

Science Communication & Democracy

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Overview

Definitions and premises

What kinds of science communication best serve civic decision-making?

How can science support and advance democratic processes at scale?

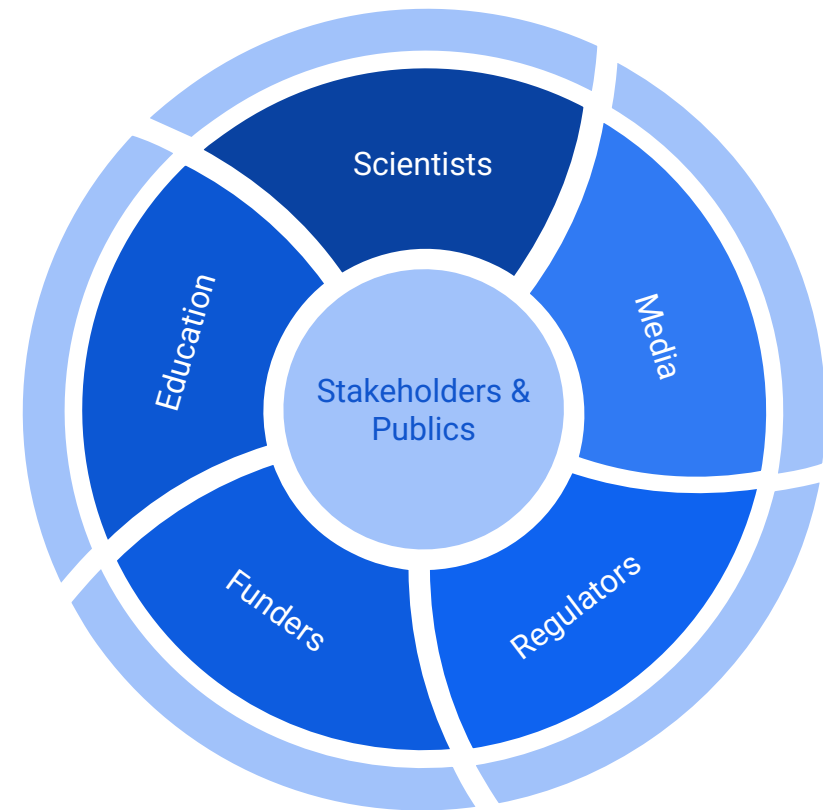
What does science communication look like when it is oriented toward collective action on shared, complex challenges?

Public Science Communication

Public science comm happens at the **intersections** of these groups

Communication is not a one-way transmission of info, but **multi-directional**

In a democracy, **stakeholders and publics are at the center** of public science comm because they are the ultimate sources of sovereignty



Science Comm's Main Rivals in the Public Sphere

Misinformation: misleading or deceptive claims relative to best available evidence at the time; counters statements by actors who adhere to scientific principles without adding accurate evidence ([Southwell et al., 2022](#))

Disinformation: intentionally misleading or deceptive misinformation

Mistrust: perceived lack of shared interest, credibility, reliability (or consistency) of source ([Southwell, 2021](#)).

Macro sources: Populist cynicism about experts; political demagoguery; corporate public relations; media fragmentation and partisan business models; regulatory capture; and highly-publicized scientific errors, revisions, and misconduct

Micro sources: Motivated thinking (e.g., confirmation and acceptance biases), echo chambers and filter bubbles, desire for stories that confer group belonging and identity, and for a sense of control and meaning

What Kinds of Science Comm Best Serve Civic Decision-Making?

Science comm that is:

1. **Based on legitimate science:** motive to discover truth is not compromised by profit motives, political motives, scientists' confirmation biases, and other threats
2. **Based on competent science:** appropriate samples and methods, reported transparently and accurately, with findings rooted in evidence and accompanied by confidence levels and/or probabilities
3. **Communicated (not just transmitted):** clearly, accurately, accessibly, and in ways that listen and speak to the needs and interests of diverse publics, stakeholders, and policy makers (enhanced by using story form, local sources, etc.)



Scientific comm isn't
lipstick on a pig

How Can Science Support and Advance Democratic Processes at Scale?

