

#AreYouHappy? Computer scientists develop algorithm to measure life satisfaction on Twitter

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University of Iowa computer scientists found that Twitter users' feelings of satisfaction with their lives remained steady over time, consistent with traditional social sciences research on subjective well-being. Credit: Lesly B. Juarez.

Happiness. It's something we all strive for, but how do we measure it—as a country? A global community?

Researchers at the University of Iowa are turning to [social media](#) to answer these questions and more. In a study published in March in the journal *PLOS One*, UI computer scientists used two years of Twitter data to measure users' [life satisfaction](#), a component of happiness.

Chao Yang, lead author on the study and a graduate of the UI Department of Computer Science, says this study is different from most social media research on happiness because it looks at how users feel about their lives over time, instead of how they feel in the moment.

"In countries like Bhutan, they are not satisfied with current measures of success like GDP, so they are measuring the Gross National Happiness Index," Yang says. "They want to know how well their people are living; we saw an opportunity there."

Yang, along with his faculty adviser Padmini Srinivasan, a UI professor of computer science, mined data from about 3 billion tweets from October 2012 to October 2014. They limited their data set to only first-person tweets with the words "I," "me," or "mine" in them to increase the likelihood of getting messages that conveyed self-reflection.

With assistance from two students in the UI Department of Linguistics, Yang and Srinivasan developed algorithms to capture the basic ways of expressing satisfaction or dissatisfaction with one's life. Then, they used these statements to build retrieval templates to find expressions of life satisfaction and their synonyms on Twitter. For example, the template for the statement "my life is great" also would include statements such as "my life is wonderful," "my life is fabulous," etc.

The UI researchers found that people's feelings of long-term happiness

and satisfaction with their lives remained steady over time, unaffected by external events such as an election, a sports game, or an earthquake in another country.

Srinivasan says these findings contrast with previous social media research on happiness, which typically has looked at short-term happiness (called "affect") and found that people's daily moods were heavily influenced by external events. However, the UI findings are consistent with traditional [social science research](#) on subjective well-being (the scientific term for "happiness"), which she says lends credibility to their research.

"The traditional methods of studying happiness have been through surveys and observations and that takes a lot of effort," Srinivasan says. "But if you can actually tap into social media and get observations, I think it would be unwise to ignore that opportunity. So let the traditional methods continue, but let's also look at social media, if it indeed gives you sensible results, and this study shows that it does."

Yang and Srinivasan were able to group Twitter users by those who expressed satisfaction or dissatisfaction with their lives, with key differences found between the two. They found satisfied users were active on Twitter for a longer period of time and used more hashtags and exclamation marks, but included fewer URLs in their tweets. Dissatisfied users were more likely to use personal pronouns, conjunctions, and profanity in their tweets.

In addition, the UI researchers found differences in satisfied and dissatisfied users' psychological processes. Dissatisfied users were at least 10 percent more likely than satisfied users to express negative emotion, anger, and sadness and to use words such as "should," "would," "expect," "hope," and "need" that may express determination and aspirations for the future. They also were more likely to use sexual

words and to use them in a negative context. Satisfied users were more likely to express positive emotion—especially related to health and sexuality—and were at least 10 percent more likely to use words related to money and religion. Dissatisfied users were at least 10 percent more likely to use words related to death, depression, and anxiety.

Yang and Srinivasan also studied users who changed their assessments of their life satisfaction. The study found users who changed from expressing satisfaction to dissatisfaction over time posted more about anger, anxiety, sadness, death, and depression compared to those who continued to express satisfaction.

Srinivasan says research like this is significant because life satisfaction is a big component of happiness.

"To be happy is what everyone strives for, ultimately, so it's important," she says. "With this research, we can get a better understanding of the differences between those who express satisfaction and those who express dissatisfaction with their life. Possibly in the future, with more such studies, one might design suitable interventions."

Srinivasan says this research has a lot of potential for future collaborations. She hopes to continue her research by looking at other features that might separate satisfied and dissatisfied social media users, such as the use of medications or linguistic capacity, and to eventually make predictions that could help identify people who are at risk for changing from satisfied to dissatisfied.

More information: Chao Yang et al, Life Satisfaction and the Pursuit of Happiness on Twitter, *PLOS ONE* (2016). [DOI: 10.1371/journal.pone.0150881](https://doi.org/10.1371/journal.pone.0150881)

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