How social networks are changing health behaviour

Social networks, social media and social diseases

Social processes underpin everything from our lifestyle choices and health decisions, to the way healthcare is conceived and delivered. Social media – information tools that both exploit and celebrate our social nature – are beginning to be used across healthcare from disease management to biomedical research. However, social media can have an even stronger role, enabling us to treat socially-shaped diseases such as obesity, depression, diabetes and heart disease.

Social media is being used in many different ways across the health sector, allowing old things to be done in new ways and creating entirely new models of delivering care, including:

· **Measuring the quality and safety of clinical care** e.g. by crowdsourcing patient or clinician opinions on the performance of health services;

· **Emergency services** e.g. broadcasting emergency information and tracking unfolding events using the first-hand accounts of citizens in disaster areas;

· **Public health and health promotion** e.g. broadcasting of public messages or using opinion leaders to disseminate messages;

· **Disease management** e.g. creating online spaces where patients can interact with clinicians and share experiences with other patients; and

· **Network therapy** e.g. modifying health behaviours to improve health and manage disease for diverse conditions from obesity to mental health.
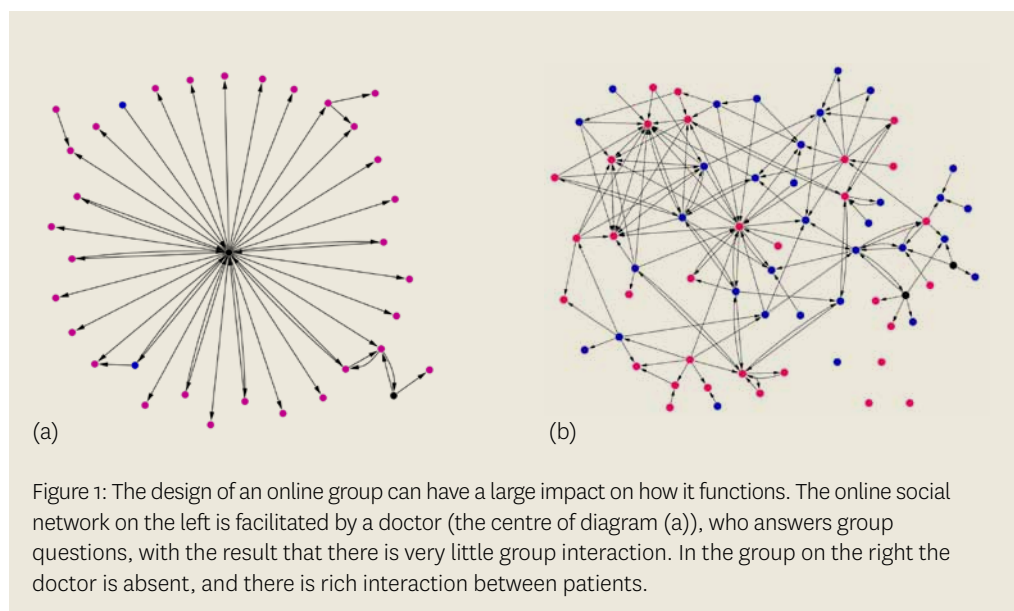
Researchers at the Centre for Health Informatics have been studying the different ways in which we can apply social media to support the healthcare enterprise, as well as working to understand the underlying nature of social networks and how they can be harnessed in the management of health behaviours and illness, and the risks and benefits of these new approaches.

We have also developed and evaluated through multiple trials, new technologies that incorporate social networking into simple tools that consumers can use. Our Healthy.me now has many years of robust evaluation behind it to demonstrate where social media is most likely to be effective.

Further reading
1. **Coiera E.** Social networks, social media, and social diseases. *BMJ*. 2013; 346:f3007
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Can social networks make us healthier?

(a) (b)

Figure 1: The design of an online group can have a large impact on how it functions. The online social network on the left is facilitated by a doctor (the centre of diagram (a)), who answers group questions, with the result that there is very little group interaction. In the group on the right the doctor is absent, and there is rich interaction between patients.

