Towards a Transdisciplinary Superfund Research Center at the University of Louisville

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Abstract

The University of Louisville's Superfund Research Center (ULSRC) engages in transdisciplinary scholarship focused on volatile organic compounds and their impacts on human health. Transdisciplinary scholarship creates new knowledge and solutions to problems through collaborative research that includes academic researchers across disciplines, community members and relevant stakeholders. This type of research practice is necessary to solve many environmental health problems. This article highlights the ULSRC Community Engagement Core's (CEC) efforts to build multi-directional lines of communication and collaboration between ULSRC investigators and community members that are required to support transdisciplinary research. Still early in our efforts, we share elements of ULSRC CEC's vision, our preliminary observations and achievements, and our future trajectory.

Introducing the UofL Superfund Research Center Community Engagement Core

The University of Louisville's Superfund Research Center (ULSRC) joined the nationwide network of centers funded by the National Institute of Environmental Health Sciences (NIEHS) Superfund Research Program in the fall of 2017. The ULSRC principal mission is to become the "go to" source for research and information about volatile organic compounds (VOCs) and their impacts on human health. The ULSRC plans to carry out this mission in a transdisciplinary manner which means forging collaborative ties between academic researchers and community stakeholders. To do this, the ULSRC Community Engagement Core (CEC) is tasked with building the collaborative capacity of *both* investigators and community partners through effective community engagement activities. As part of an iterative learning process, we reflect on the team's journey thus far sharing our preliminary observations, some practical experiences, lessons learned, and our future aspirations.

The definition of what constitutes transdisciplinary research remains contested. However, there is agreement that transdisciplinary scholarship is an inclusive enterprise, inviting the participation of scholars from a variety of academic disciplines as well as participants outside of the academic sphere, whether they are involved in public policy, serve as government officials, represent organizations, or are concerned residents (Brandt et al., 2013; Brown, Harris, & Russell, 2010; Choi & Pak, 2006; Stauffacher, Walter, Lang, Wiek, & Scholz, 2006). Broad inclusion of multiple knowledge bases is necessary because the scope of many research problems, specifically environmental problems, transcend a singular disciplinary focus, and therefore, requires collaboration by practitioners from varied backgrounds to effectively address the challenges posed (Choi & Pak, 2006; Stauffacher et al., 2006). The field of environmental health sciences in general, and the ULSRC's focus area of VOCs in particular, need transdisciplinary approaches given the breadth of issues involved.

Community-engaged research is a principal component of transdisciplinary scholarship, centered on forging mutually beneficial partnerships between researchers and community members and stakeholders. While there are several approaches to community-engaged research and scholarship, core principles include but are not limited to: treating community stakeholders as equal partners; maintaining awareness of community values and expectations; recognizing community needs; and supporting community interests (Cairns, 2005; Israel et al., 2010; Mikesell, Bromley, & Khodyakov, 2013). Transparency by the research team members allows for shared understanding across differentially positioned groups and helps prevent disappointment and confusion on the part of community stakeholders (Mikesell et al., 2013). Lastly, implementing community engagement principles when academic researchers engage with economically-disadvantaged communities, racial and ethnic minority populations, and other vulnerable groups can mitigate distrust developed over time that is often based on instances of real harm from historical research practices (Israel et al., 2010). Shared decision-making, mutual respect, and transparency are all necessary components of best practices in community-engaged research. Research partnerships that successfully incorporate these have the potential to yield mutual benefits that are relevant to the parties involved: researchers seeking to meet study participation and other research goals; concerned residents seeking accurate and relevant environmental health risk information they can act on; and decision-makers responsible for implementing policy solutions.

The ULSRC CEC spent our first year building basic infrastructure required to facilitate collaborative ties between researchers and community members (stakeholders, practitioners, and residents) and assess, monitor, and advance the capacity of researchers and community members to engage with one another effectively. We choose to meet ULSRC investigators and community members "where they are." To do so, we assess their current understanding of community-engaged research and the role they, both investigator teams and community members, think they should play in ULSRC projects and activities. We host public Community Knowledge Exchange (CKE) sessions to introduce investigators and community members to each other and provide a general introduction to VOC research. These meetings also serve as a recruiting venue for potential members of the ULSRC Community Advisory Board (CAB). The CKE sessions provide an informal venue for ULSRC investigators and community stakeholders to freely interact, get to know each other face-to-face, and create a platform on which trust can be built, while ensuring learning opportunities remain at the forefront.

