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Short Communication

Can a selfie promote public engagement with skin cancer?

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ABSTRACT

Social media may provide new opportunities to promote skin cancer prevention, but research to understand this potential is needed. In April of 2015, Kentucky native Tawny Willoughby (TW) shared a graphic skin cancer selfie on Facebook that subsequently went viral. We examined the volume of comments and shares of her original Facebook post; news volume of skin cancer from Google News; and search volume for skin cancer Google queries. We compared these latter metrics after TW's announcement against expected volumes based on forecasts of historical trends. TW's skin cancer story was picked up by the media on May 11, 2015 after the social media post had been shared approximately 50,000 times. All search queries for skin cancer increased 162% (95% CI 102 to 320) and 155% (95% CI 107 to 353) on May 13th and 14th, when news about TW's skin cancer selfie was at its peak, and remained higher through May 17th. Google searches about skin cancer prevention and tanning were also significantly higher than expected volumes. In practical terms, searches reached near-record levels - i.e., May 13th, 14th and 15th were respectively the 6th, 8th, and 40th most searched days for skin cancer since January 1, 2004 when Google began tracking searches. We conclude that an ordinary person's social media post caught the public's imagination and led to significant increases in public engagement with skin cancer prevention. Digital surveillance methods can rapidly detect these events in near real time, allowing public health practitioners to engage and potentially elevate positive effects.

1. Introduction

Celebrity health disclosures can lead to significant media coverage and public engagement (Noar et al., 2014). For instance, Angelina Jolie's 2013 disclosure that she had undergone a prophylactic mastectomy resulted in large increases in online breast cancer search queries (Noar et al., 2015), followed by a near doubling of demand for BRCA1/2 testing (Evans et al., 2014). Similarly, Charlie Sheen's 2015 revelation that he was HIV positive caused large increases in HIV-related search queries (Ayers et al., 2016), followed by significant increases in HIV testing (Allem et al., 2017).

While the modern media environment is one that supports and may even amplify the effects of celebrity stories, it is also one that allows ordinary people to share their stories in ways that may engage the public. What is currently unknown, however, is whether an ordinary person's story could spark meaningful increases in engagement with health-related topics. On April 25, 2015, Tawny Willoughby (TW) - a

then 27 year-old Kentucky native - posted a graphic selfie of her skin cancer treatment to Facebook. In it, she revealed that "this is what skin cancer treatment can look like," and advised readers to stay away from tanning beds and to not lay in the sun. She also revealed that she had tanned 4–5 times per week when she was younger and was first diagnosed with skin cancer at age 21.

Did TW's selfie resonate with the public, and did it motivate public engagement with skin cancer prevention? We sought to understand how her disclosure spread via social and mass media and to examine its impact on online information seeking about skin cancer.

2. Methods

Facebook engagement with TW's selfie was monitored by counting daily public comments to her public post and shares of her post. Google News (<https://news.google.com/>) articles that mentioned "skin cancer" were monitored daily along with reports that mentioned "Willoughby"