Community-engaged research

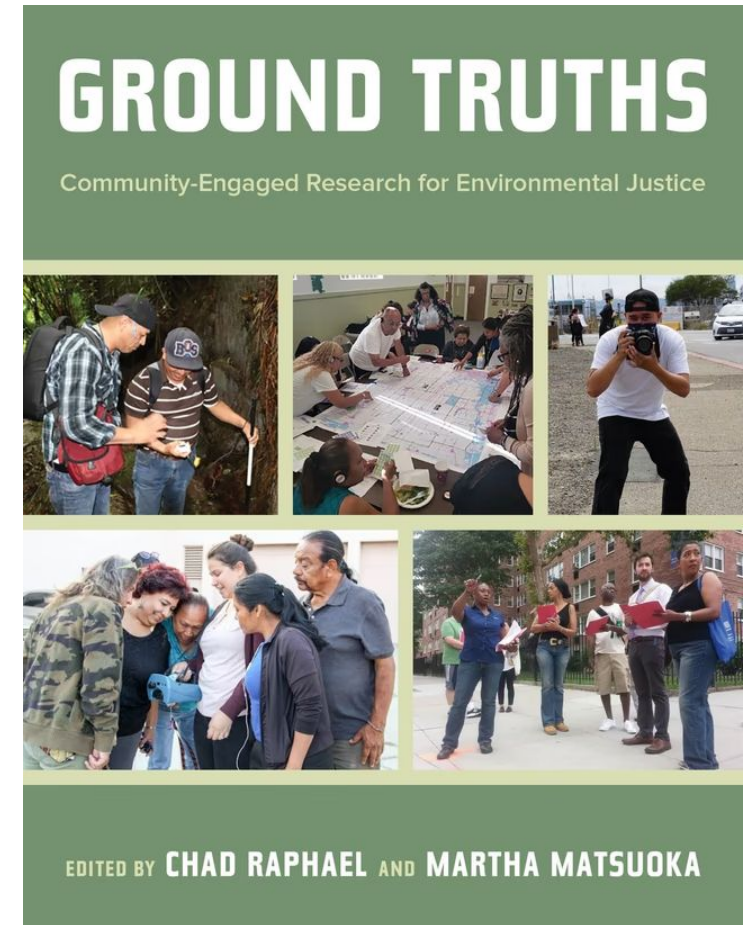
Public deliberation (democratic innovations)

How Can Science Support and Advance Democratic Processes at Scale?

Community-Engaged Research

Professional researchers collaborate with members of the public to co-design the research agenda; monitor and/or help to conduct the research and draw findings; communicate it publicly; and design policy and practical responses

Must be legitimate and competent science -- based on building bonds of trust and cooperation among experts and publics, not individuals "doing my own research" on the Internet



How Can Science Support and Advance Democratic Processes at Scale?

Benefits of Community-Engaged Research

Relevance

Grounds the research agenda in community concerns and maintains that relevance throughout the research process

