Invited Commentary

Invited Commentary: Repeated Measures, Selection Bias, and Effect Identification in Neighborhood Effect Studies

J. Michael Oakes*

* Correspondence to Dr. J. Michael Oakes, Division of Epidemiology, Minnesota Population Center, University of Minnesota, Minneapolis, MN 55454 (e-mail: oakes007@umn.edu).

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Research on neighborhood effects faces enormous methodological challenges, with selection bias being near the top of the list. In this issue of the Journal (Am J Epidemiol. 2014;180(8):776–784), Professor Jokela addresses this issue with novel repeated measures data and models that decompose putative effects into those within and between persons. His contribution shows that within-person neighborhood effects are quite modest and that there is evidence of selection bias between persons. Like all research, the work rests on assumptions. Unfortunately, such assumptions are difficult to substantiate or validate in this context. A consequentialist epidemiologic perspective compels further innovation and a larger social epidemiologic imagination.

causal; counterfactual; dynamic; methodology

Professor Jokela’s new article (1) is a thoughtful and important contribution to the social epidemiologic literature addressing neighborhood effects. The research uses rich repeated-measures data, defensible neighborhood quality measures, reasonable health measures, and an interesting set of analyses aimed at illuminating the problem of social selection, which has vexed researchers for many years.

Jokela’s analyses are based on the idea that persons who move to different neighborhoods are exposed to new neighborhood environments, be they better or worse. Obviously there may be lateral moves, which is to say moves in which the new neighborhood environment is much like the original neighborhood environment. In fact, lateral moves are probably the norm. In any case, Jokela’s is a within-person design; persons serve as their own counterfactuals when exposed to different neighborhood environments. The large number of people analyzed serve as replicates and thus increase precision of between-person averages. As usual, the questions are how different neighborhood environments impact health and to what extent better or worse health compels one to move to a better or worse neighborhood. To answer this, Jokela relies primarily on fixed-effect models of within-person change to decompose effect estimates into within-person and between-person associations.

In simplest terms, Jokela’s analyses suggest that people’s health influences their choice of neighborhood and that neighborhood correlations with health are likely due to between-person differences and related sorting by socioeconomic and health status, not necessarily neighborhood environment impact per se. In other words, Jokela’s work implies that many prior estimates are biased and that neighborhoods may have less impact on health than previously thought. One might quibble with his data, measures, or model, but the results appear as robust as almost any.

We should not be surprised by Jokela’s results. To the contrary, finding either a strong association of neighborhoods with health or no association of health with neighborhood selection in a within-person design would have been surprising. Here are some reasons why.

First, it seems that few people (to be more accurate, few families/households) make dramatic moves from one kind of neighborhood environment to another. Though no direct data are presented, I would be surprised to learn that many people moved to substantially more or less advantaged places in any given discrete move. Such moves often require an exogenous shock, like an unexpected infusion of resources from, say, an insurance settlement, or an unexpected illness without a sufficient safety net. Further, dramatic moves require imagination and a desire for a life-altering change (e.g., moving for new job). Ongoing research seems to show that it can be difficult for disadvantaged persons to imagine dramatic moves because they too often feel helpless in this regard and have too
few reference examples upon which to draw, to say nothing of the many necessarily binding social relationships that are costly to alter. As a result, most moves appear lateral or nearly so. Accordingly, there is little “dose,” and we should not expect large within-person associations with health.

To clarify some of these issues, it seems worth suggesting that researchers of neighborhood effects publish simple transition proportion/probability tables, such as in Figure 1. This simple cross-tabulation, with sample sizes of N in each cell, holds a great deal of meaningful information. The off-diagonal cells are of great interest, especially in the corners. How do people end up in such cells? Is it through divorce, a cancer diagnosis, or winning the lottery? What can be done to facilitate upward moves or mitigate such downward moves? Is there a linear dose-response relationship as we move off the diagonal? When people do move to better places, what becomes of those left behind?

Second, the persons in Jokela’s data who moved did so more or less voluntarily. That is, they were presumably not forced to move at gunpoint or by some other disturbing threat. Obviously, getting sick or losing a job and having to relocate is not desired, but the choice as to where to relocate remains at least partially under a person’s control. Thus, subtle if not latent characteristics or values of people who move help determine subsequent neighborhood environments. This is selection within a person/household, and it may not be time invariant. In fact, it is probably time and context dependent and thus violates assumptions in Jokela’s model. Metaphorically, the problem is akin to people choosing their own diets to lose weight. If a repeated-measures study shows little impact of such diets on the dieters who chose them, should we discount the efficacy of such diets, or would it be better to know the results of an experimental study that randomized people to such diets?

Third, although it is a meaningful advance, the exposure timeframe in Jokela’s data is just 10 years at maximum. Except for rare cases of a move to an acutely toxic or idyllic environment, it is hard to imagine that temporally short exposures would have large influences on health measures. My suspicion is that, save for the rare cases, neighborhood environments have subtle impacts on most people’s outlook and health, and these take a long time to accumulate. An environmental change may be enjoyable or salubrious, but the corresponding difficulties of navigating a new area and social context may mute gains. On the other hand, self-reported health measures would probably be affected sooner rather than later. Additionally, Jokela creatively examined neighborhood satisfaction measures, which correlated as theory predicts.

What does Jokela’s study mean for the problem of social selection in neighborhood effects research? Among the paper’s contribution is that, given assumptions about sufficient change in neighborhood environment, control of time- and context-dependent effects, and sufficient exposure times (to name but a few variables), there is evidence to suggest that people are moving to different neighborhoods because of their health. In other words, the paper suggests selection bias is important and probably undermines many previously published parameter estimates. In fact, some might say that bias is so extensive as to undermine the notion that neighborhood contexts impact health more generally.

Yet, even though I appreciate Jokela’s findings, I remain steadfast in believing that neighborhood contexts affect health above and beyond the characteristics of any given person. Imagine a newborn baby growing up with the same family in either a good or bad neighborhood. It seems to be common sense that exposure to the good neighborhood would be lead to better health outcomes, all else being equal.

The trouble is one of effect identification, the teasing out or disentangling of unbiased effects in a system of dynamic feedback loops and dependent accumulative effects. As I wrote 10 years ago (2), it is hard to imagine any observational design-solving identification problems in neighborhood effects research. On the other hand, subsequent experimental designs entailing exogenous relocation, such as Move to Opportunity, clearly reveal practical obstacles of perturbing the social system’s equilibrium. Efforts to exogenously change (i.e., improve) neighborhoods in some sort of community-randomized trial have faced similar political, cultural, and financial obstacles. However, such research difficulties do not mean that the impact of neighborhoods on health is negligible. Rather, they mean that the research question is difficult and that we may not ever get a precise unbiased estimate of a neighborhood’s true impact. Some questions are just not answerable (3).

What should be done? A consequentialist perspective (4) compels us to redirect our collective energy and resources. Perhaps it is time to address the impact of larger phenomena, such as culture (5), religion, or the processed food industry; or, going the other way, we may need study the impact of the families/household or loving fathers on health. For those wishing to stay focused on neighborhood effects, (experimental) research into specific policy-relevant changes of neighborhood environments would be most helpful. In any case, it seems high time to expand the social epidemiologic imagination.

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Author affiliation: Division of Epidemiology, Minnesota Population Center, University of Minnesota, Minneapolis, Minnesota (J. Michael Oakes).

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