

## Embracing complexity in social epidemiology



Published Online  
 July 17, 2018  
[http://dx.doi.org/10.1016/S2468-2667\(18\)30137-3](http://dx.doi.org/10.1016/S2468-2667(18)30137-3)  
 See [Articles](#) page e365

Where we live matters for our health. Residential neighbourhood can affect individual health independently of individual characteristics, such as socioeconomic status<sup>1</sup>. In their Article<sup>2</sup> published in *The Lancet Public Health*, Mika Kivimäki and colleagues take up the challenge of studying whether health varies according to how long people have lived in a deprived neighbourhood and at what stage of their life they lived there. The importance of a life course perspective has long been emphasised through concepts such as accumulation of risk and critical periods for understanding health inequalities;<sup>3</sup> however, few epidemiological studies actually apply this approach. Kivimäki and colleagues are in a unique position to empirically study life course influences, given the characteristics of the Young Finns Study: long-term follow-up (31 years) of participants aged 6–18 years at baseline, detailed measurement of neighbourhood disadvantage, and repeated, objective measures on health risks and outcomes.

The study shows that cumulative neighbourhood socioeconomic disadvantage was associated with a 3.7 (95% CI 1.77–7.75) increase in the odds of developing type 2 diabetes at middle age, with a dose-response association; those exposed to neighbourhood socioeconomic disadvantage for a shorter duration showed a less increased risk. The association remained after controlling for individual socioeconomic status. Through data on cardiovascular risk factors, the authors also provide insight into the critical period for developing health problems. The results show that the effect of neighbourhood disadvantage becomes visible in childhood (poor diet), adolescence (low physical activity, increased prevalence of daily smoking) and early adulthood (increased insulin concentration).

The authors conclude that they have shown how socioeconomically disadvantaged areas might shape health. This understanding is crucial when it comes to building an evidence base to inform policies that promote healthy living conditions. But has this study indeed increased our insight into how neighbourhood influences health? Does it lend support to policies to tackle the influence of neighbourhood disadvantage, requiring insights into what works for whom and under which conditions?<sup>4</sup>

First, the underlying assumption of controlling for confounders is that neighbourhood disadvantage can be isolated from other factors, such as socioeconomic status, sex, or age. In reality, the mechanisms that link neighbourhood to health interact with these characteristics at an individual level. The findings of a realist review<sup>5</sup> suggest that the presence of sidewalks on busy roads might encourage walking; however, there was also evidence that the presence of cyclists and skateboarders on these sidewalks might counteract this effect in older people. Consequently, environmental interventions might not work equally for all age groups.

Second, because the Young Finns Study assumes that inequalities in health between neighbourhoods manifest as risk factors at the individual level, the collective processes that actually drive inequalities in health between neighbourhoods remain invisible. For example, the clustering of unhealthy behaviours in disadvantaged neighbourhoods could reflect group processes that result from interactions between individuals. Social norms on healthy eating are likely to shape the dietary habits of individuals within such a group.<sup>6</sup> Therefore, policies that aim to promote a healthy food environment will not necessarily lead to healthier dietary habits if the group processes underlying this collective behaviour are not addressed.

Finally, the extent to which neighbourhood affects health depends on the interaction between different components. For example, a 2016 study<sup>7</sup> reported that the association between changes in social cohesion and health was counterbalanced by the health effects of concurrent changes in unsafety feelings. This finding implies that a statement such as “A decrease in neighbourhood violence could reduce stress and related increases in the secretion of cortisol” made by Kivimäki and colleagues might be too simplistic.

These complexities in the real world lead us to a conceptualisation of a neighbourhood as a system, consisting of many elements—such as individuals, food shops, health-care services, and local government—at multiple levels (eg, individual, physical environment) that are interconnected (eg, neighbours might share social norms on drinking habits) and interact (eg, as in the aforementioned example of interaction between unsafety and social cohesion).<sup>8</sup> These interactions

might include feedback loops; the dietary behaviour of neighbourhood residents might depend on local availability of healthy food choices, while the choice of available foods in shops depends on the buying behaviour of the same people.<sup>9</sup> Population health emerges as a result of this complex interplay between elements. Research that aims to understand population health should be led by questions that relate to the functioning of the system, such as to what extent do shared perceptions on ideal bodyweight underlie the persistence of dietary habits in a neighbourhood? Which combination of elements in a neighbourhood environment (eg, housing typologies, socioeconomic composition, facilities) promotes healthy behaviours?

Studies such as that by Kivimäki and colleagues expose the need to advance our quest to understand the complex mechanisms underlying health inequalities. As argued by others,<sup>8,10</sup> complex systems thinking offers a range of concepts and methods that have the potential to further this aim. Whether the promise can be fulfilled is still unknown but one thing is certain, we will never know until we try.

\*Karien Stronks, Mary Nicolaou

Department of Public Health, Amsterdam Public Health (APH)  
 Research Institute, Academic Medical Center, Amsterdam UMC,  
 Amsterdam 1100 DD, Netherlands  
 k.stronks@amc.uva.nl

We declare no competing interests.

Copyright © 2018 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY 4.0 license.

- 1 Kawachi I, Berkman LF. *Neighbourhoods and health*. New York, NY: Oxford University Press, 2003
- 2 Kivimäki M, Vahtera J, Tabák AG, et al. Neighbourhood socioeconomic disadvantage, risk factors, and diabetes from childhood to middle age in the Young Finns Study: a cohort study. *Lancet Public Health* 2018; published online July 17. [http://dx.doi.org/10.1016/S2468-2667\(18\)30111-7](http://dx.doi.org/10.1016/S2468-2667(18)30111-7).
- 3 Wadsworth MEJ. Health inequalities in the life course perspective. *Soc Sci Med* 1997; **44**: 859–69.
- 4 Blamey A, Mackenzie M. Theories of change and realistic evaluation: peas in a pod or apples and oranges? *Evaluation* 2007; **13**: 439–55.
- 5 Kramer D, Lakerveld J, Stronks K, Kunst AE. Uncovering how urban regeneration programs may stimulate leisure-time walking among adults in deprived areas: a realist review. *Int J Health Serv* 2017; **47**: 703–24.
- 6 Pampel FC, Krueger PM, Denney JT. Socioeconomic disparities in health behaviors. *Annu Rev Sociol* 2010; **36**: 349–70.
- 7 Ruijsbroek A, Droomers M, Hardyns W, Groenewegen PP, Stronks K. The interplay between neighbourhood characteristics: the health impact of changes in social cohesion, disorder and unsafety feelings. *Health Place* 2016; **39**: 1–8.
- 8 Diez Roux AV. Health in cities: is a systems approach needed? *Cad Saude Publica* 2015; **31** (suppl 1): 9–13.
- 9 Friel S, Pescud M, Malbon E, et al. Using systems science to understand the determinants of inequities in healthy eating. *PLoS One* 2017; **12**: e0188872.
- 10 Rutter H, Savona N, Glonti K, et al. The need for a complex systems model of evidence for public health. *Lancet* 2017; **390**: 2602–04.