

Special Communication

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Corresponding author:

L. E. Crosby; Email: lori.crosby@cchmc.org

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Using the translational science benefits model to evaluate the impact of community-engaged programs

Stacey M. Gomes^{1,2,3} , Bridget Nolan Murphy^{1,2} , Monica J. Mitchell^{1,2,4,5}, Aaron Grant⁶, Farrah M. Jacquez^{2,4}, Brittany L. Rosen^{2,5,7} and Lori E. Crosby^{1,2,5} 

¹Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA; ²Center for Clinical and Translational Science and Training, University of Cincinnati, Cincinnati, OH, USA; ³Department of Educational Studies, University of Cincinnati, Cincinnati, OH, USA; ⁴Department of Psychology, University of Cincinnati, Cincinnati, OH, USA; ⁵Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH, USA; ⁶People Working Cooperatively, Cincinnati, OH, USA and ⁷Division of Adolescent and Transition Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA

Abstract

Assessing the long-term impact of community-engaged research (CEnR) programs remains a significant challenge in translational science, such as those conducted by Clinical and Translational Science Awards (CTSAs). The Translational Science Benefits Model (TSBM) is a framework designed to evaluate impact across four health and social domains (clinical/medical, community, economic, and political/legislative). TSBM offers a comprehensive framework for evaluating CEnR projects, as it extends beyond short-term outcomes to highlight distal impacts and sustainable benefits. Progress reports from three Cincinnati CTSA CEnR programs (Community Leaders Institute [CLI; $n = 170$], Community Health Grant [CHG; $n = 82$], and Partnership Development Grant [PDG; $n = 21$]) completed between 2010 and 2023 were coded by three reviewers using the TSBM. As expected, CEnR programs primarily demonstrated community & public health benefits. Economic, policy, and clinical benefits were also identified, further amplifying the impact of this work. The adoption of frameworks like the TSBM could lead to a more standardized approach for evaluating the impact of CEnR programs and facilitate comparisons across CTSAs. Future studies that track the impact of CEnR programs on health and social systems could provide valuable insights into the long-term benefits of these initiatives.

Introduction

Evaluating the long-term impact of community engagement research efforts remains a challenge for many Clinical and Translational Science Awards (CTSAs). Eder and colleagues noted in their study of CTSA community engagement metrics that traditional measures sometimes fail to fully capture the benefits of translational research [1]. This happens when measures are based on conventional academic frameworks that do not fully capture important community and social variables or evaluate collaboration or co-production over time. The authors call for evaluation methods that assess community-engaged partnership, translational research, and real-world impact across systems.

Developed at Washington University School of Medicine, the *Translational Science Benefits Model* (TSBM) includes benefits from four health and social domains [2] as depicted in Figure 1. The framework defines 30 specific, measurable indicators that reflect four overarching categories of benefits (Figure 1): clinical benefits, community benefits, economic benefits, and policy benefits [2]. This framework was originally designed to measure the impact of clinical research programs and has been used to evaluate community partnership co-authorship, the impact of mentored career development grants (KL2 awards), and dissemination and implementation projects [2–4]. This model has broader implications for community-engaged research (CEnR) and may help programs move beyond short-term outcomes like the number of community members served to long-term impacts (e.g., changes in standards/policies, reduction in social and financial burden).

The TSBM framework is also flexible in that it can be applied to a wide variety of community-engaged projects, from training programs to clinical research projects to public health interventions. For the current paper, the authors applied the TSBM to three CTSA CEnR programs conducted at the Cincinnati CTSA from 2010–2023: the Community Leaders Institute (CLI), Community Health Grants (CHG), and Partnership Development Grants (PDG) programs [2,5]. The overall goal was to review data from progress reports for these programs to highlight the model's effectiveness in demonstrating the impact of these programs

TBSM Benefits			
Clinical	Procedures & guidelines	Tools & products	
	Diagnostic procedures Guidelines Investigative procedures Therapeutic procedures	Biological factors & products Biomedical technology Drugs Equipment & supplies Software technologies	
Community	Health activities & products	Health care characteristics	Health promotion
	Community health services Consumer software Health education resources	Health care accessibility Health care delivery Health care quality	Disease prevention & reduction Life expectancy & quality of life Public health practices
Economic	Commercial products	Financial savings & benefits	
	License agreements Non-profit or commercial entities Patents	Cost effectiveness Cost savings Societal & financial cost of illness	
Policy	Advisory activities	Policies & legislation	
	Committee participation Expert testimony Scientific research reports	Legislation Policies Standards	

Figure 1. Translational science benefits.

on health and social systems. Results will aid in identifying programmatic strengths and gaps and guide future CEnR program evaluation efforts and use of the TBSM. By applying the TBSM model, CTSA's could gain a more holistic, comprehensive understanding of their impact on translational science, addressing a notable gap in current practice.