The first CKE event focused on introducing the ULSRC to four research projects. During this session, groups of participants moved between four different tables in 15-minute increments to hear principal investigators share brief descriptions of their projects and ask questions. This provided the opportunity for small-group and one-on-one interactions. The second CKE centered on the question *'What are VOCs?'* and featured an informal panel of ULSRC researchers who were asked to present their work in more detail in an informal discussion format so that they could interact more directly with the attendees and answer questions directly. The third CKE focused on hearing about the most pressing environmental health concerns from community attendees.

As a consequence of these learning sessions and the level of engagement they inspired, we successfully recruited volunteers to form the ULSRC Community Advisory Board (CAB). The CEC intentionally used the public CKE sessions to identify individuals with interest and expertise who may not otherwise have been known to ULSRC investigators. This expanded our reach into the community for CAB participants. As a result, the CAB is demographically diverse, includes individuals with ties to environmental advocacy groups, representatives from local government agencies, and concerned citizens without formal organizational ties. The CAB members drafted and reviewed a strategic vision for the advisory board that was also reviewed by ULSRC investigator teams. The ULSRC CAB declared its mission is to "serve as a bridge between communities and the ULSRC." Additionally, the CAB will promote collaborative exchanges that "inform communities about important research findings and researchers about community-based realities." As these exchanges mature, the goal is to enhance the relevancy of investigators' research and CAB members' knowledge so that they can all better communicate vital information related to health risks and prevention and inform public policy.

Concurrent with our efforts to host knowledge exchanges and form an advisory board, the CEC examined investigator and community member understandings of, and capacity for, community-engaged research using participant observation methods and event evaluation questionnaires to document interactions at those events along with internal investigator team meetings and discussions.

Methods

We employ multiple methods to uncover investigator and community member perceptions and knowledge of community-engaged research and to elicit feedback regarding our efforts including: a pilot survey/event evaluation instrument, open-ended questionnaires, focus group-like assessments of communication materials, and participant observation. We distributed a pilot survey/questionnaire to both ULSRC investigators and community members who attended the CKE sessions. The items in the survey covered subjects such as the quality of the particular event, general community engagement preferences and experiences, and perceptions of the University of Louisville's past community engagement efforts. Open-ended questionnaires distributed to investigators captured their perceptions of community engagement and whether they include community engagement in their research objectives in their own words. Community members were asked

Figure 1. Community-Engaged Research Types

Types of Community Engagement in Research	
1.	Delegate: give the decision authority to the community to drive research topics and methods
2.	Partnership: partner with the community; make decisions together
3.	Consultation: gather public input; may not use the input
4.	Information: provide information to community
5.	Proforma: Investigator's decisions are already made. Engagement is perfunctory