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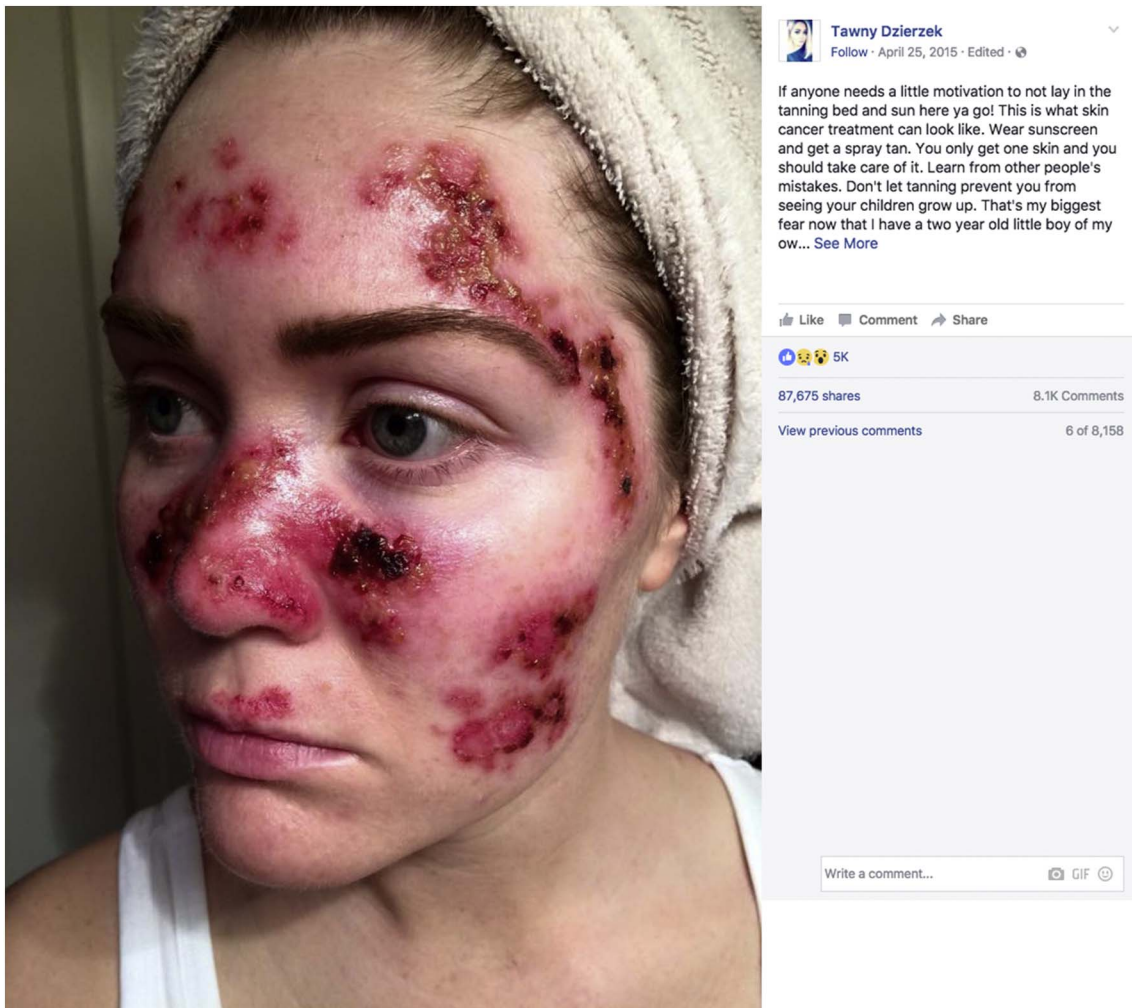


Fig. 1. Tawny Willoughby's (TW) Facebook Post. Note: This was captured in February, 2017, after TW changed her last name to Dzierzek.

(TW's surname). Google searches emerging from the United States (google.com/trends) that included the terms “skin” and “cancer” were monitored daily, along with the subset of searches focused on tanning (those including “tan(s)” or “tanning”) and prevention (those including “prevention” or “prevent”). The fraction of searches with the focal terms relative to all searches were used to adjust for variations in population size (or Internet use) across time, with absolute volumes inferred from ComScore estimates.

Trends were described for the month after TW's selfie (April 25th, 2015–May 25th, 2015). The “Tawny effect” was calculated by comparing the observed outcome volumes to a counterfactual representing expected volumes had news coverage of TW's story not occurred (Shadish et al., 2002), an autoregressive integrated moving average (ARIMA) model fit using Hyndman and Khandakar's algorithm (Hyndman & Khandakar, 2008). This model uses historical data to estimate expected volumes for the time period after TW's post. These models are robust to the most well-known biases, including recurring periodicities and trending in the data, such as how the daily volume of searches may be growing as Google's user base grows. Search volumes were logit transformed to fit the models and transformed back to the linear scale to avoid negative predictions. Observed volumes were then compared to expected volumes as a percentage increase ([observed minus expected] divided by expected) for each day after coverage of TW's story began - May 11th, 2015 as determined by Google News - until estimates of increased search volumes were no longer statistically significant. Ninety-five percent prediction intervals were generated from 1000 simulations of the ARIMA model, resampling errors from the

fitted model (rather than normal errors).

All analyses relied on public or private anonymized data, adhering to the terms and conditions, terms of use, and privacy policies of Facebook and Google. TW provided written consent to use her Facebook image and full name. All analyses were computed using R version 3.2.1.

3. Results

TW's skin cancer selfie was publicly posted on April 25th, 2015 (Fig. 1) and began spreading on Facebook soon thereafter. In fact, her selfie received more than 50 comments the day it was posted. As engagement increased, users began sharing her selfie on their Facebook pages, ultimately reaching 50,000 shares by May 11th - prompting the news site Byrdie to break the story. The single news story on May 11th was followed by nine additional news reports on May 12th, including one on CNN. News about TW's selfie increased on May 13th (35 news reports) and peaked on May 14th (117 news reports - including ABC's Good Morning America), while overall news coverage of skin cancer was declining (Fig. 2).

Google searches that included the terms “skin” and “cancer” increased around the time when news about TW's skin cancer broke (Fig. 2). All skin cancer searches were 162% (95% CI 102 to 320) and 155% (95% CI 107 to 353) higher than expected volumes on May 13 and 14, when news about TW's skin cancer selfie peaked. Searches about skin cancer remained significantly higher than expected on the 15th (88%; 95% CI 45 to 218), 16th (52%; 95% CI 11 to 152) and 17th

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