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EDITORIALS

Happiness, health, and social networks

Psychosocial determinants of health may transfer through social connections



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Two linked studies, by Fowler and Christakis, and Cohen-Cole and Fletcher, relate to the transmission of health related factors through social networks.^{1,2} The concept underlying this new field of research is that behaviours may spread over time from one person to another through their immediate and more distant social contacts. Social epidemiology has established the relevance of social connectedness for health, and social network transmission may be one mechanism through which both beneficial and adverse effects are mediated.³

The article by Fowler and Christakis investigated the social transmission of happiness. Happiness is related to several aspects of wellbeing, including better work performance, greater job satisfaction, good family relationships, and a more satisfying social life,⁴ but what has it got to do with health? It is no surprise that happiness is reduced when people are ill, and that negative emotional states such as depression and anxiety may influence the prognosis of several physical illnesses. But over recent years it has been suggested that happiness influences future ill health.

A recent meta-analysis of longitudinal observational studies found that measures of happiness, cheerfulness, and related constructs were associated prospectively with reduced mortality, both in initially healthy people and in those with established illnesses.⁵ These effects were independent of initial health status, age, demographic factors, and risk factors, and they persisted after controlling for negative affective states such as anxiety and depression. These results indicate that happiness is beneficial over and above the absence of misery. However, the analysis may have been subject to publication bias, and no intervention studies showed convincingly that improving happiness has favourable effects on health.

The pathways through which happiness might influence future health are not well established. Evidence relating happiness to health behaviours such as smoking, physical activity, and diet is mixed.⁶ More consistent findings have emerged from studies that look at biological outcomes. Happiness has been associated with lower cortisol output over the day, attenuated inflammatory responses, and patterns of heart rate variability indicative of healthy cardiac autonomic control.^{7,8} These associations are independent of socioeconomic characteristics and negative affective states. One possibility is that frontal and limbic brain mechanisms that regulate neuroendocrine and autonomic function play a role. Happiness is also related to greater social connectedness and stronger ratings of social support.⁹

If, as suggested by Fowler and Christakis, happiness is transmitted through social connections, it could indirectly contribute to the social transmission of health.

Infectious disease epidemiologists have long studied how social networks affect the transmission of infectious agents.¹⁰ As suggested by Fowler and Christakis, behaviours and psychological states relevant to health may also be transmitted from person to person. However, this process is complicated to investigate because, unlike infectious agents, the transmission of behaviours or psychological states cannot be measured directly. Therefore, studies of the transmission of non-infectious outcomes must make a special effort to rule out other reasons for shared behaviours or attitudes among socially proximate people.

Social bonds, especially friendship bonds, are often established between people who share multiple characteristics, including their personal attributes and the environments in which they live and work. Many of these characteristics have been shown to be related to health outcomes and psychological states. This is at the core of the methodological critique by Cohen-Cole and Fletcher² and previous debates.^{11,12}

Fowler and Christakis make clever use of data from the Framingham Heart Study to investigate whether happiness in the “ego” (a key person in the study) is affected by the happiness of “alters” (people connected to the ego), but because the data were not collected with these analyses in mind they address only indirectly Cohen-Cole and Fletcher’s methodological concerns about participants’ personal attributes and environments. For example, Fowler and Christakis argue that if unobserved factors drive the association between the happiness of the ego and the alter, directionality should not be relevant. But mutual friends may be more similar to one another than non-mutual friends or alter perceived friends (when the alter thinks of the ego as a friend but this is not reciprocated). Although the results seem to show slightly stronger associations for nearby friends than for nearby alter perceived friends, these two estimates may not really be all that different.

An intriguing finding is that the happiness of next door neighbours is more strongly associated with the happiness of the ego than it is for neighbours in the same block. Fowler and Christakis argue that socioeconomic confounding cannot explain their findings. However, socioeconomic factors (and other individual and environmental factors relevant to happiness) may be highly spatially correlated even at small spatial scales, and including only the educational attainment of the

ego in the regression models probably does not fully account for these confounding effects.

The network and outcome data available to Fowler and Christakis are conditional on participation in one of the Framingham Heart Study cohorts. They therefore included only the close friends, neighbours, coworkers, and relatives of a given ego who elected to participate in the study. An important question is whether pairs of socially connected people who also agree to participate in the same study are more similar than pairs of socially connected people in which one participates but the other does not. Selection could magnify the causal effects of social proximity on health if pairs of friends or neighbours in which both members choose to participate have more influence on each other than those who do not. Omitted variables may also have confounding effects if pairs of friends and neighbours who participate are more similar to each other on unmeasured attributes.

Regardless of the methodological caveats, the work by Fowler and Christakis is groundbreaking in positing the intriguing hypothesis that some psychosocial determinants of health could be transmitted through social connections.¹ The demonstration of these effects has serious implications for our understanding of the determinants of health and for the design of policies and interventions. Future work is needed to verify the presence and strength of these associations using approaches that deal with the

remaining methodological concerns, identify the specific processes through which “contagion” effects (to use the infection analogy) operate, and determine with greater specificity the health related variables for which contagion effects are important.

- 1 Fowler JH, Christakis NA. Dynamic spread of happiness in a large social network: longitudinal analysis over 20 years. *BMJ* 2008;337:a2338.
- 2 Cohen-Cole E, Fletcher JM. Detecting implausible social network effects in acne, height, and headaches: longitudinal analysis. *BMJ* 2008;337:a2533.
- 3 Christakis NA, Fowler JH. The spread of obesity in a large social network over 32 years. *N Engl J Med* 2007;357:370-9.
- 4 Lyubomirsky S, King L, Diener E. The benefits of frequent positive affect: does happiness lead to success? *Psychol Bull* 2005;131:803-55.
- 5 Chida Y, Steptoe A. Positive psychological well-being and mortality: a quantitative review of prospective observational studies. *Psychosom Med* 2008;70:741-56.
- 6 Pressman SD, Cohen S. Does positive affect influence health? *Psychol Bull* 2005;131:925-71.
- 7 Prather AA, Marsland AL, Muldoon MF, Manuck SB. Positive affective style covaries with stimulated IL-6 and IL-10 production in a middle-aged community sample. *Brain Behav Immun* 2007;21:1033-7.
- 8 Steptoe A, Wardle J, Marmot M. Positive affect and health-related neuroendocrine, cardiovascular, and inflammatory processes. *Proc Natl Acad Sci USA* 2005;102:6508-12.
- 9 Steptoe A, O'Donnell K, Marmot M, Wardle J. Positive affect and psychosocial processes related to health. *Br J Psychol* 2008;99:211-7.
- 10 Keeling MJ, Eames KT. Networks and epidemic models. *J R Soc Interface* 2005;2:295-307.
- 11 Cohen-Cole E, Fletcher JM. Is obesity contagious? Social networks vs environmental factors in the obesity epidemic. *J Health Econ* 2008;27:1382-7.
- 12 Fowler JH, Christakis NA. Estimating peer effects on health in social networks: a response to Cohen-Cole and Fletcher; and Trogdon, Nonnemaker, and Pais. *J Health Econ* 2008;27:1400-5.