academic collaboration, the combination of a high average centrality and low average density affects the performance of a network, we are unsure if a different network structure would perform better. Previous research does indicate that within a given sociocultural context, high density networks have relatively greater paths for communicating information (but may require more time and deliberation to reach consensus), whereas low density networks may have specific individuals that regulate the flow of information to create a streamlined decision-making process.³⁵ However, the literature does not provide a history of studying the success of a network on the basis of the compounding effect of varying density and centrality.

In this small study, the number of collaborative ties that an individual community member had with other CAB members did not appear to influence their rating of the quality of community engagement by the collaboration. Despite these unanswered questions, the results reveal a mean of 16-17 ties per CAB member, meaning that there are still many previous and growing connections as it continues to expand. Indeed, in response to feedback from the CAB, we have already increased patient representation by six members since the survey was administered.

Community members rated the community-academic collaboration's engagement processes high on several dimensions; however, the slightly lower rating of decision-making, combined with the centrality of faculty and staff in the network, suggests further efforts to

enhance decision-making processes and community members' influence and outreach within the network could further promote achievement of the collaboration's goals. This study creates a path for future research and improvement of other community-academic collaborations; however, there are also limitations. First, this research used a small sample group—one that reflects the experience of a single private institution, with participants that live in one of two states, Maryland and Pennsylvania. Thus, the findings might not be generalizable to community-academic collaborations that differ in important ways from the current participants and their communities. Second, this study uses a cross-sectional design and only captures the experiences of participants at one point in time and may not be representative of their overall experience on the CAB. We are unable to determine whether the community engagement indicators and network characteristics in this study are associated with outcomes such as sustained interventions or collaborations, individual agency and capacity of community partners, or community health. Third, the study uses self-report data; thus, the influences of social desirability bias and response bias are possible. Additionally, due to the desire to avoid bias, community members were not explicitly involved in the generation of the survey; however, they were instrumental in the establishment of the JHCHE, the development of CAB goals, vision and mission, and their input on key content and principles addressed in the survey was obtained in focus group discussions. The research team pulled directly from the experiences and commentary of community members who were involved in this process to support the selection of survey instruments.

This study provides novel findings for the field through the exploration of whole network data in a community-academic collaboration as potential indicators of success and sustainability. Regular evaluation of community-academic collaborations will enhance understanding of how

existing partnerships function and identify ways to advance partnerships towards the true collaboration and shared leadership that characterizes community-based participatory research.³⁶ Our findings may help other institutions develop evaluation plans for current community collaborations and inform the structure of new collaborations. Further research, particularly social-network analysis, is needed to elucidate how individual connections and overall network characteristics impact a community-academic collaboration's effectiveness in attaining community-informed research design, strengthened collaborations and alliances, enhanced individual and organizational capacity, improved programs, and policies, thriving communities, and health equity.

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REFERENCES

1. Plamondon K, et al. CCGHR Principles for Global Health Research. Canadian Coalition for Global Health Research. <https://www.ccghr.ca/wp-content/uploads/2015/10/CCGHR-Principles-for-GHR-FINAL.pdf>. Published 2015. Accessed on July 17, 2019.
2. Monette EM, McHugh D, Smith MJ, et al. Informing ‘good’ global health research partnerships: A scoping review of guiding principles. *Global Health Action*. 2021; 14(1) DOI: [10.1080/16549716.2021.1892308](https://doi.org/10.1080/16549716.2021.1892308)
3. Williams DR, Cooper LA. Reducing Racial Inequities in Health: Using What We Already Know to Take Action. *Int J Environ Res Public Health*. 2019 Feb 19;16(4):606. doi: 10.3390/ijerph16040606. PMID: 30791452; PMCID: PMC6406315.
4. Wallerstein NB, Duran B. Using community-based participatory research to address health disparities. *Health Promot Pract*. 2006;7(3):312-323. doi:10.1177/1524839906289376
5. Wallerstein N, Duran B. Community-based participatory research contributions to intervention research: the intersection of science and practice to improve health equity. *Am J Public Health*. 2010;100 Suppl 1(Suppl 1):S40-S46. doi:10.2105/AJPH.2009.184036
6. Ortiz K, Nash J, Shea L, et al. Partnerships, Processes, and Outcomes: A Health Equity-Focused Scoping Meta-Review of Community-Engaged Scholarship. *Annu Rev Public Health*. 2020;41:177-199. doi:10.1146/annurev-publhealth-040119-094220
7. Centers for Disease Control. Community Health Improvement Navigator. <https://www.cdc.gov/chinav/tools/engage.html>. Updated October 2019. Accessed September 8, 2023.
8. Carman KL, Workman TA. Engaging patients and consumers in research evidence: Applying the conceptual model of patient and family engagement. *Patient Educ Couns*. 2017 Jan;100(1):25-29.
9. Alang S, Batts H, Letcher A. Interrogating academic hegemony in community-based participatory research to address health inequities. *J Health Serv Res Policy*. 2021 Jul;26(3):215-220.
10. MacQueen KM, Bhan A, Frohlich J, Holzer J, Sugarman J, Ethics Working Group of the HIV Prevention Trials Network. Evaluating community engagement in global health research: the need for metrics. *BMC Medical Ethics*. 2015; 16(44). <https://doi.org/10.1186/s12910-015-0033-9>
11. Milton B, Attree P, French B, Povall S, Whitehead M, Popay J. The impact of community engagement on health and social outcomes: a systematic review. *Community Development Journal*. 2012;47(3): 316–334.
12. Drahota A, Meza RD, Brikho B, Naaf M, Estabillo JA, Gomez ED, et al. Community-academic partnerships: a systematic review of the state of the literature and recommendations for future research. *Milbank Q*. 2016;94(1):163–214. doi: 10.1111/1468-0009.12184.