Materials and methods

Community Leaders Institute (CLI)

The Community Leaders Institute (CLI) training program was developed based on findings from literature reviews, feedback from our Community Engagement Core (CEC) Partner Council (Community Partner Council [CPC]), and suggestions from academic health center faculty, staff, and community research experts [6]. The CPC consists of an average of 30 academic and community members annually representing health, public health, social services, business, criminal justice, and public education sectors, and is described in more detail in prior publications [6,7]. The CPC meets quarterly to collaborate on CEC activities and to review community-engaged grant applications including the CLI which aims to attract organizational and community leaders, key staff members, and community advocates who will leverage the CLI training to enhance capacity in their neighborhoods and health, social service, or educational initiatives. These leaders play a vital role in fostering successful and productive partnerships within the academic health center. The curriculum covers topics tailored

to community capacity-building and engagement, as well as those suggested by the CPC, and includes (1) Delivering a 90-Second Overview of Your Program and Results, (2) Quality Improvement/ Ensuring Evidence-Based Practice, (3) Design Thinking, (4) Accessing Public Datasets, (5) Grant Writing, (6) Community Research Ethics, (7) Program Evaluation, and (8) Survey Development & Assessing Community Health. Participants engage in nine interactive sessions, each lasting three hours, spread over five weeks (including four full-day sessions and one half-day session). These sessions aim to enhance skills and confidence while addressing general and participant-specific challenges. Each session combines didactic instruction, experiential exercises, group discussions, skills development, and networking opportunities. The seminars are recorded, allowing participants to review them as needed. On the final half-day, participants demonstrate what they have learned via their project presentation.

Participants are required to select a “real-world” project to complete over 12 months, utilizing their CLI training and receiving technical assistance from CTSA faculty as needed. Examples of projects include conducting a program evaluation or quality improvement project or developing an organizational database to track processes and outcomes. All accepted applicants receive a grant of \$1,500 to \$2,000 to support their project over the 12-month period. They must submit session evaluations, an overall evaluation, and progress reports at 6-month and 12-month intervals detailing their project’s advancement.

Table 1. Overview of projects funded in the Community Leaders Institute, Community Health Grants, and Partnership Development Grants programs

	Community Leaders Institute (CLI)	Community Health Grant (CHG)	Partnership Development Grant (PDG)
Funding Years Included	2010–2023	2010–2023	2018–2023
# of Projects Funded	190	85	22
# of 6-Month Progress Reports	170	79	17
# of 12-Month Progress Reports	132	82	14
Projects Included in Analyses (n, %)	170 (89.5)	82 (96.5)	21 (95.5)

Community Health Grants (CHG)

The CHG program was developed in collaboration with the Cincinnati CTSA's CPC and aims to facilitate research conducted by academic-community partnerships (ACPs) [7]. Academic (faculty or affiliates from CTSA member institutions) or community (community programs, agencies, physician practices, non-profit organizations) partners can apply as the principal investigator. The CHG program prioritizes ACP projects that (1) apply existing health knowledge to real-world settings (i.e., translational research) and (2) demonstrate shared decision-making in research activities intended to improve community outcomes. Projects must be feasible, utilize a community-engaged measurement and evaluation strategy, and include a sustainability plan for both the project and partnership. The sustainability plan must describe how the ACP and proposed project will continue to make an impact beyond the funding period. Grantees can receive up to \$20,000 in funding for one year for their proposed project.

