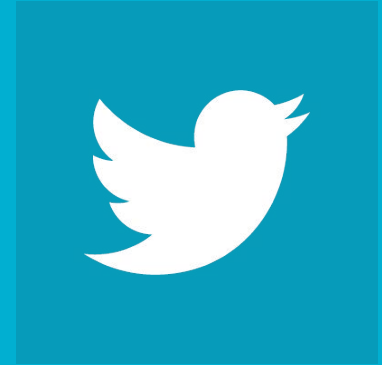# Factors Related to Twitter Engagement in Anxiety Support Seeking

Yingchen Ma, Thomas Macheras, Elisabeth Petit - Bois, Anuraag Govindarajan

Background

- Twitter has 353M monthly active users[1]
- 500M tweets sent per day[1]
- Included are discussions about mental health (MH)
- Twitter allows a series of options for users to share their MH experiences - as well as receive engagement

[1] https://www.wordstream.com/blog/ws/2020/04/14/twitter-statistics
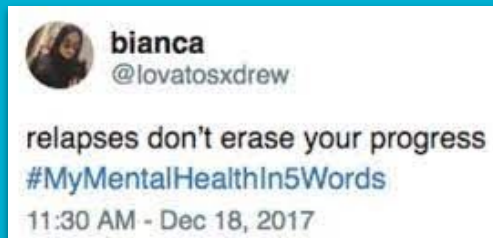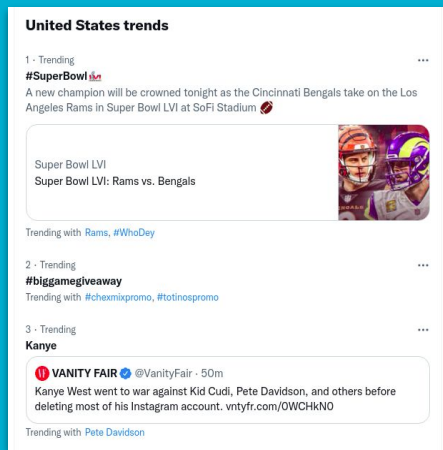
Motivation and Significance

- Increase in individuals seeking mental health support on social media

- No definable space on Twitter for individuals to seek support
    - Different from Reddit (subreddits) or Facebook (groups)

- Uncertainty regarding best method to solicit responses to disclosure

Related Work

Improving Offline Support Systems

- **Role of social media in tackling challenges in mental health** — (De Choudhury, 2013)
- **Catalyzing social support for breast cancer patients** — (Skeels et al., 2010)

Investigating Online Social Support Systems

- **Building an online community of care: Tumblr use by transgender individuals** — (Hawkins & Haimson, 2018)
- **Supporting Constructive Mental Health Discourse in Social Media** — (Blair & Abdullah, 2018)

Analyzing Behavior in OMHC

- **Social Support is Contagious: Exploring the Effect of Social Support in Online Mental Health Communities** — (Chen & Xu, 2021)
- **Crazy mad nutters: The language of mental health** — (Hwang & Hallingshead, 2016)

Gaps in Related Work

- Do not examine specific mental health topics
- Do not examine Tweet metadata and sentiment relationships
- Do not examine hashtags in the context of mental health on Twitter
  - Past studies done on Reddit subreddits, Tumblr tag searches, etc.

Problem Definition and Goal

Research Question: What is the most effective way to seek support for anxiety on Twitter?

- Which tweet features will elicit **the most engagement**?
- Which tweet features will elicit **the most positive responses**?
- Are there **other factors** that contribute to the effectiveness?

Project Goal: We will investigate how the volume and sentiment of responses to anxiety-related tweets are influenced by hashtags, profanity, and other factors.

- "If a post my tweet with a certain hashtag (for example), am I more likely to receive more positive replies or more support?"