13. Jagosh, J., Bush, P.L., Salsberg, J. *et al.* A realist evaluation of community-based participatory research: partnership synergy, trust building and related ripple effects. *BMC Public Health* **15**, 725 (2015). <https://doi.org/10.1186/s12889-015-1949-1>
14. Popay J, Attree P, Hornby D, et al. Community Engagement in Initiatives Addressing the Wider Social Determinants of Health: A Rapid Review of Evidence on Impact, Experience and Process. *Social Determinants Effectiveness Review, Lancaster University*. 2007.
15. Organizing Committee for Assessing Meaningful Community Engagement in Health & Health Care Programs & Policies. Assessing Meaningful Community Engagement: A Conceptual Model to Advance Health Equity through Transformed Systems for Health. *NAM Perspectives*. 2022. Commentary, National Academy of Medicine, Washington, DC. doi: <https://doi.org/10.31478/202202c>.
16. Cooper LA, Boulware LE, Miller ER III, et al. Creating a transdisciplinary research center to reduce cardiovascular health disparities in Baltimore, Maryland: lessons learned. *Am J Public Health*. 2013;103(11):e26-e38.
17. Cooper LA, Purnell TS, Ibe CA, et. al. Reaching for Health Equity and Social Justice in Baltimore: The Evolution of an Academic-Community Partnership and Conceptual Framework to Address Hypertension Disparities. *Ethn Dis*. 2016 Jul 21;26(3):369-78. doi: 10.18865/ed.26.3.369. PMID: 27440977; PMCID: PMC4948804.
18. Wallerstein N, Oetzel J, Duran B, Tafoya G, Belone L, Rae R. What predicts outcomes in CBPR? In: Minkler M, Wallerstein N, eds. *Community Based Participatory Research for Health: Process to Outcomes*. 2nd ed. San Francisco, CA: Jossey-Bass; 2008:371–392.
19. Goodman MS, Sanders Thompson VL, Johnson CA, Gennarelli R, Drake BF, Bajwa P, Witherspoon M, Bowen D. Evaluating Community Engagement in Research: Quantitative Measure Development. *J Community Psychol*. 2017 Jan;45(1):17-32.
20. Partnership Self-Assessment Tool (PSAT). Center for the Advancement of Collaborative Strategies in Health. (2002). Partnership self-assessment tool questionnaire. Retrieved from https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/3129/Partnership_Self-Assessment_Tool-Questionnaire_complete.pdf?sequence=1&isAllowed=y. Accessed on December 4, 2018.
21. Borgatti, S. P., & Foster, P. C. The network paradigm in organizational research: A review and typology. *Journal of Management*. 2003; 29(6), 991-1013.
22. Bright C, Haynes E, Patterson D, Pisu M. The value of social network analysis for evaluating academic-community partnerships and collaborations for social determinants of health research. *Ethnic Dis*. 2017;27(suppl 1):337–346.
23. Valente TW, Palinkas LA, Czaja S, Chu K-H, Brown CH. Social Network Analysis for Program Implementation. *PLoS ONE*. 2015;10(6): e0131712. <https://doi.org/10.1371/journal.pone.0131712>.
24. Wasserman S, Faust K. *Social Network Analysis: Methods and Applications*, 1st ed. Cambridge, NY: Cambridge University Press; 1994:857.
25. PA Harris, R Taylor, R Thielke, J Payne, N Gonzalez, JG. Conde, Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for

