Social Networks for Quantified Self

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Glossary

Connected Health – Health care through the use of technology
mHealth – Mobile Health
Mobile Fitness Apps – Mobile Fitness Applications used from a smart phone or website

Definition

Over three quarters of US health care spending goes to the care of people with chronic conditions, including heart disease, diabetes and asthma whilst in 2004, nearly half of Americans were diagnosed with one or more chronic conditions, a number is expected to increase dramatically as the baby boomer generation rapidly approaches their retirement age (Accenture, 2009). The new reality, dubbed "Connected Health", incorporates a broad range of health and fitness applications that are always on, always active and always aware (Accenture, 2009).

Since many aspects of health promotion professionals involve interdependent actors, social networks are of increasing interest to health services researchers (O'Malley & Marsden, 2008). The creation of a social network map of a person's social network can help visualize and thus better understand the strengths of the social ties of the network (Christakis & Fowler, 2009).

Technology Will Transform the Future of Chronic Care

In a 1995 editorial in the American Journal of Public Health, former U.S. Surgeon General C. Everett Koop stated, "Cutting-edge technology, especially in communication and information transfer, will enable the greatest advances yet in public health. Eventually, we will have access to health information 24 hours a day, 7 days a week, encouraging personal wellness and prevention, and leading to better informed decisions about health care" (Koop, 1995). Technologies like miniaturized health sensors, broadband networks and mobile devices, are enhancing and creating new health care capabilities such as remote monitoring and online care (Accenture, 2009).

In 2009, management and technology consultant Accenture released a report on how technology will transform the future of chronic care. Cited in the report is the anticipated crisis in care that will be further challenged as the baby boomer generation begins to retire.

> "According to the US Census Bureau, the world's population of people age 65 and older is projected to triple by mid-century, from 516 million in 2009 to 1.53 billion in 2050. This growing trend places a tremendous economic burden on governments, private employers and individual consumers alike. It also puts strain on the capacity of skilled care professionals and nursing homes."
> (Accenture, 2009)

In addition to the inexpensive cost of computers and internet connectivity, the report identifies three technological advancements that are paramount to the future of chronic care:

- Seamless capture and sharing of patient information in real-world settings;
- Improvements in ways to combine and interpret data about an individual's health and wellness so that appropriate interventions can be made before an acute situation occurs;
- Innovative tools including user modeling, advanced visualization, decision support and collaboration.

Health and Social Networking

One aspect of "Connected Health" is via the power of a person's social network. Research suggests that people interact with their social network with regards to their health. Christakis and Fowler (2009) concluded that "… a person with more friends and social contacts generally has better health than a person with fewer friends, and a person at the center of a network is more susceptible to both the benefits and risks of social connection than those at the periphery of a network". This would suggest that not only is a person affected by their location in a social network, but also are influenced by the behaviors of those who are "close" to them in the network. Perceived social support and physical activity are directly associated with a person's perceived health status (Almeida, 2008).

As technology continues to impact humanity, the understanding of one's social network may be one key to better health. The basic element of a person's social network is simple: a social network starts with a central person (called an ego) and other people (called nodes) that are interconnected by links (called ties). As the numbers of nodes and links increase, the number of possible connections grows exponentially – known as the network effect (Christakis & Fowler, 2009).

Christakis and Fowler (2009) suggest that "people are inter-connected and so their health is inter-connected. Inter-personal health effects in social networks provide a new foundation for public health". As online connections between people become ever more interweaved with offline real-world interests, social networking methods are moving toward simulating real-life social

interactions, including physical activity, health and disease management: rather than randomly approaching each other, people meet through things they have in common (Breslin & Decker, 2007).

Technology and Health Behavior Modification

By using Mobile Health technology (mHealth), health providers can practice a more "personalized medicine" and potentially reach more individuals with effective health-related advice and information at a very low cost (Strecher, 2007). Griffiths et al. (2006) suggest a number of reasons for delivering web based health, wellness and fitness interventions including reduced delivery costs, convenience to users, timeliness, reduction of stigma and reduction of time based isolation barriers.

Technologies can play three roles with regards to behavior modification: as tools, as media, and as social actors.

- As a tool, interactive technologies can be persuasive by making target behavior easier, leading people through a process, or performing calculations/measurements that motivate.
- As a medium, interactive technologies can be persuasive by allowing people to explore cause-and effect relationships, providing people with experiences that motivate, or helping people to rehearse a behavior.
- As a social actor, interactive technologies can be persuasive by rewarding people with positive feedback, modeling a target behavior or attitude, and providing a social network of support (Fogg, 2002).

Within the health care field, interactive technologies can be effectively deployed to take on multiple roles at the same time. For example, a simple persuasive tool can measure calories while at the same time giving a reward upon attainment of a personal goal. This type of self-monitoring is a key ingredient in successful behavioral modification. In addition, if several people are connected through the internet, then social support can be leveraged, which has been shown to impact motivation and behavior change (Chatterjee & Price, 2009).