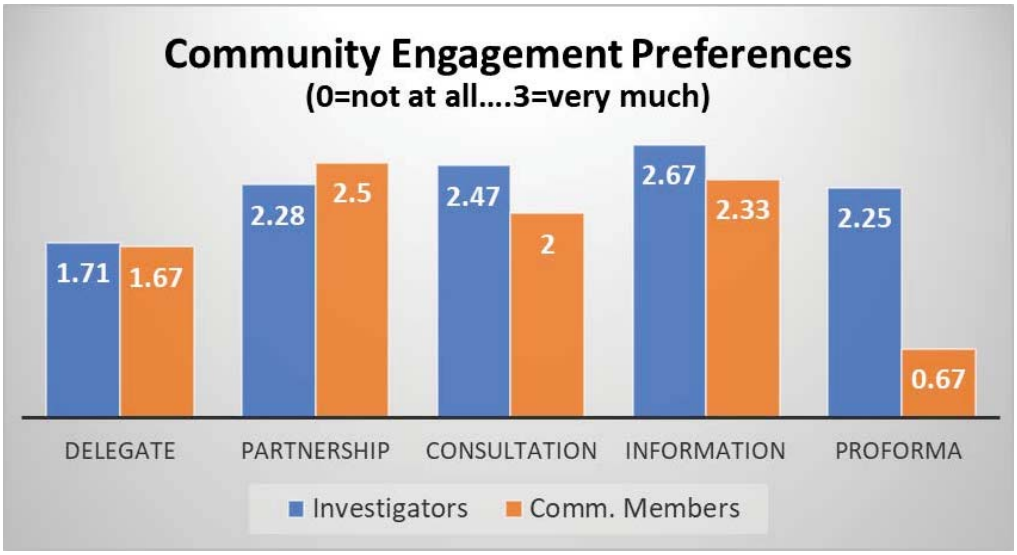
to review public education materials about VOC sources and health impacts using a focus-group format during one of the CKE sessions. In addition to the information collected through the CKE sessions, we observed and documented group and peer-to-peer interactions, conversations, and presentations as participants in numerous internal ULSRC investigator team meetings and presentations, as well as the CAB meetings. Our qualitative observations contribute to our ability to critically assess the ULSRC community engagement capacity. This combination of research and evaluation methods allows us to assess and monitor progress toward and achievement of milestones that we deem necessary to establish a transdisciplinary research program in which investigators and community members can collaborate effectively across disciplinary, organizational, and social boundaries.

What Have We Learned So Far?

Our preliminary observations reveal several areas of strengths and areas of growth that we will need to address as a team if we are to reach a goal of effective collaboration, a crucial component of a transdisciplinary research center. A key question in the pilot survey asked respondents to indicate preferences on a scale of 0 to 3 (with 0=to not at all and 3= 'very much') for different types of community-engaged research (Figure 1). Community member respondents show a preference for *Partnership* with researchers where as investigators indicated a preference for uni-directional engagement in which they provide *Information* to community members. Both groups showed a lower preference for *Delegating* research decisions to community members. The largest gap between the two groups is evident in investigators' much higher level of preference for *Proforma* engagement in which research decisions are already made and the engagement is simply a requirement to be fulfilled (Figure 2). Even though the respondents indicated a difference in how they ranked engagement types, there was certainly enough overlap in *Partnership*, *Consultation*, and *Information* types that suggest these forms of community engagement could be successful and supported by the community members and investigators in attendance. The results suggest both community members and investigators prefer investigators to be ultimately responsible for making research decisions, neither want community members in that position. However, they also suggest that both prefer research that engages and includes community members in a variety of ways.

The open-ended questionnaire distributed to investigators provides insights into the most prevalent perceptions of community engagement among investigators and what role community engagement plays their research objectives. While a few investigators demonstrated a fuller understanding of community engagement in alignment with principles such as transparency and supporting community interests, the majority demonstrated just a basic understanding of community engagement. This was evident in their statements about community engagement that repeated language used in CEC team materials we distributed and by their comments indicating that the scope of community-engaged research is limited to unidirectional communication and events in which information is provided to the community or feedback is received from the community. Many investigators described community engagement as peripheral to their research, indicated

Figure 2. Community Engagement Preferences (Investigators/Community Members)



that community engagement had a minimal effect on their everyday activities, and expressed a sense of contentment with this arrangement. Because most investigator responses indicated at least a basic understanding of community engagement, we see an opportunity to augment the investigators' knowledge base. However, their responses did not overwhelmingly indicate a desire to change current practices. This said, because investigators voluntarily attend the CKEs and, in discussions, communicate the value of community-based knowledge, this suggests that investigators may be content with their current practices, but are open to change. The CEC therefore sees the need to demonstrate research benefits of different types of engagement with the UofL investigators in order to develop deeper engagement that supports a transdisciplinary environmental health science research program. Investigators could benefit from seeing specific examples of how different types of engagement could be integrated into their research protocols. The ULSRC investigators engage in a wide variety of clinical, bench, and technological research questions, each employing different methodological practice and therefore would benefit from different types of community engagement efforts relevant to their practice. This is central to the CEC effort to meet investigators "where they are" to help make community engagement relevant to their research agendas.

It is not surprising that our observations suggest an ongoing need for well-conceived strategies for facilitating communication and understanding between community members and investigators. The daily experiences of both groups and the social networks in which they are embedded lead to different ways of communicating and thinking about research. The challenge before us is to bridge these experiences to the extent that effective collaboration becomes possible and sustainable.