- providing translational research informatics support, *J Biomed Inform.* 2009 Apr;42(2):377-81.
26. PA Harris, R Taylor, BL Minor, V Elliott, M Fernandez, L O’Neal, L McLeod, G Delacqua, F Delacqua, J Kirby, SN Duda, REDCap Consortium, The REDCap consortium: Building an international community of software partners, *J Biomed Inform.* 2019 May 9 doi: 10.1016/j.jbi.2019.103208
 27. Scott, J. Social network analysis: a handbook. London: Sage. 1991.
 28. Aunger, R. Exposure versus susceptibility in the epidemiology of “everyday” beliefs. *Journal of Cognition and Culture.* 2002; 2(2):113–157.
 29. Borgatti, S. P. NetDraw: Graph visualization software. Harvard: Analytic Technologies. 2002.
 30. Borgatti, S. P., Everett, M.G. and Freeman, L.C. 2002. Ucinet for Windows: software for social network analysis. Harvard, MA: Analytic Technologies.
 31. Mishra P, Pandey CM, Singh U, Gupta A, Sahu C, Keshri A. Descriptive statistics and normality tests for statistical data. *Ann Card Anaesth.* 2019;22(1):67-72. doi:10.4103/aca.ACA_157_18
 32. National Academies of Sciences, Engineering, and Medicine; National Academy of Medicine; Committee on the Future of Nursing 2020–2030; Flaubert JL, Le Menestrel S, Williams DR, et al., editors. The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity. Washington (DC): National Academies Press (US); 2021 May 11. 2, Social Determinants of Health and Health Equity. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK573923/>
 33. Brennan Ramirez, Laura K. et al. (2008). Promoting health equity; a resource to help communities address social determinants of health. <https://stacks.cdc.gov/view/cdc/11130>.
 34. Bloodgood, J.M., Hornsby, J.S., Rutherford, M. et al. The role of network density and betweenness centrality in diffusing new venture legitimacy: an epidemiological approach. *Int Entrep Manag J.* 2017; 13: 525–552. <https://doi.org/10.1007/s11365-016-0412-9>
 35. Pfortmüller F. Key to understanding communities: the centralized to distributed spectrum. Together Institute. <https://medium.com/together-institute/key-to-understanding-communities-the-centralized-to-distributed-spectrum-f41436f7a2f3>. Accessed September 8, 2023.
 36. Principles of Community Engagement, 2nd Edition. CDC/ATSDR Committee on Community Engagement. https://www.atsdr.cdc.gov/communityengagement/pdf/PCE_Report_508_FINAL.pdf. Published 2011. Accessed September 2023.

Table 1. Characteristics of the Johns Hopkins Center for Health Equity Community Advisory Board, 2019-2020

Characteristic	All Members N=54	Community Members N=24^a	Faculty and Staff Members N=30^b	P value^c
Age in years, mean (SD)	48.8 (13.9)	54.3 (12.9)	44.6 (13.4)	0.01
Gender, N (%):				0.49
Male	11 (21)	6 (27)	5 (17)	
Female	41 (79)	16 (73)	25 (83)	
Ethnicity, N (%):				0.25
Hispanic/Latino	3 (6)	0 (0)	3 (10)	
Race, N (%):				
Asian	8 (15)	1 (5)	7 (23)	0.12
Black	32 (62)	18 (82)	14 (47)	0.02
White	13 (25)	3 (14)	10 (33)	0.19
Education, N (%):				<0.001
High school/GED	5 (9)	5 (21)	0 (0)	
Bachelor's degree	9 (17)	7 (29)	2 (7)	
Master's degree	17 (31)	6 (25)	11 (37)	
Doctorate	23 (43)	6 (25)	17 (57)	
Primary area worked to improve health equity, N (%)				<0.001
Service delivery	13 (25)	12 (52)	1 (3)	
Outreach	3 (6)	3 (13)	0 (0)	
Community organizing	2 (4)	2 (9)	0 (0)	
Education	3 (6)	2 (9)	1 (3)	
Research	30 (57)	3 (13)	27 (90)	
Other	2 (4)	1 (4)	1 (3)	
Years working to improve health equity, median (IQR)		10 (5-21)	10 (2-18)	
Years, N (%):				0.43
1-5	15 (33)	5 (26)	10 (37)	
6-10	11 (24)	6 (32)	5 (19)	
11-15	5 (11)	1 (5)	4 (15)	
16-20	8 (17)	2 (11)	6 (22)	
Greater than 20	7 (15)	5 (26)	2 (7)	
Years served on CAB, median (IQR)		2 (2-8)	2 (1.5-7)	
Years, N (%):				0.98
1	12 (24)	5 (23)	7 (25)	
2	16 (32)	8 (36)	8 (29)	
3-7	9 (18)	3 (14)	6 (21)	