The Quatified Self

The idea of measuring things to relative to a business or personal goal is common in today's society. The same measurement tools can be used within the self-tracking of a person's health and fitness. Commonly known as the Quantified Self movement, this is eclectic mix of early adopters, fitness fanatics, technology evangelists, personal development junkies, hackers, and patients suffering from a wide range of health challenges ("The Quantified Self - Counting Every Moment," 2012). Some measure their hourly mood swings, others the stages of their nightly sleep habits. Some track every meal, snack or drink, while others share on Twitter and Facebook

their workout routine complete with heart rate, time, distance, calories burned and musical preferences.

Research by Vickey and Breslin from the National University of Ireland at Galway aim to classify and understand why a person shares their workouts within their social network via Twitter and the associated benefits. While there are various personal devices that monitor/track a person's exercise characteristics (e.g. Body Media, Fitbit, MapMyFitness, Nike+, etc.), the effectiveness of online sharing via social networks of one's physical activity is limited in scientific research. Studies have indicated that "lack of motivation" is a key factor in why a person does not exercise.

One factor to address is the relationship between participant and provider (i.e. personal trainer) and/or participant and social network, including their influence. People join gyms not only for health and fitness, but also for the social atmosphere. To fully understand the power of combining social networking and exercise adherence, the physical barrier of the four walls of an exercise facility is removed and technology is used that enables a measurable improvement towards one's fitness goals.

Conclusion

With the move towards making machine-understandable data available for computers, allowing exercise data to become accessible/exchangeable between trusted peers is quite important. However, one's historical exercise records are often locked in to proprietary systems. By publishing selected aspects of these profiles using semantic terms, it will become easier for people to search for and discover relevant exercise regimes.

Early prevention and healthy lifestyles may be the least expensive and best ways to combat the growing prevalence of avoidable diseases associated with a lack of physical activity including obesity (Almeida, 2008). If people who lead sedentary lives would adopt a more active lifestyle, there would be enormous benefit to the public's health and to individual well-being. An active lifestyle does not require a regimented, vigorous exercise program. Instead, small changes that increase daily physical activity will enable individuals to reduce their risk of chronic disease and may contribute to enhanced quality of life (Pate et al., 1995).

Cross-References

Actionable Information in Social Networks, Diffusion of *Long Essay* 00286 3/3

Analysis Specific Social Media *Long Essay* 00226 7/7

Benchmarks for Network Analysis *Long Essay* 00023 9/9

Data Mining *Long Essay* 00056 *60/60*

Evolution of Social Networks *Long Essay* 00318 *83/83*

Extracting Social Networks from Data *Long Essay* 00011 *90/90*

Models of Social Networks *Long Essay* 00182 *166/166*

Social Behavior Modeling and Prediction *Long Essay* 00185 *277/277*

Twitter Microblog Sentiment Analysis *Long Essay* 00265 *358/358*

References

Accenture. (2009). Always On, Always Connected: How Technology Will Transform the Future of Chronic Care. Accenture, New York, NY

Almeida, F. (2008). *The relationship between social networks, social support, physical activity and self-rated health: An exploratory study*. University of Denver, Boulder, CO

Breslin, J., & Decker, S. (2007). The Future of Social The Need for Semantics. *Ieee Internet Computing*, *5*, 86–90.

Chatterjee, S., & Price, A. (2009). Healthy living with persuasive technologies: framework, issues, and challenges. *Journal of the American Medical Informatics Association : JAMIA*, *16*(2), 171–8. doi:10.1197/jamia.M2859

Christakis, N. A., & Fowler, J. H. (2009). Social network visualization in epidemiology. *Health Care*, *19*(1), 5–16.

Fogg, B. (2002). Persuasive technology: using computers to change what we think and do. *Ubiquity*, *2002*(December), 5. doi:10.1145/763955.763957

Griffiths, F., Lindenmeyer, A., Powell, J., Lowe, P., & Thorogood, M. (2006). Why Are Health Care Interventions Delivered Over the Internet? A Systematic Review of the Published Literature. *Journal of medical Internet research*, *8*(2), e10. doi:10.2196/jmir.8.2.e10

Koop, C. E. (1995). A personal role in health care reform. *American journal of public health*, *85*(6), 759–60. Retrieved from http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1615490&tool=pmcentrez&rendertype=abstract
Access date: 13 June 2012

O'Malley, A., & Marsden, P. (2008). The analysis of social networks. *Health Services and Outcomes Research Methodology*, *8*(4), 222–269.

Pate, R. R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C., Buchner, D., et al. (1995). Physical Activity and Public Health: A Recommendation From the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*, *273*(5), 402–407. doi:10.1001/jama.1995.03520290054029

Strecher, V. (2007). Internet methods for delivering behavioral and health-related interventions (eHealth). *Annual review of clinical psychology*, *3*, 53–76. doi:10.1146/annurev.clinpsy.3.022806.091428

The Quantified Self - Counting Every Moment. (2012).*Economist*. Retrieved from http://www.economist.com/node/21548493
Access date: 15 September 2012