Data Gathering

1. Build relevant keyword set from anxiety subreddit scrapes
   - r/anxiety, r/anxietyhelp, r/healthanxiety, etc.
2. Validate 34 initial keywords
   - Pulled 25 tweets per keyword from Twitter for annotation
   - Acceptance = majority tweet relevance & annotator agreement
3. Narrowed candidates to 6 final keywords
4. Pulled 10,000 tweets for each keyword (5000 with hashtags, 5000 no hashtag)
5. Pulled all tweet reply chains

Dataset Description

Number of Tweets: 42,569

Number of Tweets with Replies: 11,724

Number of Total Replies: 51,414

Datetime Range of Tweets: 11/02/2009 - 04/05/2022

Approach/Method

Linear Regression:

- To determine features which influence volume of response
- Created a variable 'interaction_score'
    - (# of quotes)*10 + (# of replies)*5 + (# of retweets)*3 + (# of likes)

Linear SVM:

- To determine features which influence sentiment of response
- Sentiment of response = average sentiment of the replies
    - 0 if negative, 1 if positive

Features

|	
Positive Sentiment	Positivity score of tweet (using VADER)
Negative Sentiment	Negativity score of tweet (using VADER)
Contains Hashtag	0 if no hashtags present, 1 if hashtag present
Capitals	% of letters which are capitalized
Mentions	0 if no users tagged, 1 if other user(s) tagged
Swear Words	% of words which are swear words
Uses Profanity	0 if no profanity present, 1 if profanity present
Contains Question	0 if there is no question, 1 if there is a question
Number of Words	Normalized length of tweet
Time of Day	Normalized hour of day tweet was posted
First Person	0 if no first person pronouns present, 1 if there are

Results

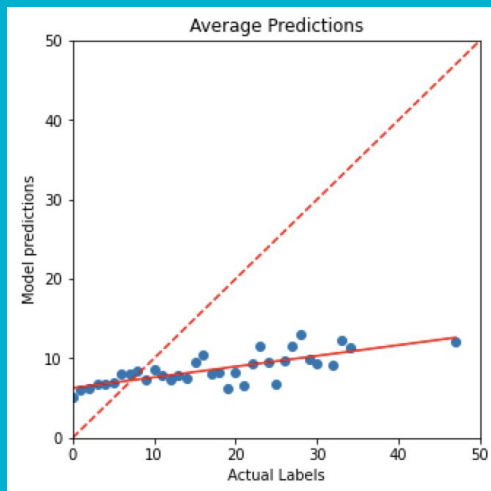MAE (Interaction Score): 9.533

MAE (Like Count): 5.890

Significant Positive Correlation:

- Positive Sentiment
- Negative Sentiment
- Mentions

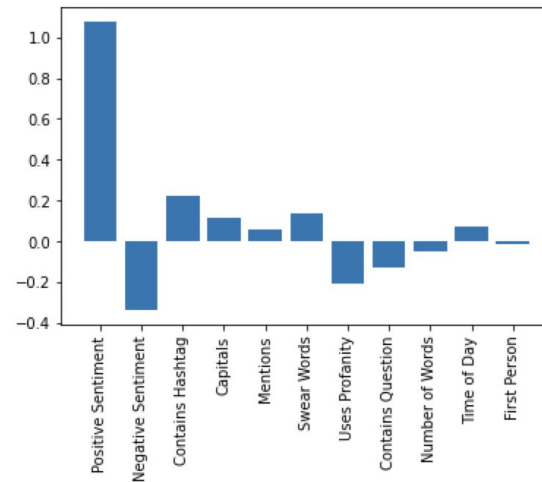Significant Negative Correlation

- Swear Words

Results

Precision	.846
Recall	.538
F1 Score	.658
Specificity	.682
AUC	.610
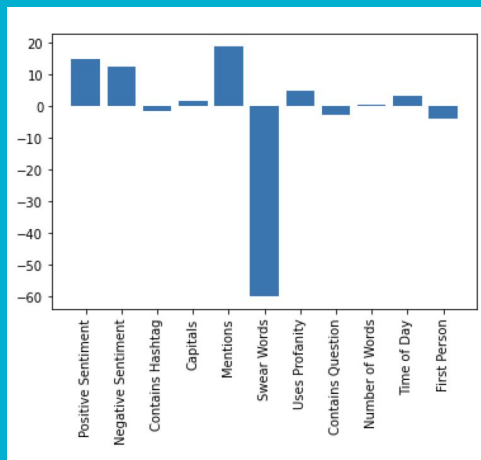
Significant Positive Correlation:

- Positive Sentiment
- Contains Hashtag

Significant Negative Correlation

- Negative Sentiment
- Uses Profanity

Implications

- We have identified some 'controllable' aspects of Tweets which can positively or negatively affect the volume and sentiment of the response they get
- Other features such as structure and length of the tweet, as well as use of keywords (unigrams, bigrams) were not reliable predictors
- Narrative-based model
  - Desire, Family, Money, Job, Student
  - Not a good predictor of engagement
- Depth-Sentiment Analysis

Questions?