



Commentary

Health equity: Utopian and scientific[☆]Jay S. Kaufman^{*}, Sam Harper

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They say that the road to hell is paved with good intentions, and nobody has better intentions than we do in public health. Let others blather on about evidence while we spend our time removing pump handles. And so it was that the well intentioned public health leaders in Hamburg, Germany faced a cholera epidemic in 1892 and sprang to action. They dutifully exhumed all of the carcasses underneath slaughterhouses, in accordance with Max von Pettenkofer's miasma theory, and carted them away. Sadly for them, this intervention was wholly misguided, and nearly nine thousand people died (Evans, 1987). In fact, Snow had published his work on the transmission of cholera through fecally contaminated water decades earlier. Cholera was associated with a great many things, including poverty and crowding, and so on the basis of these patterns, the miasma theory seemed perfectly reasonable. But Snow's innovation, for which he is considered to be the father of modern scientific thinking in our field, was to rely not on these observed associations, but instead on a natural experiment in which houses were "randomly" assigned a contaminated or an uncontaminated water supply. Only on the basis of this quasi-experimental evidence was Snow confident of what public health action needed to be taken (Freedman, 1999).

The provocative essay by Dr. Schrecker focuses attention on social determinants of health, those "upstream" factors that pattern exposure to all manner of noxious and pathogenic insults (Schrecker, 2013). There is little doubt that the poor and powerless in every society bear the brunt of most adverse exposures, from pollution and poor diet to violence, stress and the predations of addiction merchants. But what is to be done? That is, between Policy A and Policy B, which alternative action will eliminate the greatest amount of inequality at the least cost to society? The author noisily decries inaction as a nefarious strategy of stalling reform by powerful interests who profit from the status quo. Fine. But which immediate action then? If one wants to estimate the likely result of a potential intervention, one necessarily must be interested in causal inference (Pearl, 2009). Surely there are ethical issues at play as well, and these are always critical considerations for policy decisions in addition to the causal predictions. But that doesn't change the fact that a rational policy decision requires, at a minimum, good causal inference,

which in turn requires high quality data, thoughtful design, and competent analysis. No amount of well-intentioned passion can substitute for these essential elements and the requisite hard work to make good use of them.

Rather than acknowledging the steady technical development of rational strategies for causal inference, Dr. Schrecker instead calls for "methodological pluralism," in which experimental or quasi-experimental approaches would be dethroned as the reigning standards of evidence for informing policy. Clearly, as the author notes, randomized trials are not always feasible, or ethically appropriate. And natural experiments are available only rarely when some kind of lottery just happens to occur. He is not the first to propose that over-reliance on this traditional aristocracy of inference can be a hindrance to progress (Heckman and Smith, 1995). Thus it is obvious to all that we can't rely on these approaches alone. In this sense, "methodological pluralism" is surely a necessity, if not a virtue. But there are still a great many clever things that one can do with data that are superior to crude associations if one really wants a solid basis for policy decisions. For example, when there is policy or exposure variation across clusters and across time, one can attempt to control for both selection into treatment and secular trends over time (Angrist and Pischke, 2008). Yet controlling for these sources of bias does not yet appear to be standard practice in much of the literature on social determinants of health. Given that such techniques exist and are demonstrably superior for predicting the impacts of public health interventions, why wouldn't we favor them over the crude associations that we know are confounded? Dr. Schrecker does not offer an answer other than to merely slander such approaches as a "tobacco industry standard of proof". Name-calling is no substitute for an actual argument.