Partnership Development Grants (PDG)

New and developing ACPs may apply to the PDG program to support a health-focused pilot study or needs assessment in a shared interest area. Like the CHG program, PDG applicants are eligible for funding if they include at least one member from each academic institution and a non-profit organization. Although the priorities for competitive review are identical to that of the CHG, the project is anticipated to be smaller in scale, with a greater focus on the potential impact of the partnership in addressing the health challenge. PDG awardees receive \$5,000 to complete a one-year project and unlimited technical support from the CTSA staff until the project is complete. Additional details about the CHG and PDG programs can be found in Gomes et al [2]. Grantees complete 6- and 12-month progress reports detailing their activities and advances toward outcomes. The Cincinnati CTSA also surveyed grantees to better understand overall program impact and outcomes.

TSBM data coding

Three coders reviewed data from all available CLI, CHG, and PDG 6-month and 12-month progress reports ($n = 273$), identified project outcomes, using deductive thematic analysis to categorize outcomes from each within the TSBM benefits (Figure 2). Consistent with a thematic analysis approach, 10–25% of each

program's data were double-coded, reaching coder agreement of >90%, and any disagreements were resolved through a consensus discussion [8]. The remaining progress reports were split-coded. To avoid conflation, only direct reported outcomes within the progress reports were coded and quantified.

Data analysis

Frequencies were calculated for each program (e.g., CLI) by TSBM benefit ($n = 30$) and category ($n = 4$) to provide a detailed analysis of the distribution and frequency of benefits across each of the programs (Table 1 & Figure 2). To further illustrate how project outcomes can be translated into benefits using the TSBM, a PDG case example is provided in Figure 3.

Results

From 2010 to 2023, 190 projects were completed by community leaders or community health advocates who completed the CLI training program. During the same period, 85 partnerships received a CHG. Since their development in 2017, 22 PDG projects have been funded. Data from CLI 6- and 12 progress reports ($n = 170$), CHG 6- and 12-month reports ($n = 82$), and PDG 6- and 12-month progress reports ($n = 21$) were reviewed (see Table 1). If a grantee had both reports, we only included benefits from the 12-month progress report.

The CLI, CHG, and PDG programs demonstrated impacts from all four domains and from 20 (66.7%) of the individual benefits. The Community category was the most common amongst all three programs, with 222 (81.3%) yielding benefits in public health practices, 202 (74.0%) in community health services, 146 (53.5%) in life expectancy and quality of life, 131 (48.0%) in health education resources, 79 (28.9%) in disease prevention and reduction, 63 (23.1%) in healthcare accessibility, 33 (12.1%) in healthcare quality, 28 (10.3%) in healthcare delivery, and 19 (7.0%), in consumer software. Notable individual benefits from other categories include: cost savings (economic; $n = 105$, 38.5%), scientific research reports (policy; $n = 61$, 22.3%), and software technologies (clinical; $n = 11$, 4.0 %). See Table 1 & Figure 2 for more details. For clinical benefits, all three programs had grantees who developed guidelines or therapeutic procedures (see Figure 2 for examples). For example, one PDG program developed an app for individuals experiencing homelessness (software technology). In the community and public health realm, program grantees increased access to community health services such as mental health treatment, primary care services, parenting skill development, and care coordination. Health education resource benefits included education to reduce substance use in adolescents in one project. Projects also demonstrate the potential for longer-term sustainability and impact, such as a new CHG project that increased health care accessibility by providing medical services in a pharmacy, a CHG project that improved healthcare delivery via connecting Appalachian diabetes patients with care, and another project focused on improving follow-up care for patients with asthma who are discharged from the hospital. Benefits for disease prevention and reduction, as well as life expectancy and quality of life, were numerous, including projects focused on improving nutrition, physical health, and blood pressure and diabetes screening for populations with poor access to care. One CLI grantee's project demonstrated a significant public health practice benefit. The project developed a safe sleep intervention that has now been adopted by 71/88 counties in Ohio. In the economics

