Public health: real-world network targeting of interventions

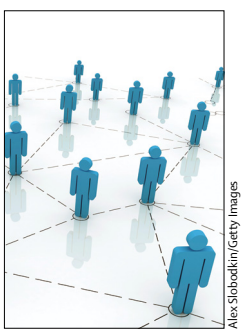
Public health interventions rarely introduce health innovations to every individual in a population all at once. Rather, practitioners target some people for early adoption, hoping that the innovation will spread by word of mouth through social networks. Selection of optimum targets for health interventions in social networks is difficult, because little is known about the spread of health innovations in real-world social networks.[1] In *The Lancet*, David Kim and colleagues[2] deliver the first randomised comparison of multiple network-targeting strategies to promote the spread of health innovations in real-world face-to-face social networks.

The authors establish two practically important results. First, on the encouraging side, they show that a new and cheap targeting strategy can substantially improve the spread of health innovations in social networks compared with a conventional and expensive targeting strategy. In 32 villages in rural Honduras, with a total population of 5773, villages were randomly assigned to receive one, both, or neither of two interventions (chlorine for water purification or multivitamins, each accompanied by vouchers which could be used by others to obtain further quantities of the same intervention). In each village, interventions were introduced to target groups composed either of randomly selected villagers, the best-connected villagers, or the friends of randomly selected villagers. As judged by redemption of vouchers, asking the friends of a random sample of villagers to distribute vouchers for multivitamins to other villagers led to a greater diffusion of multivitamins throughout the villages than asking the best-connected people in the villages to distribute the vouchers ($p<0·01$), and to an increase of 12·2% (95% CI 6·9–17·9) compared with a randomly targeted intervention. Targeting friends of a random sample of villagers is fairly cheap because it does not require a mapping of the entire social network, as would finding the most connected villagers. Getting more for less is always good news.

Second, on the cautionary side, Kim and colleagues[2] establish that the efficacy of different targeting strategies is highly context dependent: the targeting strategy that most improved the spread of multivitamins made no difference to the spread of chlorine for water purification. For any specific innovation, it will be difficult to predict which targeting strategy will produce the best results in practice. Yet Kim and colleagues' study marks real progress. Empirical confirmation that targeting the most-connected people in a network does not guarantee that a health innovation will ultimately reach the greatest number of people in the network challenges the conventional practice of focusing innovations on so-called opinion leaders or hubs.[3]

This study[2] should motivate further empirical research on how best to exploit face-to-face social networks for the seeding of health innovations. Among other things, future research should probe whether other network targeting strategies might reach even more people while maintaining cost savings. The difficulty of this optimisation task is foreshadowed in Kim and colleagues' own arguments. On the one hand, targeting the friends of random villagers presumably extended the reach of the vitamin vouchers compared with directly targeting a random sample of villagers, because friends on average have more social ties.[4] On the other hand, targeting the villagers with the largest number of social ties proved less effective, presumably because popular people tend to share too many ties in common.[5,6] This suggests that the spread of multivitamins in these villages might have been optimised by targeting the group of villagers who collectively have the greatest number of non-redundant ties—that is, the group that together can reach the greatest number of other people in the population. Figuring out who these targets might be, however, generally requires mapping the entire network, avoidance of which was the cost-saving purpose of Kim and colleagues' preferred strategy in the first place.

Following the example of Kim and colleagues,[2] public health research will benefit from more frequent forays into the messy world of real-world face-to-face social networks. Much previous research on social networks conducts theoretical simulations or analyses of online social networks; this research has produced many useful insights, especially for the burgeoning field of internet marketing. But assumption-driven simulations need to be validated with real-life data,[6] and many public health interventions cannot be implemented via LinkedIn or Facebook. The diffusion of new protective knowledge and health behaviours throughout a population often requires not only cognitive awareness—which internet messaging can provide—but physical assistance and



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hands-on training. To advance the interpersonal transmission of practical health skills, network research must embrace real offline settings.

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I declare no competing interests.

1 Valente TW. Network interventions. *Science* 2012; **337:** 49–53.
2 Kim DA, Hwong AR, Stafford D, et al. Social network targeting to maximise population behaviour change: a cluster randomised controlled trial. *Lancet* 2015; published online May 5. http://dx.doi.org/10.1016/S0140-6736(15)60095-2.
3 Valente TW, Pumpuang P. Identifying opinion leaders to promote behavior change. *Health Educ Behav* 2007; **34:** 881–96.
4 Feld SL. Why your friends have more friends than you do. *Am J Sociol* 1991; **96:** 1464–77.
5 Wasserman S, Faust K. Social network analysis: methods and applications. New York: Cambridge University Press, 1994.
6 Aral S, Muchnik L, Sundararajan A. Engineering social contagions: optimal network seeding in the presence of homophily. *Network Science* 2013, **1:** 125–53.