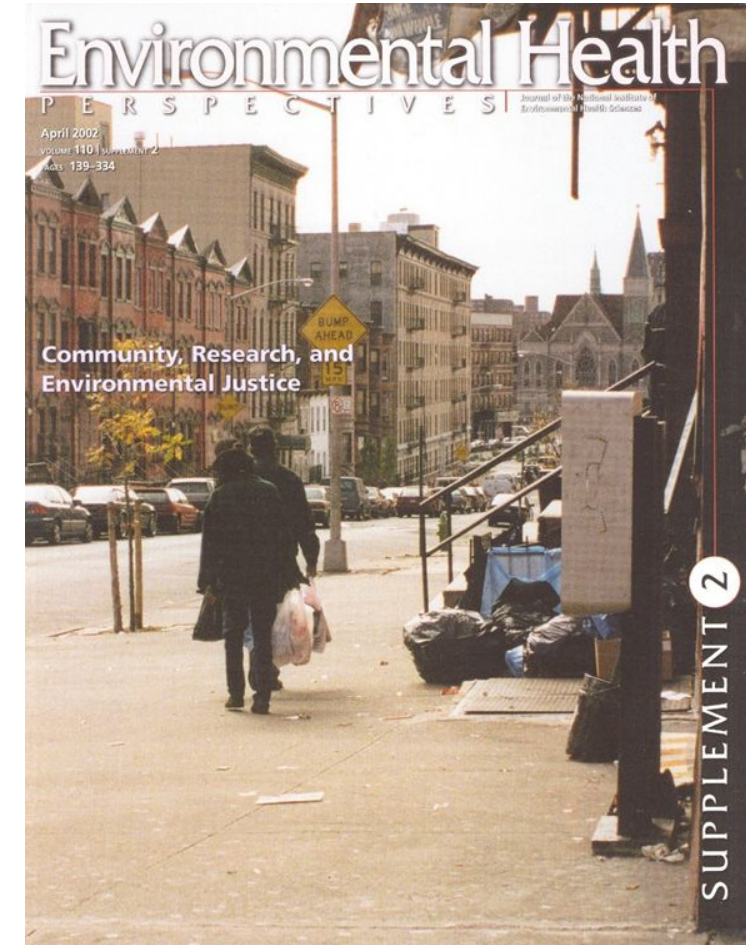
Rigor

Community partners identify research sites and populations, build trust necessary to earn access to them

Can increase sample sizes, survey and interview response rates, participation in interventions and treatments, etc.

Ground-truthing can correct and enrich data and analysis, providing local contextual and explanatory knowledge

Sources: Balazs & Morello-Frosch (2013); Minkler, Salvatore, & Chang (2018); Raphael (2019)



How Can Science Support and Advance Democratic Processes at Scale?

Benefits of Community-Engaged Research

Reach

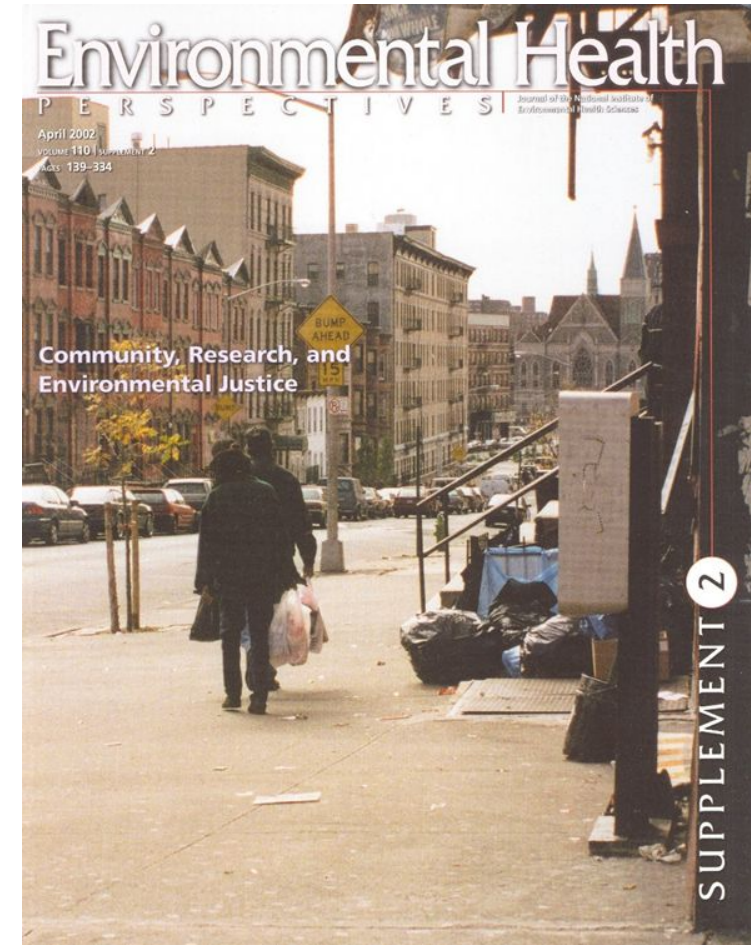
Community partners help disseminate knowledge to diverse audiences and translate it into useful tools for practice, policy, and organizing

Builds an active user base for research by translating it into local languages and lay terms, involving participants in implementing their findings

Reflexivity

Collaborating with Community Advisory Boards and research partners clarifies agenda, nature, ethics, and purposes of research, and whose interests it serves

Sources: Cacari-Stone et al. 2014; Chen et al. (2010)



How Can Science Support and Advance Democratic Processes at Scale?

Benefits of Community-Engaged Research

Combating Misinformation and Building Trust

People who are involved in research are more likely to believe it and act on **their** findings, than if they are passive recipients of others' knowledge (Lewin, 1948; Balazs & Morello-Frosch, 2013)

Effective Storytelling

Communicating local and personal impacts of findings (e.g., about climate change) is most persuasive

Source credibility: CER is the story of science that people tell themselves and their communities

Experience is the best teacher ... if it's the experience of doing rigorous research in collaboration with professional researchers and community members

Testimony from “people like us” who have done CER is a powerful teacher too

How Can Science Support and Advance Democratic Processes at Scale?