Translational Benefit			Programs with Benefit; n (%)	Program Example
Clinical	Procedures & guidelines	Diagnostic Procedures	1 (0.4)	Housing code enforcement referrals for children with asthma
		Guidelines	1 (0.4)	Linking fall prevention classes to electronic health records for patient referral
		Therapeutic Procedures	2 (0.7)	Improving prenatal care experiences for high risk women
	Tools & products	Software Technologies	11 (4.0)	Resource app for individuals experiencing homelessness
Community	Health activities & products	Community Health Services	202 (74.0)	Mental health treatment, primary care services, parenting skill development, care coordination
		Consumer Software	19 (7.0)	Care coordination model dashboard for refugees
		Health Education Resources	131 (48.0)	Substance use education in the schools
	Health care characteristics	Health Care Accessibility	63 (23.1)	Medical care in an urban community pharmacy setting
		Health Care Delivery	28 (10.3)	Connecting Appalachian diabetes patients to care and follow-up care for pediatric patients with asthma recently discharged from the hospital
		Health Care Quality	33 (12.1)	Developing culturally responsive training for first responders and autistic individuals and their families
	Health promotion	Disease Prevention & Reduction	79 (28.9)	Interventions to improve nutrition, physical activity, blood pressure and diabetes screening
		Life Expectancy & Quality of Life	146 (53.5)	Addressing opioid misuse in a high-risk neighborhood
		Public Health Practices	222 (81.3)	Sleep safe intervention adopted by the county public health department
Economic	Commercial products	Non-profit or commercial entities	2 (0.7)	Balance and footcare program becomes its own nonprofit
	Financial savings & benefits	Cost effectiveness	3 (1.1)	Program reducing emergency department utilization
		Cost savings	105 (38.5)	Grant funding & in-kind academic research support
Policy	Advisory activities	Committee Participation	3 (1.1)	Grantee serves on the American Society of Hematology Research Collaborative Sickle Cell Community Advisory Board
		Scientific Research Reports	61 (22.3)	Publications & Presentations
	Policies & legislation	Legislation	1 (0.4)	State-level hearing diagnostic changes
		Policies	16 (5.9)	Reducing early intervention barriers for at-risk preschoolers

Figure 2. Translational science benefits from the Community Leaders Institute, Community Health Grants, and Partnership Development Grants programs.

Program: CCTST Partnership Development Grant, 2019 – Cincinnati Asthma-Friendly Environments (CAFE) – People Working Cooperatively (PWC) and Cincinnati Children’s Hospital and Medical Center Environmental Health and Lead Clinic (CCHMC-EHLC).

Challenge or Problem: Asthma is the most common chronic disease of childhood affecting 8% of children in the US and 12% of children in Hamilton County, OH, and disproportionately affects low-income children of color. Multi-trigger, multi-component environmental home interventions, including repairs and structural modifications, have been shown to reduce asthma symptoms as well as reduce school days missed and acute care visits. There are minimal active partnerships between pediatric asthma clinics and in-home environmental intervention service providers.

Approach: We co-designed a pilot partnership program between CCHMC-EHLC and PWC to identify children with difficult-to-treat asthma, enroll patients in a program to address in-home environmental asthma triggers, provide asthma home visits, repairs and other structural modifications to the patient’s home, and measure the effectiveness of this new partnership on addressing environmental asthma triggers.

Benefits:



Clinical Guidelines: *Demonstrated*

- Developed guidelines for CCHMC clinicians and social workers to identify patients with difficult-to-treat asthma who would benefit from environmental housing interventions.



Community Benefits: *Demonstrated*

- Developed protocol for PWC to provide asthma trigger reduction home visits and patient education to reduce home-based triggers.
- Provided asthma trigger reduction home visits, cleaning kits, supplies and education to 6 families with children who have difficult-to-treat asthma.
- Provided repairs and structural modifications to home environment for 4 families.



Health Care Quality: *Demonstrated*

- Increased engagement between patients, clinicians and community-based organization (PWC) to address both medical and social determinants of health.



Disease Prevention and Reduction: *Potential*

- Will work with additional pediatric primary care clinics (beyond difficult-to-treat clinic) to increase patient access to community-based housing resources to address asthma triggers.



Societal and financial cost of illness: *Potential*

- Once this program can be implemented at a larger scale, will reduce asthma symptoms and medical utilization for asthma, as well as reduce missed school days. Will reduce costs to parents who could not otherwise make housing improvements to address indoor asthma triggers.

Figure 3. Case Study Exemplar: People Working Cooperatively (PWC) in collaboration with Cincinnati Children’s Hospital Medical Center (CCHMC) [5,9,10].

category, CLI and CHG projects demonstrated benefits in reducing the societal and financial cost of illness through developing community gardens to address food insecurity. Finally, within the policy category, grantees authored scientific research reports, and some programs became exemplars (e.g., Health Coaches for a housing program).