8-10	13 (26)	6 (27)	7 (25)
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Abbreviations: CAB, community advisory board; IQR, interquartile range

^a Missing data for external members: 2 are missing age, gender, race, ethnicity and years served on CAB; 1 is missing primary area worked to improve health equity; 5 are missing years working to improve health equity

^b Missing data for faculty and staff members: 1 is missing age; 3 are missing years working to improve health equity; 2 are missing years served on CAB

^c P value is from two-sample t-test for age, Jonckheere-Terpstra test for ordinal measures, and Fisher's exact test for categorical characteristics.

Table 2. Community Member Ratings of the Quality of Engagement and Partnership Processes, Johns Hopkins Center for Health Equity Community Advisory Board, 2019-2020

Community Engagement Quality and Partnership Processes			
Engagement Principle¹⁹	N	Mean Score (SD)	Range
Focus on local relevance and social determinants of health	24	4.21 (0.69)	3 - 5
Acknowledge the community	24	4.17 (0.69)	3 - 5
Disseminate findings and knowledge gained to all partners	22	3.63 (0.75)	2 - 5
Seek and use the input of community partners	23	3.81 (0.79)	2 - 5
Involve a cyclical and iterative process in pursuit of objectives	20	3.71 (0.78)	2 - 5
Foster co-learning, capacity building, and co-benefit for all partners	23	3.75 (0.75)	2.2 - 5
Build on strengths and resources within the community	23	3.67 (0.87)	2 - 5
Facilitate collaborative, equitable partners	23	3.74 (0.82)	1 - 5
Integrate and achieve a balance of all partners	23	4.08 (0.85)	1.25 - 5
Involve all partners in the dissemination process	21	3.72 (0.78)	2 - 5
Plan for a long-term process and commitment	23	3.84 (0.82)	2 - 5
Overall engagement quality score	24	3.84 (0.66)	2.2 - 5.0
Partnership Domain²⁰	N	Mean Score (SD)	Range
Synergy	22	4.04 (0.66)	2.2 - 5
Leadership	23	4.20 (0.65)	2.36 - 5
Administration	22	3.95 (0.70)	2.56 - 5
Decisions	22	3.21 (0.19)	2.67 - 3.33
Satisfaction	23	4.20 (0.55)	3 - 5

¹⁹Goodman MS, Sanders Thompson VL, Johnson CA, Gennarelli R, Drake BF, Bajwa P, Witherspoon M, Bowen D. Evaluating Community Engagement in Research: Quantitative Measure Development. *J Community Psychol.* 2017 Jan;45(1):17-32.) Scoring: 1=poor, 2=fair, 3=good, 4=very good, 5=excellent

²⁰Partnership Self-Assessment Tool (PSAT). Center for the Advancement of Collaborative Strategies in Health. (2002). Partnership self-assessment tool questionnaire.

Retrieved from

https://atrium.lib.uoguelph.ca/xmlui/bitstream/handle/10214/3129/Partnership_Self-Assessment_Tool-Questionnaire_complete.pdf?sequence=1&isAllowed=y.

Mean scores of 3.0 to 3.9 are “good” and 4.0 to 4.5 are “very good”. 5 is “excellent”.

Table 3. Network Properties of the Johns Hopkins Center for Health Equity Community Advisory Board, 2019-2020

Network	Average Degree	Density¹	Centralization²
Multiplex (all relationships)	16.63 ties	0.22	0.68
Research	12.47 ties	0.17	0.68
Training	5.24 ties	0.07	0.49
Community Outreach	4.61 ties	0.06	0.64
Grant Funding	4.03 ties	0.05	0.55
Community Education	3.59 ties	0.05	0.65
Service Delivery	2.32 ties	0.03	0.43
Advocacy	1.76 ties	0.02	0.62
Other relationships	0.88 ties	0.01	0.22

¹ A measure of cohesion; the ratio of actual ties to the total possible ties in the network (possible range 0-1)

² The degree to which connections in a network are centralized around one or more nodes