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Review

Paradigmatic approaches to studying environment and human health: (Forgotten) implications for interdisciplinary research

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ARTICLE INFO

Published on line 9 November 2012

Keywords:

Interdisciplinary
Methodology
Philosophy of science
Epistemology
Ontology
Positivism
Postpositivism
Interpretivism
Generalizability

ABSTRACT

Interdisciplinary research is increasingly promoted in a wide range of fields, especially so in the study of relationships between the environment and human health. However, many projects and research teams struggle to address exactly how researchers from a multitude of disciplinary and methodological backgrounds can best work together to maximize the value of this approach to research. In this paper, we briefly review the role of interdisciplinary research, and emphasise that it is not only our discipline and methods, but our research paradigms, that shape the way that we work. We summarise three key research paradigms – positivism, postpositivism and interpretivism – with an example of how each might approach a given environment-health research issue. In turn, we argue that understanding the paradigm from which each researcher operates is fundamental to enabling and optimizing the integration of research disciplines, now argued by many to be necessary for our understanding of the complexities of the interconnections between human health and our environment as well as their impacts in the policy arena. We recognise that a comprehensive interrogation of research approaches and philosophies would require far greater length than is available in a journal paper. However, our intention is to instigate debate, recognition, and appreciation of the different worlds inhabited by the multitude of researchers involved in this rapidly expanding field.

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<http://dx.doi.org/10.1016/j.envsci.2012.10.015>

1. Introduction

Over the last two decades, interdisciplinary research has been highlighted as being the *mantra of science policy* (Metzger and Zare, 1999), a highly touted activity (Robertson et al., 2003), and an approach that “must increasingly become the standard rather than the exception” (Aboelela et al., 2007: 343). Such research must bring together scholars with “very different mental models, conceptual frameworks and methods with the goal of creating new ways of doing science” (Romero-Lankao et al., 2012: 3) (refer also to Table 1 for definitions).

An inclusive, interdisciplinary approach is highly valuable for the study of environment and human health relationships which often involve complex interactions between physical, social, biological, and ecological domains (Gohlke and Portier, 2007; Schwartz, 2005). This approach can lead to a complex evidence base that can prove difficult to incorporate into policy (Huby and Adams, 2009), but nevertheless can be an extremely effective mode of enquiry. When successful, the value of interdisciplinary research for addressing complex, policy-relevant problems regarding environment and human health linkages is apparent. As but one example, a program of research investigating the health impacts of Florida Red Tide (*Karenia brevis*, an algae that produces a harmful toxin) has brought together disciplines including biochemistry, oceanography, and epidemiology; and has highlighted the potential for aerosolised toxin to exacerbate respiratory conditions (Fleming et al., 2005, 2011). In turn, the Florida State Department of Health developed an Aquatic Toxins Disease Prevention Program (www.doh.state.fl.us/environment/medicine/aquatic/), including guidance and action relating to the respiratory health impacts of toxins produced by *K. brevis*. Given the advances that can be made at the science–policy interface when this type of research is performed well, it is perhaps unsurprising to see an interdisciplinary approach being strongly advocated for environmental health research and policy on issues ranging from housing (Lawrence, 2004) and the built environment (Kent and Thompson, 2012) to air pollution (Nadadur et al., 2007) and climate change (Hrynkow, 2008).

That noted, many obstacles can prevent high quality, truly integrated (as opposed to complimentary/parallel) interdisciplinary work being accomplished. Shortcomings can include: researchers being chosen to fill a “nominal slot” rather than address a specific role (Rhoten, 2004) – or what Reich and Reich (2006: 57) term “tokenism”; additional demands on time (Kessel et al., 2009); the limited communication of interdisciplinary research resulting from inappropriate reviewers; and the perceived inferiority of interdisciplinary journals (Campbell, 2005). Underpinning many of these shortcomings is a lack of shared vocabularies, attitudes, use of tools, and understandings between the different disciplines and subsequent methods (Bracken and Oughton, 2006). For Jacobs and Fricke (2009), these “[E]pistemic barriers involve incompatible styles of thought, research traditions, techniques, and language that are difficult to translate across disciplinary domains” (p. 47). As one example, Kessel et al. (2009) highlight the consequences of epistemic barriers when discussing their interdisciplinary research on greenspace access. These authors note

Table 1 – Characteristics of multidisciplinary, interdisciplinary, and transdisciplinary research in environment and human health.

	Participants/discipline	Problem definition	Research style	Presentation of findings	Examples from EHH research
Multidisciplinary	Two or more disciplines	Same question but different paradigm OR different but related questions	‘Parallel play’ Combines rather than integrates different expertises	Separate publications by participants from each discipline	The THESEUS approach (Zanuttigh, 2011)
Interdisciplinary	Two or more distinct academic fields	Described/defined in language of at least two fields, using multiple models or intersecting models	Drawn from more than one, with multiple data sources and varying analysis of same data, Some integration demonstrated	Shared publications, with language intelligible to all involved fields	The ADAPTE project (Romero-Lankao et al., 2012)
Transdisciplinary	Two or more distinct academic fields	Stated in new language or theory that is broader than any one discipline	Fully synthesized methods and ideas, which may result in creation of new conceptual frameworks	Shared publications, probably using at least some new language developed for translation across traditional lines	(Muterio et al., 2004)

Adapted from Aboelela et al. (2007).

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