LETTERS TO THE EDITOR

What Can Tweets Tell Us About a Person's Sleep?

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BACKGROUND

There is a great deal of public interest in whether President Donald J. Trump is sleep deprived, and whether this may be an explanation for his sometimes apparently inconsistent actions. The timing of his use of social media, especially Twitter, and his self-professed short sleep times have added to the concern that he may be chronically sleep deprived.

Twitter has become a pervasive form of communication. It is used by politicians in their never-ending quest to be elected or reelected, celebrities who bask in adulation of their fans, and mere mortals, like me, who don't quite know why they ever signed on to Twitter.

In this report, we examine the use of Twitter by President Donald J. Trump to see whether the timing of his Twitter activity ("Tweets") is consistent with his self-professed short sleep times.

METHODS

There are archives of Tweets, that give the date, time, content of Tweets, and what device was the source of the Tweet. The best known is Trump Twitter Archive.¹

Presumably, when a Tweet or a reTweet is generated from a person's account, the person is awake, or (perhaps) a Tweeting surrogate is awake. If we assume that people generate their own Tweets, examining Tweets is not too different from accelerometers (found on smart devices, that document movement) to determine whether a person is awake or asleep. We evaluated Tweets to look at the variables found in Tweet archives to give a hint about sleep/wake activity. The dates examined were President Trump's initial few months in office: January 20, 2017 to June 2, 2017; 133 days. The accounts examined were: Donald J. Trump (@realdonaldtrump and @POTUS). The @POTUS refers to the account of the President of the United States, which Mr. Trump took over on Inauguration Day, January 20, 2017.

RESULTS

As of June 2, there have been more than 31,000 Tweets from the Trump accounts going back to May 4, 2009. His first documented Tweet was: "Be sure to tune in and watch Donald Trump on Late Night with David Letterman as he presents the Top Ten List tonight!" Initially, the content of the Tweets was mostly related to his enterprises and appearances on media. The source of the Tweets was presumably from a computer web client. On July 18, 2011, Tweets were generated from a program called Tweetdeck, a Twitter client running on portable devices. The first such Tweet was: "Congratulations to my daughter Ivanka and her husband Jared on the birth of their daughter Arabella Rose yesterday." Later the Tweets came from smartphones.

Since January 20, 2017 (Inauguration Day) to June 2, 2017 there were Tweets daily. During the dates under consideration there were over 1,300 Tweets. During this period there was only 1 hour of the night when there was not a single Tweet: 3:00–4:00 AM (**Figure 1**). The Tweeting seemed to start at about 5:00 AM. Mr. Trump had a large number of Tweets (210) between 5:00 and 8:00 AM. The consistently "quiet" time (less than 20 Tweets, presumably sleep or simply not Tweeting) was about 5 hours (from midnight to 5:00 AM).

On examining the Tweets from @POTUS and @realDonaldTrump separately, (**Figure 2**) there is clearly a difference in the timing and number of Tweets between 4:00 and 9:00 AM.

Some of the Tweets and reTweets have indicated the amount of sleep attained; here are examples:

- Feb. 8, 2012, 2:39 PM. I only require four hours of sleep per night.
- Apr. 25, 2013, 6:46 AM. "@realDonaldTrump up nice and early cuz money never sleeps!!!!" That's great - go get 'em!
- Sep. 11, 2013, 2:29 PM. Many people have asked recently "when do you sleep?" The answer is -- not much.
- May 31, 2014, 6:14 AM "@ukcarioca: @ realDonaldTrump do you ever sleep? I see timelines from you at 3-5am?" Not much!
- Jan. 10, 2015, 5:00 AM "@bpeazy42: @ realDonaldTrump make \$ while others sleep!"

Sleep seems to have a negative connotation in the Tweets:

- Aug. 19, 2016, 7:17 PM. #WheresHillary? Sleeping!!!!!
 - Jul. 26, 2016, 9:11 PM. Many of Bernie's supporters have left the arena. Did Bernie go home and go to sleep?

DISCUSSION

Examination of the timing and content of President Trump's activity on Twitter suggest that he is sleeping less than what is



Figure 1—Number of Tweets per hour between January 20, 2017 and June 2, 2017.

Numbers on the x-axis refer to 1-hour increments. For example, 2 refers to the time period between 1:00 AM and 2:00 AM. 24 represents 11:00 PM to midnight.



Red bars = Tweets from the @POTUS account, blue bars = Tweets from the @realDonaldTrump account. Numbers on the x-axis refer to 1-hour increments. For example, 2 refers to the time period between 1:00 AM and 2:00 AM. 24 represents 11:00 PM to midnight.

recommended for optimal health and performance. One can infer he sleeps about 5 hours a night, less than the recommended 7 to 9 hours for adults.^{2–4} The recommendations are based on vast medical literature examining health and mortality outcomes, mood, and cognitive function.^{5–7} It is beyond the scope of this article to review in detail the negative neurocognitive outcomes of chronic sleep deprivation. Goel et al. have stated: "Cognitive functions particularly affected by sleep loss include psychomotor and cognitive speed, vigilant and executive attention, working memory, and higher cognitive abilities," and that those with chronic sleep deprivation may manifest symptoms "…without full awareness by the affected individual."⁶

Some short-duration sleepers report dysfunction, whereas others do not. Imaging studies have found that both short-sleeper groups (with and without perceived deficits) had resting functional magnetic resonance imaging findings consistent with reduced wakefulness. Those not complaining of dysfunction had increased connections between sensory cortices and bilateral amygdala and hippocampus.⁸

Sleep disorders have probably been present in previous United States presidents. Examples include Calvin Coolidge (hypersomnia after the death of a son),⁹ William Howard Taft (sleep apnea),¹⁰ and Abraham Lincoln (insomnia). Both Bill Clinton and Barack Obama admitted to sleep deprivation. Other disorders that might affect sleep and subsequently impair performance have been reported in United States presidents.^{11,12} Physical and mental impairment of United States presidents has been of great concern in the past^{13–20} and the 25th amendment of the Constitution (certified in 1967) in part deals with this issue.

Possible Pitfalls

There has not been objective confirmation that President Trump is a short sleeper. The statements of admitted short sleep duration might be a form of bravado. It is also possible that not all the Tweets are created by Mr. Trump. It is possible that some are generated by others, because more than 1 device has been used to generate the Tweets. The timing of the Tweets (apparent phase delay of about 2 to 3 hours) suggests that @POTUS Tweets might be generated by others. It is worth mentioning that when the archive was rechecked 1 month after June 2, 2017, the number of Tweets was reduced slightly and it is possible some had been retracted or removed.

CONCLUSIONS

The pattern of Tweets and admissions suggest that President Trump sleeps less than is recommended for optimal health and performance. It is unknown whether he is a "healthy short sleeper."

CITATION

Kryger M. What can tweets tell us about a person's sleep? *J Clin Sleep Med.* 2017;13(10):1219–1221.

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