Discussion

This paper utilized the TSBM framework to translate scientific outputs and outcomes from three CEnR programs at the Cincinnati CTSA – the CLI, the CHG, and the PDG – into health and social benefits. The TSBM provides a systematic approach to evaluating the impact of these research programs, ensuring that social factors (e.g., local public health priorities) are considered. The framework can also help CTSA and community partners better understand the real-world implications of these programs. These insights can inform future programmatic, research, and evaluation directions, thus promoting CEnR. For example, we have revised our progress report templates to better capture TSBM benefits, enabling us to examine correlates which will inform future programming (e.g., resources and strategies to support factors correlated with benefits).

Moreover, the framework provides a clear and straightforward way to describe impact and emphasize the value of these research programs to potential funders and the broader community. The use of the TSBM can enhance the ability of CTSA to measure and communicate the impact of their CEnR programs, including their contribution to better health and social outcomes. Specifically, the use of the TSBM across CTSA promotes the use of consistent metrics enabling site comparisons. Application of the TSBM into evaluation also establishes benchmarks while supporting data sharing and collaboration.

The CLI, CHG, and PDG programs have demonstrated significant clinical benefits through the development of guidelines and therapeutic procedures by their grantees. Use of evidence-based guidelines and procedures improves the quality of care provided and has the potential to reduce long-term healthcare costs. Additionally, the CHG program had a notable clinical benefit with one grantee's use of software technology to address community health needs.

All programs have resulted in community and public health benefits. Increasing access to health and mental health treatment and care coordination have most likely resulted in improved health outcomes and greater support for socially disadvantaged and chronic disease populations, including individuals facing homelessness and those diagnosed with diabetes and asthma. Moreover, disease prevention and reduction efforts and health education initiatives (e.g., adolescent substance use interventions) have further contributed to community well-being. Notably, one CLI grantee's safe sleep intervention has been widely adopted across the state, demonstrating a significant impact on public health practices. These findings underscore the importance of community-engaged research programs in addressing health disparities and improving overall public health [11]. Sharing these benefits can encourage other programs and CTSA to invest in similar initiatives, spreading positive changes to other communities.

CLI, CHG, and PDG projects have demonstrated economic benefits by leveraging projects into additional grant funds, such as to support programs and reducing the financial burden of food insecurity. However, there were fewer overall benefits in this category, suggesting a gap that could be addressed through

intentional investment in CEnR programs that target the societal and financial contributors to disease. Policy and legislative benefits primarily involved the generation of scientific research reports which have helped to inform communities about health benefits and innovative strategies to improve health (e.g., population health, public health) [12]. Furthermore, it is likely that these benefits would be observed later than the one-year funding period, suggesting that more longitudinal evaluation should be considered in the future.

Limitations

There are some limitations to applying the TSBM framework to the evaluation of these programs. Firstly, the framework was applied retrospectively after data collection and thus may not fully capture the nuances or impact of the programs. This also limited the ability to compare the potential impact (identified pre-data collection) versus the demonstrated impact component of the TSBM framework. Secondly, the available data is self-reported by grantees and limited; not all TSBM benefits were observable using the existing progress reports, making this not a comprehensive examination. Thirdly, the data were collected from only one CTSA which may limit the generalizability of the findings. Lastly, we did not fully engage our full CPC in this evaluation process, possibly overlooking important dynamics and meaningful benefits in the interpretation of these findings.

Future directions resulting from this work will impact the type of data we collect and the way we measure the impact of our programs and the projects they support. To enhance the TSBM model, evaluation tools for community health and research programs similar to the CLI, CHG, and PDG should be inclusive of all potential TSBM benefits and be measured prospectively as part of the evaluation process. Benefits should also be tracked over time to assess long-term impact and sustainability. Additionally, there is a need to build capacity among participants to fully and meaningfully report their impact within all areas of the TSBM.

Conclusions

Despite the limitations, this paper provides a valuable evaluation of three community-engaged research programs. Unsurprisingly, the evaluation highlights strengths in translating science into clinical and community/public health benefits, aligning well with CTSA missions. However, gaps in economic and policy/legislative benefits present opportunities for future improvement. As CTSA curate their community-engaged and translational research programs, there is a need to ensure they not only align with community and national health priorities but also focus on areas where a sustainable impact can be achieved, such as through policy transformation and economic changes.

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