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Original article

## Twitter Chatter About Marijuana



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### A B S T R A C T

**Purpose:** We sought to examine the sentiment and themes of marijuana-related chatter on Twitter sent by influential Twitter users and to describe the demographics of these Twitter users.

**Methods:** We assessed the sentiment and themes of a random sample ( $n = 7,000$ ) of influential marijuana-related tweets (sent from February 5, 2014, to March 5, 2014). Demographics of the users tweeting about marijuana were inferred using a social media analytics company (Demographics Pro for Twitter).

**Results:** Most marijuana-related tweets reflected a positive sentiment toward marijuana use, with pro-marijuana tweets outnumbering anti-marijuana tweets by a factor of greater than 15. The most common theme of pro-marijuana tweets included the Tweeter stating that he/she wants/plans to use marijuana, followed by tweeting about frequent/heavy/or regular marijuana use, and that marijuana has health benefits and/or should be legalized. Tweepsters of marijuana-related content were younger and a greater proportion was African-American compared with the Twitter average.

**Conclusions:** Marijuana Twitter chatter sent by influential Twitter users tends to be pro-marijuana and popular among African-Americans and youth/young adults. Marijuana-related harms may afflict some individuals; therefore, our findings should be used to inform online and offline prevention efforts that work to target individuals who are most at risk for harms associated with marijuana use.

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### IMPLICATIONS AND CONTRIBUTION

Twitter is a popular social media platform among young people. Results from this study highlight the pervasiveness of pro-marijuana Twitter chatter particularly among youth and African-Americans and stress the need for more online marijuana prevention messages to target individuals who are most at risk for marijuana use-associated harms.

Twitter is a free-to-use social media platform that has become very popular among young people in recent years [1,2]. Twitter users can easily and instantly connect to a mass audience via tweets that are 140 characters or less [3]. The ability to engage with unknown persons is a unique and appealing feature of Twitter that helps drive its popularity among young people [4]. A 2013 survey found that Twitter was

viewed as “the most important social media service” among teens [5], and nearly half of the 240 million Twitter users [4] are aged less than 34 years.

Twitter users can engage with adverse tweets that glamorize harmful substance use behaviors. In our own research, we identified a popular pro-marijuana Twitter handle (@stillblazingtho) that sends an average of 11 tweets per day which primarily promote recreational marijuana use behaviors; this handle has approximately 1 million followers and most are predicted to be youth and young adults [6]. Related studies have found that young Twitter users could easily view tweets that promote alcohol use [7,8]. Similarly, underage youth were able to view and post tweets that promoted trendy tobacco products such as hookah and e-cigarettes [9].

**Conflicts of Interest:** L.J.B. is listed as an inventor on Issued U.S. Patent 8,080,371, “Markers for Addiction” covering the use of certain single nucleotide polymorphisms in determining the diagnosis, prognosis, and treatment of addiction.

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In the present study, we examine marijuana-related Twitter chatter. The liberalizing of marijuana policies has prompted increasing media attention in recent years, and discussions about this hot topic may occur on Twitter. We therefore hypothesize that the bulk of Twitter chatter about marijuana is favorable toward marijuana. Because Twitter is commonly used among young people and marijuana is a relatively popular substance among teens and young adults [10], we additionally hypothesize that the Tweeters who are sending marijuana-related messages are youth and young adults.

## Methods

The Twitter data in our study are public, and our research was deemed exempt from human subjects review.

### Marijuana-related tweets

Marijuana-related tweets in the English language were collected from February 5, 2014, to March 5, 2014 using Simply Measured, a company that provides social media analytics and measurement [11]. Simply Measured has access to the Twitter “firehose” (100% of tweets) via Gnip, a licensed company that can retrieve the full Twitter data stream [11].

All tweets that contained one or more of specific marijuana-related terms were pulled. To compile an inclusive list of marijuana-related terms, members from our research team initially composed a list of search terms that reflected common terms for marijuana. Additionally, [urbandictionary.com](http://urbandictionary.com) and marijuana-related tweets on [Topsy.com](http://Topsy.com) were also used. Simply Measured garnered all tweets that included one or more of the terms listed in Table 1.