We found significant communication gaps when community members reviewed and critiqued VOC educational materials and provided feedback on investigator presentations. They found some of the language to be inaccessible and complained that the information was overwhelming by exposing serious problems without offering solutions. Much of the feedback stated that the nomenclature used to indicate the presence of VOCs and other pollutants made the materials difficult to understand. While community members felt that the images were informative, if they could be understood, some expressed consternation because the materials informed them about a problem that could impact their lives, but included no information about what they could do to mitigate their potential exposure. In essence, some of the images made community members feel powerless in the face of seemingly insurmountable forces. This means that our investigators should ensure their findings include information that community members can act upon in addition to communicating their findings in accessible and relevant formats.

Through our observations and interactions with investigators, we observed that investigators are committed to their professions and tend to relate most strongly with professional peers. This impacts their ability to connect with people from affected communities, whether in face-to-face interactions or through more formal venues such as public presentations or published articles. If investigators do not have experience interacting with communities impacted by their research, their willingness and capacity to sustain engagement and respond constructively to challenging questions and suggestions from members of affected communities will be affected. Success of the CEC will hinge on our ability to facilitate *regular and intentional opportunities for engagement*, which will help investigators and residents alike to become more comfortable with each other and enhance a sense of resilience among investigators when challenging interactions inevitably occur.

Overall, our early observations of ULSRC investigator and community member participant interactions and initial assessments of their understanding and experience with community-engaged research suggest many opportunities to build on existing strengths and close some of the gaps that have been exposed. The pivotal strength is a willingness on the part of both investigators and community members to commit to a partnership approach to community engagement and the investigators' willingness to learn more. The difficult challenge the CEC will face is addressing the tension that exists between meeting the goal of building more capacity for community engagement and the pressures and professional incentives operating in the lives of investigators that inhibit their community engagement capacity. Our observations suggest for example, that the tendency of investigators to place community engagement on the periphery is likely a product of the lack of incentives for investigators to devote the necessary time and energy, especially in the face of more weighty professional pressures. The academic research system does not reward time spent in community engagement efforts. This dynamic affects investigators' modes of communication, expectations, and prioritization.

Towards Transdisciplinarity

The University of Louisville's Superfund Research Center stated in its proposal that it would carry out transdisciplinary research. In practice, this means studying toxic volatile organic compounds and their effects on human health in a manner that is inclusive of diverse academic disciplines and concerned stakeholders outside of academia. The practical significance of such a proposal lies in the acknowledgement that the research problem transcends the expertise of academic disciplines and requires the collaborative efforts of stakeholders across a variety of sectors and standpoints in order to produce useful knowledge that can be implanted in policy and practice to improve health outcomes. Effective community engagement is a key component of transdisciplinary scholarship and requires building ties between researchers and concerned community members.

Launching the UofL Community Engagement Core has involved practical work to develop structures and practices

that facilitate collaboration between ULSRC investigators and community members and conducting research that helps us better understand our ULSRC investigators' and interested community members' baseline capacities to fruitfully engage with each other. Our preliminary observations suggest that there is promise with respect to the willingness of investigators and community members to collaborate as partners in the ongoing research, but this willingness may be curtailed by existing social boundaries between the two and the daily realities and pressures each face. Ensuring that the ULSRC develops into an effective transdisciplinary enterprise will depend on focused efforts to build regular communication platforms and opportunities between investigators and community members and identifying incentives for investigators to include community engagement as an integral part of their research strategies. Both UofL investigators and our community participants will need to experience benefits from these interactions so that they will contribute toward developing new knowledge and solutions to the negative health impacts of toxic VOC exposures. We look forward to reporting on our progress as we open new paths for transdisciplinary environmental health science research at UofL.

UofL Superfund Research Center Community Engagement Core is on the web at louisville.edu/cepm and louisville.edu/envirome institute/superfund.

Follow us on Facebook @CEPMUofL and on Twitter @CepmUofL.

Documents related to the ULSRC Community Advisory Board and their meetings will be found at louisville.edu/cepm/superfund-center-project.

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