US EPA Iris Database versus ChemHAT

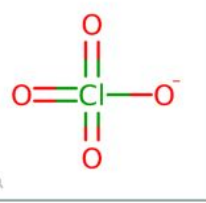
CompTox Chemicals Dashboard
Search 1,200,059 Chemicals

Chemicals Products/Use Categories Assay/Gene

Search for chemical by systematic name, synonym, CAS number, DTXSID or InChIKey

☐ Identifier substring search

Chemical Details



Wikipedia

A **perchlorate** is a chemical compound containing the perchlorate ion, ClO₄⁻. The majority of perchlorates are commercially produced salts. They are mainly used as oxidizers for pyrotechnic devices and to control static electricity in food packaging. Perchlorate contamination in food, water, and other parts of the environment has been studied in the U.S. because

[Read more](#)

Quality Control Notes

Intrinsic Properties

Molecular Formula: ClO₄ [MOL FILE](#) [FIND ALL CHEMICALS](#)

Average Mass: 99.45 g/mol [ISOTOPE MASS DISTRIBUTION](#)

Monoisotopic Mass: 98.94906 g/mol

Structural Identifiers

Linked Substances

Presence in Lists

Record Information

ChemHAT.org
Chemical Hazard and Alternatives Toolbox

English | Español | Tiếng Việt

HOME / SEARCH ABOUT CHEMHAT SAFER CHEMICALS FOR WORKERS BREAST CANCER SAFER FAMILIES

Search by material name or CAS #

Stronger effect / evidence    Weaker effect / evidence 

Perchlorate
CAS: 14797-73-0

How can this chemical affect my health?

Chronic (Long Term) Effects [Data sources](#)

 **Endocrine Disruption** – Can interfere with hormone communication between cells which controls metabolism, development, growth, reproduction and behavior (the endocrine system).

Inherent Hazards [Data sources](#)

 **Restricted List** – This chemical is on a list from an authoritative body recommending that its use be avoided.

What safer alternatives are available for this chemical?

How Can Science Support and Advance Democratic Processes at Scale?

US EPA Iris Database versus ChemHAT

ChemHAT is a product of CER with workers by unions, OSH and environmental groups, public health scholars, and digital media designers

Links to global scientific data sources

Plain language

Color-coded icons describe stronger/weaker effects + evidence

Acute & chronic, cumulative & synergistic effects

Where one is likely to be exposed

How to protect oneself

Identifies safer alternative chemicals

The screenshot displays the ChemHAT.org website, which is a Chemical Hazard and Alternatives Toolbox. The header includes the site name, logo, and navigation links. A search bar is present with the text "Search by material name or CAS #". Below the search bar, a legend indicates the strength of evidence with color-coded diamonds: red for "Stronger effect / evidence" and grey for "Weaker effect / evidence". The main content area shows results for "Perchlorate" (CAS: 14797-73-0). A section titled "How can this chemical affect my health?" lists "Chronic (Long Term) Effects" with a link to "Data sources". Under this, an "Endocrine Disruption" icon and text explain that it can interfere with hormone communication. Another section, "Inherent Hazards", lists a "Restricted List" where the chemical is recommended for avoidance. The bottom of the page features a section titled "What safer alternatives are available for this chemical?".

How Can Science Support and Advance Democratic Processes at Scale?

Spectrum of CER

CER can be expanded at every level of public engagement

Adapted from IAP2 (2018) *Spectrum of Public Participation in Decision Making*

ENVIRONMENTAL COMMUNICATION
https://doi.org/10.1080/17524032.2019.1591478



RESEARCH ARTICLE



Engaged Communication Scholarship for Environmental Justice:
A Research Agenda

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ABSTRACT

As a discipline of crisis and care, environmental communication needs to address questions of environmental justice. This article argues that the most appropriate approach to studying environmental justice communication is engaged scholarship, in which academics collaborate with community partners, advocates, and others to conduct research. The article reviews prior engaged communication scholarship on environmental justice, and proposes four streams of future research, focused on news and information, deliberation and participation, campaigns and movements, and education and literacy.