Our lifestyles can make us sick. Risky behaviours such as smoking, alcohol consumption, poor diet and lack of exercise underlie the huge upturn in diseases such as diabetes, heart disease and stroke.

We already know that creating social groups like Weight Watchers or Alcoholics Anonymous can be very effective in changing individual behaviours. Social groups can also form online, so there is now great interest in using online social networks to provide peer support and improve health behaviours.

Dr Liliana Laranjo and Dr Annie Lau have published a world-first analysis looking at the research published about health and online social networks. They concluded that online social networking can have a positive impact on lifestyle by:

• Providing access to health information and social support.

• Promoting better-informed treatment decisions.

• Promoting positive lifestyles.

The team is now working to understand how we can design social networks to promote healthy lifestyles as well as how we need to tailor designs to different communities and different health conditions.

Further reading
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2. **Lau AY, Dunn AG,** Mortimer N, Gallagher A, Proudfoot J, Andrews A, Liaw ST, Crimmins J, Arguel A, **Coiera E.** Social and self-reflective use of a Web-based personally controlled health management system. *J Med Internet Res*. 2013; Sep 23;15(9):e211. doi: 10.2196/jmir.2682.

Is your information diet unhealthy?

In this information-saturated internet age, misinformation is rife. Yet health behaviours are influenced by this information and poor health decisions (e.g. vaccine refusal) can result.

"Our goal is to help make it easier for people to judge the information they read," says Dr Adam Dunn, a Senior Research Fellow in the Centre for Health Informatics. "If we understand what information people are consuming then we can develop appropriate materials to help give them an evidence based perspective."

The growth of anti-vaccine rhetoric is an international problem. To monitor the 'information diets' of people in different communities, Dr Dunn's team are harnessing state-of-the-art methods in network science and machine learning. This involves building 'rain gauges' for different online communities that collect the vaccine information circulating in a community. The aim is to understand how exposure to poor information influences people, and whether information received by social networks is influential.

The data show that Twitter users who are exposed to negative information about vaccines are about 3.5 times more likely to then express a negative opinion about the benefits of vaccination. Different communities have very different information diets because of differences in the information online groups share with each other. The team is working to see whether online groups also live in the same place, given that some locations are known to have a high number of people who are strongly anti-vaccination. The team now has estimated locations for over 100 million Twitter users to help explore how physical and online social groups match up.

Once completed, the technology will be made available to government and public health organisations to aid in the effective, targeted use of social media to communities with evidence-based health messages.

Further reading

1. **Dunn AG,** Leask J, Zhou X, Mandl KD, **Coiera E.** Associations Between Exposure to and Expression of Negative Opinions About Human Papillomavirus Vaccines on Social Media: An Observational Study. *J Med Internet Res*. 2015; Jun 10;17(6):e144. doi: 10.2196/jmir.4343.

2. Zhou X, **Coiera E, Tsafnat G,** Arachi D, **Ong MS, Dunn AG.** Using social connection information to improve opinion mining: Identifying negative sentiment about HPV vaccines on Twitter. *Stud Health Technol Inform*. 2015; 216:761-5.

The darker side of YouTube

Dr Annie Lau and her team are interested in understanding both the benefits, as well as the risks, of looking online for health information. YouTube is not just a place to find cat videos and music clips. It is also a place where social groups can meet virtually to discuss and share videos that have a health impact.

After reviewing 450 articles that explored YouTube, the team found that there were many specific patient safety problems, including:

• Public displays of unhealthy behaviour (e.g. 'pro-anorexia' and self-injury images) which are disproportionately highly accessed.

• Tainted public health messages e.g. anti-vaccination messages that contradict or undermine evidence-based public health messages.

• Negative psychological impact e.g. people may feel stigmatised after watching negative or offensive portrayals of their illness or symptoms.

• Social media being used to intentionally distort public policy or research funding.

There are few policies or guidelines to protect people from these harms. The team therefore recommends that consumers develop skills to:

• Avoid potentially harmful material.

