Sentiments and emotions in social media associated with substance abuse come to light

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Substantial differences exist between the texts of the posts from Twitter users who self-report nonmedical prescription drug use (NMPDU) and those who do not, and between males and females who report NMPDU, according to a recent study from Emory University.

The results were published in *Health Data Science*.

"Nonmedical use of prescription drugs (NMPDU) is a global health concern," says Abeed Sarker, assistant professor with Emory University. Involving the use of prescription drugs without a prescription or for reasons other than what the prescriber indicated, NMPDU is responsible for increased emergency department visits and overdoes deaths, among other adverse health outcomes, registered over recent years.

Though studies have attempted to characterize the reasons for NMPDU, the emotional status of the consumers at the time of NMPDU remains little known. "Survey-based studies about NMPDU face several obstacles related to data collection, such as slow collection rates, high costs, and limited sample sizes. Importantly, studies using surveys are unable to capture naturally occurring emotions due to experimental or instrumental manipulations that could introduce measurement and observation biases," Sarker says as he describes their study, the first that utilizes largescale social media data for the subject.

"In this study, we sought to employ natural language processing (NLP) and machine learning approaches to study a large public dataset from Twitter about three common NMPDU categories to explore and answer questions," says Sarker.

The research questions were

(1) How do the emotional contents expressed in NMPDU groups' Twitter profiles differ from those expressed in non-NMPDU (control group) groups' Twitter profiles?

(2) How do NMPDU tweets sentimentally differ from non-NMPDU tweets?

(3) How do personal, social, biological, and core drive concerns expressed in NMPDU groups' Twitter profiles differ from those expressed in non-NMPDU groups' Twitter profiles?"

Pooling more than 130 million tweets from 87,718 unique users, the study reveals observable differences in the language contents between people who self-report NMPDU and those who do not.

"People in the former group express more negative emotions and less positive emotions, more concerns about family, the past, and body, and less concerns related to work, leisure, home, money, religion, health, and achievement compared to the latter group," says Mohammed Ali Al-Garadi, postdoc and co-author. "Moreover, posts mentioning NMPDU tend to be highly polarized, indicating potential emotional triggers."

The findings from these analyses are consistent with previous results from a survey-based study, demonstrating the utility of social media for NMPDU surveillance. "Traditional public health surveillance designed based laggy information may not be as effective as close-to-real-time measures, and this is one area where social media mining may contribute. There is also the potential to integrate social media data with traditional data sources (e.g., survey data) to obtain a complete picture of population-level substance use," Al-Garadi says as he posits the potential role of the study methodology.

Social media provides a unique opportunity to study NMPDU at a macro level, at a lower cost, unobtrusively, in close to real-time, and with the ability to represent seldom heard populations. "The triangulation of social media and traditional survey data (or any other offline data source) to study NMPDU can help minimize the potential biases in the representative samples," Sarker says as he projects the potential of social media analysis in public health.

The investigators also posit that the higher numbers of negative emotion words of the users from the NMPDU group are likely associated with greater psychological distress and poorer physical health compared to their non-NMPDU counterparts. Sarker comments that this is "a hypothesis that we plan to study in future work."

More information: Mohammed Ali Al-Garadi et al, Large-Scale Social Media Analysis Reveals Emotions Associated with Nonmedical Prescription Drug Use, *Health Data Science* (2022). DOI: 10.34133/2022/9851989

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