ARTICLE HISTORY

Received 18 December 2017
Accepted 27 February 2019

KEYWORDS

Engaged scholarship;
environmental justice; news;
deliberation; campaigns;
social movements; education

	The Community Is ...				
	Informed	Consulted	Involved	Collaborated With	Leading
Process	- Researchers share information with the community, customized to its needs or interests - Mutual recognition - Brief encounter	- Researchers seek community input, views, voices, and feedback on analysis before dissemination - Dialogue - Short-term and medium-term relationships	- Researchers enlist community partners or work for clients, who contribute to study design, data gathering, and/or execution - Cooperation - Short-term and medium-term relationships	- Researchers share resources and control over all stages of study with community - Co-production of knowledge - Long-term partnership	- Community controls resources and has final say over all stages of study - Community-led production of knowledge - Long-term partnership
Outcomes	Tailored transmission of research findings to community strengthens its relevance and impact	Community perspectives and information strengthen interpretive validity of research, responsiveness of action steps	Relationships strengthen research study design, access to data, validity, community and organizational problem solving	Cooperative learning partnership strengthens research and community problem solving, mobilization, transformation	Co-ownership strengthens research and community capacities for further research, mobilization, transformation
Approaches	- Risk communication - Public understanding of science	- Ethnography - Community needs assessment - Public consultation (public comments and hearings)	- Crowdsourced citizen science - Action research and professional consultancies for organizations	- Participatory citizen science and community science - Participatory action research - Community-based participatory research	Community-owned and managed research

How Can Science Support and Advance Democratic Processes at Scale?

Caveats

CER is Not the Only Valuable Type of EJ Research

Lit reviews, legal analyses, and other expert studies make valuable contributions to analyzing EJ and communication

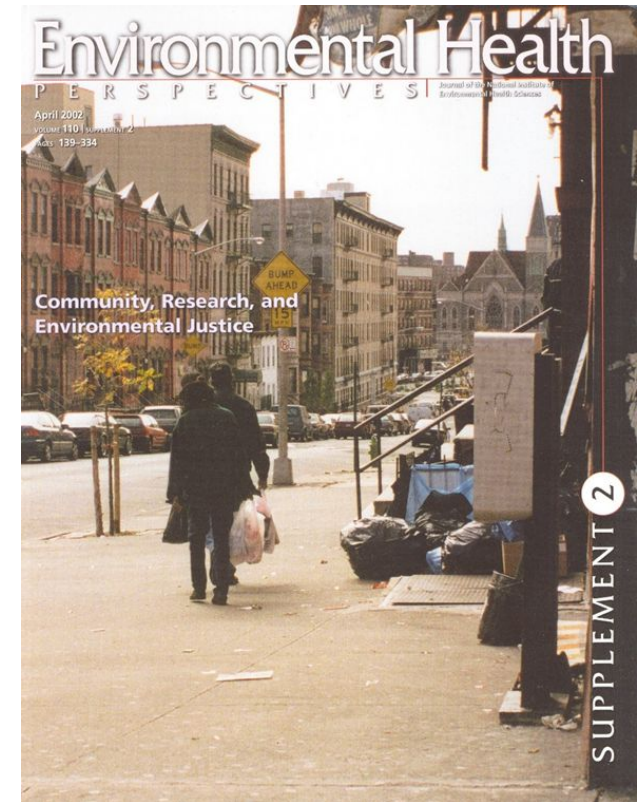
Can also be necessary prep work to build understanding and credibility with community partners

Not All Situations are Ripe for CER

Lack of awareness of and commitment to collaboration

Risks to community partners' health and safety

Community has “research fatigue,” mistrust, lack of representative organizations, uninterest or preference to delegate research to trusted researchers, or capability to do research without us