• Be respectful towards others.

• Report adverse incidents.

• Be cautious of bias from commercially-motivated material.

• Be aware of the amplified extent of social influence of some online individuals.

With these points in mind, online health consumers can stay safe.

Further reading

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2. **Lau A,** Siek K, Fernandez-Luque L, Tange H, Chhanabhai P, Li S, Elkin P, Arjabi A, Walczowski L, Ang CS. The role of social media for patients and consumer health. *IMIA Yearbook.* 2011; 6(1):131-8.

The power of a social network

HEALTHY ME, HEALTHY YOU

We know that online networks are powerful in shaping our preferences, self-perception, behaviour and our wellbeing. Our reliance on Dr Google and social media for diagnosis and health advice is a given in today's world. And for those medically diagnosed with chronic or serious conditions, being a patient is hard work.

Healthy.me is a secure e-health platform developed at the Centre for Health Informatics which allows people to keep track of all their health information and connect with others to share experiences, information and support. Healthy.me aims to make staying healthy and journeying through illness easier by providing:

1) Patient health management tools, e.g. for tracking test results, medications and appointment dates, and space for online journaling.

2) Social tools (e.g. forums and polls) where the user can connect to similar peers or online medical professionals to help answer questions such as, 'Am I normal, or do others experience this symptom too?' and 'Am I managing this symptom safely?' and 'How do others like me manage this medication side effect?'

3) 'Journey' tools, which provide 'itineraries' for typical hospital stays or courses of treatment, so that there are no surprises for newly-diagnosed patients.

We have tested Healthy.me across 6 different clinical settings with 2,000 patients. Healthy.me strongly influences positive health behaviours (e.g. doubling the rates of influenza vaccination and Sexually Transmitted Infection (STI) screening over a 6-month period).

Further reading
1. **Lau AY,** Proudfoot J, Andrews A, Liaw S-T, Crimmins J, Arguel A, **Coiera E.** Which bundles of features in a Web-based personally controlled health management system are associated with consumer help-seeking behaviors for physical and emotional well-being? *Journal of medical Internet research.* 2013; 15(5):e79.
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DRIVING CHANGE IN
HEALTHCARE AND
BIOMEDICINE BY MAKING
CONTRIBUTIONS TO:

SCIENCE

POLICY

INNOVATION

EDUCATION

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Professor Coiera is an internationally recognised research leader focussed on the application of information and communication technologies to solving health service delivery problems and creating sustainable health systems. Professor Coiera is currently working on topics in patient safety, implementation science, consumer e-health, evidence-based decision support, and clinical communication.
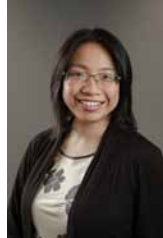
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Dr Lau is a Senior Research Fellow leading the Consumer Informatics team which focusses on those with the highest stake in our healthcare system – patients and healthcare consumers. Her research program investigates the 'impact', 'design', and 'science' of Information and Communications Technology (ICT) on consumers, patients and their carers. She has a national and international profile for her expertise in consumer e-health. Her interests lie in e-health consumer informatics, health service engagement, social computing and human behaviour modelling.

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Dr Laranjo is a Post-Doctoral Research Fellow in the Consumer Informatics team. As a physician with a background in General Practice, her focus is in primary care and public health-related research. She is researching the use of Personal Health Records to promote patient empowerment, activation and involvement in care, as well as the use of social media and mobile health (mHealth) in interventions to support behaviour change and facilitate the self-management of chronic diseases.

EVIDENCE SURVEILLANCE
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Dr Dunn is a Senior Research Fellow who uses network science, machine learning, and data mining to measure and understand the uptake of new practices, biases that affect clinical evidence, conflicts of interest, and the spread of information online. He is currently working on applications of complex networks in medicine especially networks made up of interacting researchers, drugs, clinical evidence or clinicians. Adam has a background in computational methods, network science and spatial methods.

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