**Table 1**

Marijuana-related tweets by keyword, February 5, 2014, to March 5, 2014 (N = 7,653,738)

Keyword	Number of tweets <sup>a</sup>
weed or #weed	3,390,851
blunt or #blunt <sup>b</sup>	1,338,057
marijuana or #marijuana	986,200
stoner or #stoner	477,605
kush or #kush	407,198
stoned or #stoned	354,706
bong or #bong <sup>c</sup>	297,047
pot or #pot <sup>d</sup>	202,297
cannabis or #cannabis	201,384
joint or #joint <sup>e</sup>	137,209
ganja or #ganja	54,018
pothead or #pothead	39,703
sativa or #sativa	18,000
indica or #indica	13,603
#mmot <sup>f</sup>	13,004

<sup>a</sup> Sum does not equal the total of 7,653,738 tweets because some tweets contain more than one term.

<sup>b</sup> Excluded tweets with “Emily Blunt,” “James Blunt,” “blunt object,” “blunt people,” “so blunt,” “too blunt,” “be blunt,” “Sagittarius,” “#Virgo,” “#Leo,” “#Aries,” or “#Taurus.”

<sup>c</sup> Excluded tweets with “beer bong” or “beerbong” and tweets/retweets from Big Ben @big\_ben\_clock or other clocks tweeting “BONG BONG...,” “bing-bong,” or “Kim Keun Bong.”

<sup>d</sup> Only includes tweets with “smoke,” “smoking,” “smokin,” “head,” “legal,” “shops,” “high,” or “legalize.”

<sup>e</sup> Only includes tweets with “smok,” “roll,” “high,” or “light,” and excludes tweets with “highlight.”

<sup>f</sup> #mmot means “Marijuana Movement on Twitter.”

Once the marijuana-related tweets were collected from Simply Measured, the research team scanned the data, including popular retweets, to exclude irrelevant tweets from analysis. See footnotes of Table 1 for a complete list of exclusion/inclusion terms.

### Tweet sentiment

We randomly sampled 7,000 tweets from those whose handles were in the top 25th percentile for both number of followers and Klout score. Klout score considers the extent to which the user’s content is “acted upon” by being clicked, replied, and/or retweeted [12]. Klout score is used as a measure of influence versus number of followers, which is a measure of popularity. We restricted our sample to these tweets because of the potentially higher impact these tweets have compared with tweets from individuals who have fewer followers. Tweets that were direct @replies were excluded from analysis because often the original tweets would also need to be reviewed to understand the context.

Tweets (along with the content of any links) were coded for sentiment. Pro-marijuana tweets relate positive experiences with using marijuana and/or encourage others to use marijuana. Anti-marijuana tweets relay unpleasant experiences with marijuana and/or discourage others to use marijuana. We established sentiment codes on a Likert scale: 1, strongly against marijuana use; 2, slightly against marijuana use; 3, neutral/unknown; 4, slightly for (pro) marijuana use; and 5, strongly for (pro) marijuana use. Nondiscernible tweets were excluded from further analysis.

### Themes and source of tweets

The content of tweets was coded to summarize their main themes. Two members of the research team with expertise in substance use research scanned 300 random marijuana-related tweets. Different sets of themes were distinguished between pro-marijuana tweets versus anti-marijuana tweets. The presence of themes was coded as yes/no.

For pro-marijuana tweets, 10 themes were identified: (1) intent to use or craving marijuana; (2) frequent, regular, or heavy use of marijuana; (3) medical and/or recreational marijuana use has benefits and/or should be legalized; (4) marijuana use in relation to sex/romance, attractiveness (e.g., sexy stoner girls), or helping to facilitate friendships; (5) currently using marijuana or is high; (6) marijuana helps you to feel good or relieve stress; (7) others should use marijuana; (8) a celebrity or song is linked to marijuana use; (9) using marijuana with alcohol, tobacco, or other drugs; and (10) marijuana use is harmless.

Sentiment of the tweets was first determined by Crowd-Flower contributors (described in detail in the following), and then two members of the research team reviewed the anti-marijuana tweets (n = 317) to refine and code the themes. Seven themes were identified: (1) marijuana users are losers or unproductive; (2) smoking marijuana is unattractive or gross; (3) marijuana use is harmful and/or the tweeter wants to quit smoking marijuana; (4) tweeter does not personally use marijuana and/or has no interest in using or trying marijuana; (5) against marijuana legalization; (6) a celebrity or song is linked to marijuana use; and (7) criminal or legal consequences of marijuana use.

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