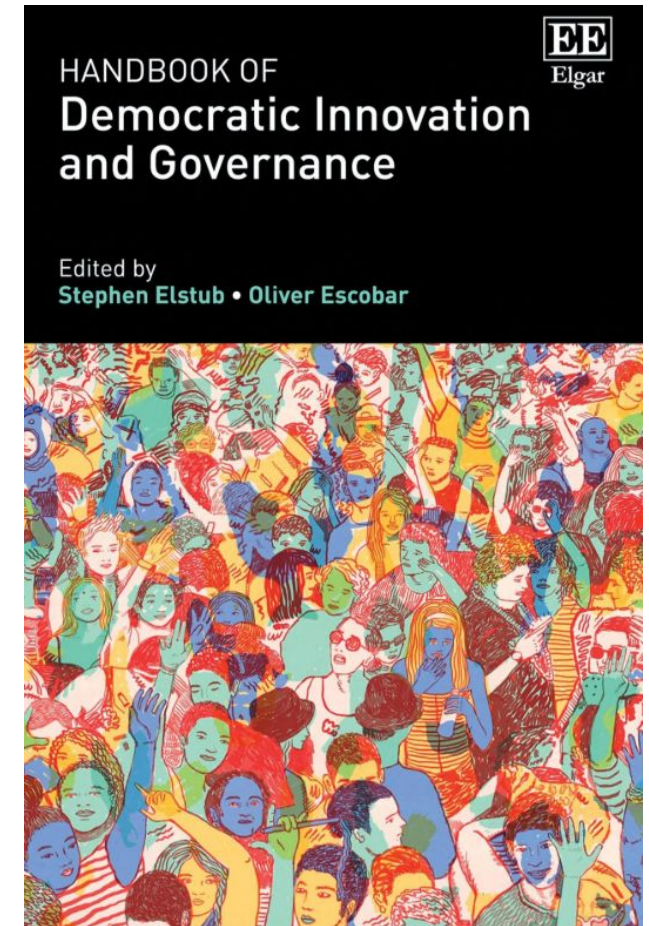
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Public Deliberation/Democratic Innovations

New(ish) forms of public engagement that improve on public hearings, public comments, social media sewers by convening public, experts, and decision makers to deliberate about science and tech policy

Mini-Publics: Deliberative Polls, Consensus Conferences, Planning Cells, 21st Century Town Meetings

Co-Governance: Participatory Budgeting, etc.



How Can Science Support and Advance Democratic Processes at Scale?

The image shows the header and hero section of the Participedia website. The header is dark with a hamburger menu, the site name 'Participedia', a search bar, a language selector, a 't Participedia.' button, and a 'Login' button. The hero section features a background image of a diverse group of people looking at a screen. Overlaid on this is a text description of the platform and a row of five statistics: 2427 Cases, 397 Methods, 876 Organizations, 21 Collections, and 160 Countries. At the bottom of the hero section is another search bar, a filter dropdown set to 'All', a red 'Search' button, a link to 'Browse all entries', and a red circular button with a white plus sign.

≡ Participedia

🔍 Search

🌐 Language ▼ t Participedia. Login

A global network and crowdsourcing platform for researchers, educators, practitioners, policymakers, activists, and anyone interested in public participation and democratic innovations

2427	397	876	21	160
CASES	METHODS	ORGANIZATIONS	COLLECTIONS	COUNTRIES

🔍 Search All x ▼ Search [Browse all entries](#) +

References

- Balazs, C. L., & Morello-Frosch, R. (2013). The three Rs: How community-based participatory research strengthens the rigor, relevance, and reach of science. *Environmental Justice*, 6(1), 9-16.
- Cacari-Stone, L., Wallerstein, N., Garcia, A. P., & Minkler, M. (2014). The promise of community-based participatory research for health equity: A conceptual model for bridging evidence with policy. *American Journal of Public Health* 104(9), 1615-1623.
- Chen, P. G., Diaz, N., Lucas, G., & Rosenthal, M. S. (2010). Dissemination of results in community-based participatory research. *American Journal of Preventive Medicine* 39(4), 372-378.
- Lewin, K. (Ed.) (1948). *Resolving social conflicts: Selected papers on group dynamics*. Harper and Row.
- Minkler, M., Salvatore, A., & Chang, C. (2012). Participatory approaches for study design and analysis in dissemination and implementation research. In ." In R. C. Brownson, G. A. Colditz, & E. K. Proctor, eds. *Dissemination and implementation research in health*, pp. 175-190. Oxford.
- Raphael, C. (2019). Engaged communication scholarship for environmental justice: A research agenda. *Environmental Communication*, 13(8), 1087-1107.
- Raphael, C., & Matsuoka, M. (Eds.). (2024). *Ground truths: Community-engaged research for environmental justice*. Univ of California Press.
- Southwell, B. (2021). A future of trusted clinical trials: communication strategies to encourage trust and transparency. *Health Affairs Forefront*.
- Southwell, B. G., Brennen, J. S. B., Paquin, R., Boudewyns, V., & Zeng, J. (2022). Defining and measuring scientific misinformation. *The ANNALS of the American Academy of Political and Social Science*, 700(1), 98-111.