


# Diabetes in the Time of COVID-19: A Twitter-Based Sentiment Analysis

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## Keywords

COVID-19, coronavirus, diabetes, sentiment analysis, social media, twitter

Since December 31, 2019 and as of May 31, 2020, 6 028 135 cases of coronavirus disease 2019 (COVID-19) have been reported, including 368 944 deaths.<sup>1</sup> A Chinese longitudinal study showed that the COVID-19 outbreak had a significant psychological impact on the general population, with symptoms comparable to those of post-traumatic stress disease.<sup>2</sup> Diabetes represents a fully-fledged risk factor for poorer prognosis of COVID-19.<sup>3</sup>

The past few years have seen the rise of social networks as virtual spaces where people could share their emotions with a multitude of other users. Twitter is one of the most popular social networks, based on brief messages, called tweets, composed of up to 280 characters, and could represent a useful tool for clinicians to intercept patients' needs with the ultimate goal of improving healthcare.<sup>4</sup>

In this analysis, we assessed the need to share personal opinions on this new dramatic context and measured the perception by the general population on important aspects of diabetes.

We gathered data from new tweets containing the word “diabetes” via an automated script involving the R package *rtweet*<sup>4</sup> between March 14, 2020 and March 27, 2020 (14 days) and compared this with the same number of tweets collected between June 4, 2018 and September 13, 2018. A total of 128 185 tweets on diabetes for 2020 and for 2018 were collected.

Compared to two years ago, tweets regarding diabetes at the COVID-19 time have more often a negative emotional connotation, mainly expressing fear and sadness (Figure 1A). Consistently, in 2018, the diabetes tweets mostly expressed emotions of trust, fear, and anticipation, whereas in 2020, fear was the most represented emotion, followed by sadness (Figure 1B).

Word clusters, as assessed by the analysis of correlation between monograms, allowed to identify several “hot topics” among tweets suggesting how tweets highlight a relevant shift from the past (Figure 1C). In 2018, people

were seemingly interested in ways to get healthier and fitter through “diet,” “exercise,” and “sleep,” aware of the relevance of “weight loss” and “blood glucose and pressure levels” in diabetes, with some concerns regarding the risk of “cancer” and “heart diseases.” However, all the good intentions vanished in the gloomier correlation network of 2020, leaving room to a tangle of worries regarding “underlying medical conditions,” such as “heart,” “lung,” or “kidney” diseases and the risk of “death” in a time in which people are advised to “stay home” due to “COVID”.

Social media provides an opportunity to directly communicate and exchange health information in a public context.<sup>5</sup> The negative sentiments conveyed by tweets on diabetes, the loss of interest in healthy habits, and the hovering presence of the COVID-19 outbreak represent a call to action for diabetologists. Communication with our patients regarding their personal level of risk during the COVID-19 pandemic requires additional interventions. Given that worse glucose control is associated with poor prognosis of COVID-19 in diabetic individuals,<sup>6</sup> tweets analysis could be useful to implement strategies aiming at restoring patients' focus on diabetes management to improve clinical outcomes.

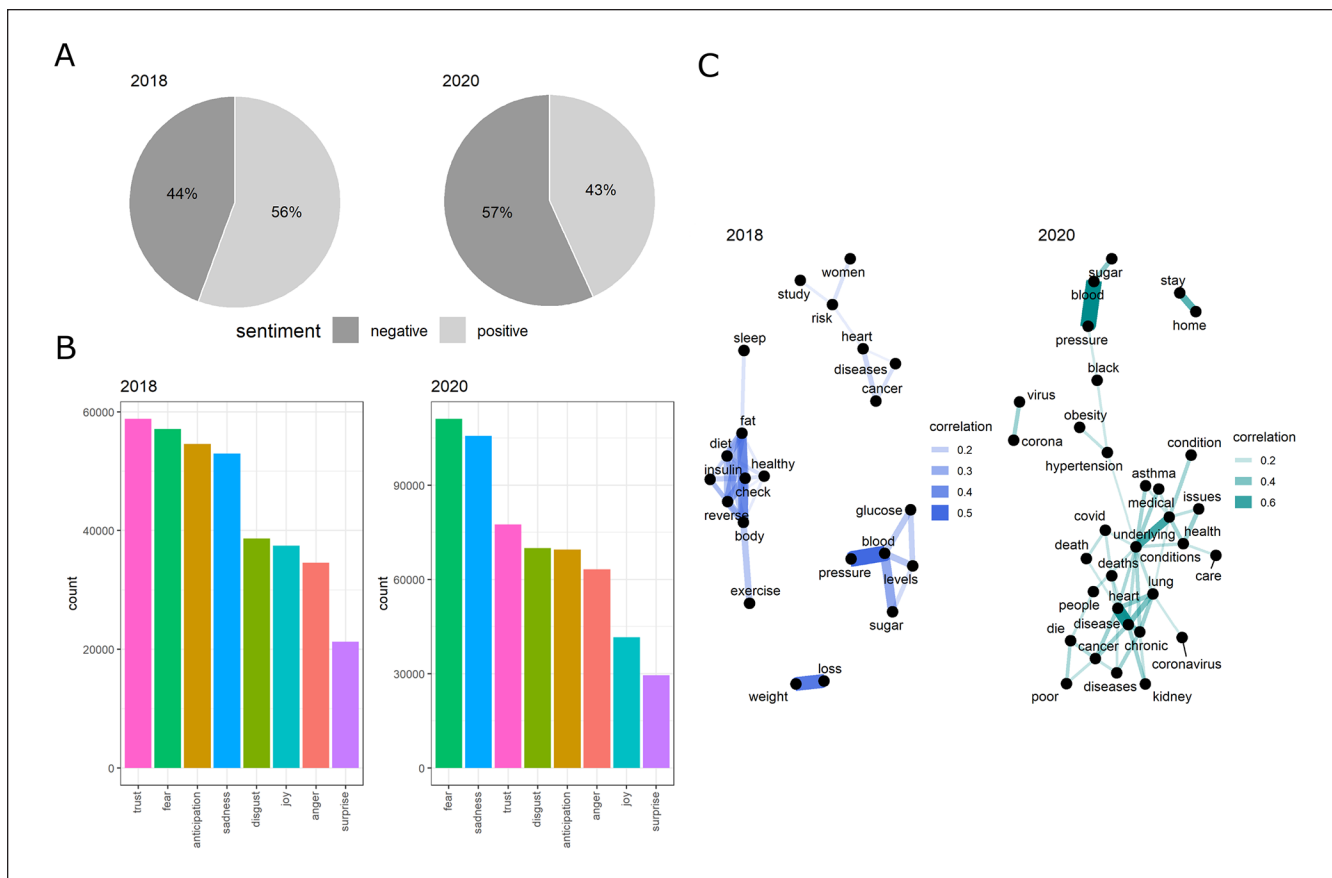
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**Figure 1.** Contribution to sentiment. Panel A shows the percentage of positive and negative words in tweets related to diabetes in 2018 (left) and 2020 (right). Panel B shows sentiment distribution related to tweets in 2018 (left panel) and 2020 (right panel). Panel C shows a correlation network graph of keywords of diabetes tweets. Line thickness is a measure of the degree of association between words. Left panel shows word combinations indicating a correlation  $>0.2$  among tweets pertaining to diabetes in 2018. Right panel shows word combinations indicating a correlation  $>0.2$  among tweets pertaining to diabetes in 2020.

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