There is broad agreement that social deprivation and its adverse health consequences are abhorrent, and that policies should be pursued to mitigate such injustices, and that this must necessarily occur under conditions of scientific uncertainty. But the crucial consideration is the cost of a decision, broadly speaking: how much will Policy A versus Policy B "cost" (i.e. good outcomes minus bad outcomes)? For example, we might decide to ban cell phones as a possible human carcinogen (Davis et al., 2013), and estimating the cost of this policy weighs the brain cancers and car accidents prevented against some quantification of the loss of this technology for the good of human safety, communication and quality of life. Each of these parameters comes with considerable uncertainty, all of which enters into any honest calculation. The level of evidence required for a particular decision (or no decision) must account for these various costs and uncertainties. A novel chemical compound that is not yet dispersed into the environment can be banned

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in a precautionary way with little social disruption. There may be an opportunity cost associated with it being unavailable for some potential use, but this cost is minimal if other compounds can take its place. On the other extreme, however, would be an exposure that is widely distributed throughout the built environment, such as asbestos in the 1970s or cell-phones today. The costs associated with removing a ubiquitous factor can be enormous, and therefore must naturally require much stronger evidence. The technical challenges of such a calculation are not insignificant. And of course beyond those challenges there are inevitably ethical considerations, since interventions never affect subpopulations equally and always have secondary implications (Marmot et al., 2012). But if democratic governance promises policy by rational consideration rather than ideological fiat, there is only one way to approach this problem: by simply accepting the responsibility to use the best tools available and make the best decisions we can using the information we have under some transparent set of values and priorities (Kaufman, 2007).

The health equity literature is not plagued by too many randomized trials and an insufficient number of simple ecologic correlation studies. Indeed, Dr. Schrecker cites the Commission on Social Determinants of Health report as an example of policy formulation in the absence of decisive evidence. To take but one example, the WHO Commission's Report concludes, based on a "rigorous analysis" of evidence that countries should promote fair employment because it is good for both the economy and health equity (Benach et al., 2007). Yet the report on which these policy recommendations rest ignored a wealth of evidence from studies, many of which had stronger research designs, demonstrating precisely the opposite conclusion—that increases in unemployment have net mortality benefits (Ruhm, 2008). Of course the best should not be the enemy of the good, but neither does this qualify the bad as a friend of the good. The point is that "methodological pluralism" is fine as long as it is a pluralism of sound methods. A wide variety of weak studies accomplishes nothing. Dr. Schrecker does not write specifically about what would make a study count as strong evidence for health equity questions, although others have done so (Harper and Strumpf, 2012; Petticrew, 2007; Welch et al., 2012).

The author's point about "manufacturing uncertainty" is certainly a valid one, but it cuts both ways. Public health advocates can be just as passionately obfuscating as their corporate foes (Hughes, 2013). The only difference is that the corporations are much richer. The difficulties highlighted in Dr. Schrecker's essay concern serious social problems, and must be confronted vigorously. Lowering the bar of scientific evidence is not the solution to these problems, however. Science needs to be open and self-correcting. Data sharing and replication are the scientific tools to fight the manufacture of uncertainty, just as they are the means to combat the obscuring of uncertainty (Hernán and Wilcox, 2009). The public health research force needs to be funded adequately to address corporate interests that create a biased literature (e.g., Petticrew et al., 2012). In the absence of such funding, it is not a suitable "quick fix" to intentionally bias the literature in the other direction. It may be true that for decades the tobacco companies sought to bury evidence that cigarettes cause death and disease. This is surely criminal, but does not justify in retaliation granting a methodological free pass to every study on the dire consequences of third hand smoking

(Ferrante et al., 2013) or the impact of income inequality on health (Snowdon, 2010). Two (or more) wrongs don't make a right. A scientific impropriety is not resolved by allowing less rigor for the proponents of opposing views. This is a political view of science as a kind of football game with opposing teams—a foolish model that will generate oppositional literatures in which each side attempts to bend the truth in their direction. A better approach would be to raise the level of rigor on both sides, and require data sharing, replication, and more transparency about all sources of uncertainty (Greenland, 2009). We suspect that both sides would find this notion threatening, which is quite revealing by itself.

Conflict of interest

The authors declare that there are no conflicts of interests.

