

Self-Tracking: Better Medicine Through Pattern Recognition

Brenda K. Wiederhold, Ph.D., M.B.A., BCIA

THE FIRST ANNUAL QUANTIFIED SELF CONFERENCE in 2011 attracted mainstream medicine, as evidenced by the attendance of representatives from Humana and the Robert Wood Johnson Foundation. If they are paying attention, so should we. What is the Quantified Self, what is the self-tracking movement about, and how can self-tracking lead to better medical outcomes?

In addition to the annual conference noted above, the Quantified Self also holds face-to-face meetings in local areas, and features a blog and community networking forums for individuals who are self-tracking and technology developers who serve them. The site itself was founded in 2008 by San Francisco Bay-area journalists Kevin Kelly and Gary Wolf as a place for self-trackers to share “best practices” as to, for example, the best mood-boosting foods.

Self-tracking through technology to improve health and medical conditions has been around for a long time. For example, since about 1980, people with diabetes have been able to monitor their blood sugar via glucose meters. What is new is the rise of consumer health informatics, including the increased ability of individuals to perform self-monitoring through smartphone apps and to share their personal metrics via social networking sites connected to their phones.

One blogger writes that he has seen people track one or more of these: “sex, dates, attention span, REM sleep, car routes, daydreams, caffeine intake, people they meet, every keystroke, arithmetic speed, allergic reactions, mood, happiness, footsteps, memory recall, body motion, and every medical and health related factor one can quantify.”¹

Now, people can track more frequently, since few leave home without their cellphones, and perhaps track more accurately, since there need be no lag time between taking a measurement and “writing it down.” Further, when data are aggregated on the individual level, patterns can emerge—such as when a person suspecting a food allergy tracks his headache days and correlates that with his intake of particular foods. Even more promising is aggregation of data on a macro level: Analysis of crowdsourced data may lead scientists to test connections between behaviors that they might not have considered otherwise.

For certain disorders, researchers already know that self-monitoring works. For example, people have long self-tracked their weight loss, and a recent review of 22 studies² found a significant association between self-tracking (diet, exercise, or weight) and weight loss, though the level of evidence was weak due to methodological limitations of

the studies. The author concluded the “need for studies in more diverse populations, for objective measures of adherence to self-monitoring, and for studies that establish the required dose of self-monitoring for successful outcomes.” Hispanics and Blacks are more likely than Whites to use a cellphone for health information,³ according to a Pew survey. So a smartphone app for weight-loss self-tracking might aid researchers in formulating hypotheses for such studies.

A researcher who analyzed existing data called for the use of both electronic medical records and personal health records to help manage diabetes. The author further concluded that “integration of the records of both patients and health-care providers, as well as the input of mobile smartphone tools, such as providing real-time support to patients, may bring a new paradigm of the way diabetes care is organized and delivered in the near future.”⁴

In the field of psychology, a recent literature review of technology as adjunctive to psychotherapy noted that collection of “ecological momentary assessment” (e.g., mood data) via mobile phone was well received by participants, with few dropouts, and reported medium to strong effect sizes in data collection and ease of use for mobile phones and PDAs as a group.⁵

Say, for example, I want to track my mood on my cellphone. I might consult that category in the Quantified Self Guide (<http://quantifiedself.com/guide/tag/mood>) and download the free MoodPanda app to my iPhone. On the front page of the MoodPanda.com website is a feed that shares how users around the world are feeling, in real time. As a researcher, I think about how such data could be used. Could they, for example, provide an early indicator of posttraumatic stress in parts of the world affected by a natural disaster? Would this enable us to augment the services of deployed health professionals by providing an exposure-therapy virtual-reality environment in a downloadable iPhone or Android app? Perhaps some health care costs could be averted through such early intervention.

Small, wireless sensors costing less than \$100 can make the collection of some metrics automatic, and mass digitization of personal data makes the explosion in self-tracking possible. With smartphone use approaching 85 million people in the United States by the end of 2012, we are on the leading edge of yet another revolution in health care, brought to you by the patient herself as she uses her phone for self-tracking.

References

1. Kelly K. The technium: self-tracking? You will. www.kk.org/thetechnium/archives/2011/03/self-tracking_y.php (accessed Feb. 8, 2012).
2. Burke LE, Wang J, Sevick MA. Self-monitoring in weight loss: a systematic review of the literature. *Journal of the American Dietetic Association* 2011; 111:92–102.
3. Marketing Charts. Mobile health apps. www.marketingcharts.com/direct/1-in-5-cell-users-looks-up-healthinfo-14670/pew-mobile-health-apps-oct-2010jpg/ (accessed Feb. 8, 2012).
4. Benhamou P-Y. Improving diabetes management with electronic health records and patients' health records. *Diabetes & Metabolism* 2011; 37:S53–6.
5. Clough BA, Casey LM. Technological adjuncts to enhance current psychotherapy practices: a review. *Clinical Psychology Review* 2011; 31:279–92.

Brenda K. Wiederhold
Editor-in-Chief