

# Preface

Over the last decade, scholars have developed a *complexities of place* (COP) approach to the study of place and health. According to COP, the problem with conventional public health research is that it lacks effective theories and methods to model the complexities of neighborhoods, communities and so forth, given that places exhibit nine essential “complex system” characteristics: they are (1) causally complex, (2) self-organizing and emergent, (3) nodes within a larger network, (4) socio-spatially dynamic and evolving, (5) nonlinear, (6) historical, (7) socio-spatially open-ended with fuzzy boundaries, (8) critically conflicted and negotiated, and (9) agent-based.

However, while promising, the COP approach is currently faced with two challenges: its comprehensive definition of complexity remains systematically untested; and its recommended computational and complexity science methods (e.g., geospatial modeling, social network analysis, agent-based modeling) have yet to be organized into a cohesive framework.

The current study therefore conducted an exhaustive test of all nine COP characteristics and suggested methods. To conduct our test we made two important advances: First, we developed and applied the *Definitional Test of Complex Systems* (DTCS) to a case study on community health and sprawl (a complex systems problem) to examine, in litmus test fashion, the empirical validity of the COP’s 9-characteristic definition. Second, we employed the SACS Toolkit, which we used to organize the suggested list of COP methods into a cohesive framework. The SACS Toolkit is a case-based, mixed-methods platform that draws on the latest advances in computational and complexity science methods to model the temporal and spatial complexities of complex systems. For our case study we examined a network of 20 communities, located in Summit County, Ohio USA. In particular, we examined the negative impact that suburban sprawl is having on the poorer communities in this county. Our database was partitioned from the *Summit 2010: Quality of Life Project*.

Overall, we found the COP’s 9-characteristic definition to be empirically valid and useful. We also found the SACS Toolkit to be an effective way to employ and organize the methods recommended by the COP approach. Nonetheless, some issues did emerge. For example, the COP approach seems almost entirely focused on the complexities of place. As such, it has yet to develop a sophisticated view of how place, health and health care are intersecting complex systems. Also, while it is

useful to think of places as agent-based based (Characteristic 9), there are limits to this modeling approach, such as its microscopic view of emergent social structure and its restricted (rule-based) view of agency. Still, despite these challenges, the COP approach seems to hold real empirical promise as a useful way to address many of the challenges that conventional public health research seems unable to solve; in particular, modeling the complex evolution and dynamics of places, and addressing the causal interplay between compositional and contextual factors and their impact on community-level health outcomes.

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Castellani, B.; Rajaram, R.; Buckwalter, J.G.; Ball, M.;

Hafferty, F.W.

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