References

- Angrist, J.D., Pischke, J.S., 2008. *Mostly Harmless Econometrics: an Empiricist's Companion*. Princeton University Press.
- Benach, J., Muntaner, C., Santana, V., 2007. Employment Conditions and Health Inequalities: Final Report to the WHO Commission on Social Determinants of Health (CSDH). Available at http://www.who.int/social_determinants/resources/articles/emconet_who_report.pdf (Accessed: 16 Sept 2013).
- Davis, D.L., Kesari, S., Soskolne, C.L., Miller, A.B., Stein, Y., 2013. Swedish review strengthens grounds for concluding that radiation from cellular and cordless phones is a probable human carcinogen. *Pathophysiology* 20 (2), 123–129 (Apr).
- Evans, R.J., 1987. *Death in Hamburg: Society and Politics in the Cholera Years 1830–1910*. Clarendon Press, Oxford.
- Ferrante, G., Simoni, M., Cibella, F., Ferrara, F., Liotta, G., Malizia, V., Corsello, G., Viegi, G., La Grutta, S., 2013. Third-hand smoke exposure and health hazards in children. *Monaldi Arch. Chest Dis.* 79 (1), 38–43 (Mar).
- Freedman, D., 1999. From association to causation: some remarks on the history of statistics. *Stat. Sci.* 14 (3), 243–258.
- Greenland, S., 2009. Accounting for uncertainty about investigator bias: disclosure is informative: how could disclosure of interests work better in medicine, epidemiology and public health? *J. Epidemiol. Community Health* 63 (8), 593–598.
- Harper, S., Strumpf, E.C., 2012. Social epidemiology: questionable answers and answerable questions. *Epidemiology* 23 (6), 795–798 (Nov).
- Heckman, J.J., Smith, J., 1995. Assessing the case for social experiments. *J. Econ. Perspect.* 9 (2), 85–115.
- Hernán, M.A., Wilcox, A.J., 2009. Epidemiology, data sharing, and the challenge of scientific replication. *Epidemiology* 20 (2), 167–168 (Mar).
- Hughes, V., 2013. The big fat truth. *Nature* 497 (7450), 428–430 (May 23).
- Kaufman, J.S., 2007. Making causal inferences about macrosocial factors as a basis for public health policies. In: Galea, S. (Ed.), *Macrosocial Determinants of Population Health*. Springer, New York, pp. 355–373 (Chapter 17).
- Marmot, M., Allen, J., Bell, R., Bloomer, E., Goldblatt, P., 2012. WHO European review of social determinants of health and the health divide. *Lancet* 380, 1011–1029.
- Pearl, J., 2009. *Causality*, 2nd ed. Cambridge University Press, New York.
- Petticrew, M., 2007. "More research needed": plugging gaps in the evidence base on health inequalities. *Eur. J. Public Health* 17 (5), 411–413.
- Petticrew, M.P., Lee, K., Mckee, M., 2012. Type A behavior pattern and coronary heart disease: Philip Morris's "crown jewel". *Am. J. Public Health* 102 (11), 2018–2025.
- Ruhm, C.J., 2008. Macroeconomic conditions, health, and government policy. In: Schoeni, R.F., House, J.S., Kaplan, G.A., Pollack, H. (Eds.), *Making Americans Healthier: Social and Economic Policy as Health Policy*. Russell Sage Foundation, New York, pp. 173–200.
- Schrecker, T., 2013. Can health equity survive epidemiology? Standards of proof and social determinants of health. *Prev. Med.* 57 (6), 741–744.
- Snowdon, C., 2010. *The Spirit Level Delusion: Fact-checking the Left's New Theory of Everything*. Little Dice, London.
- Welch, V., Petticrew, M., Tugwell, P., et al., 2012. PRISMA-Equity 2012 extension: reporting guidelines for systematic reviews with a focus on health equity. *PLoS Med.* 9 (10), e1001333. <http://dx.doi.org/10.1371/journal.pmed.1001333>.