

# Bipolar Disorder Subtypes and Mood Stabilisers

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An NLP exploration of the two main subtypes of bipolar disorder with regards to Reddit posts on mood stabilisers

Eric Lim



b i p o l a r  
d i s o r d e r

# Bipolar at a glance

## The World

**46 million**  
of the world's population

## Singapore

**0.82%**  
of Singaporeans

**1.07%**  
of Singaporeans aged 20-24  
years old

## The United States

**0.68%**  
of the U.S. population

**0.96%**  
of the U.S population  
aged 20-24 years old

**For bipolar  
individuals,  
suicide is a  
problem.**

**Suicide is the leading cause of premature death.**

Bipolar Disorder – Fact Sheet, Treatment Advocacy Center

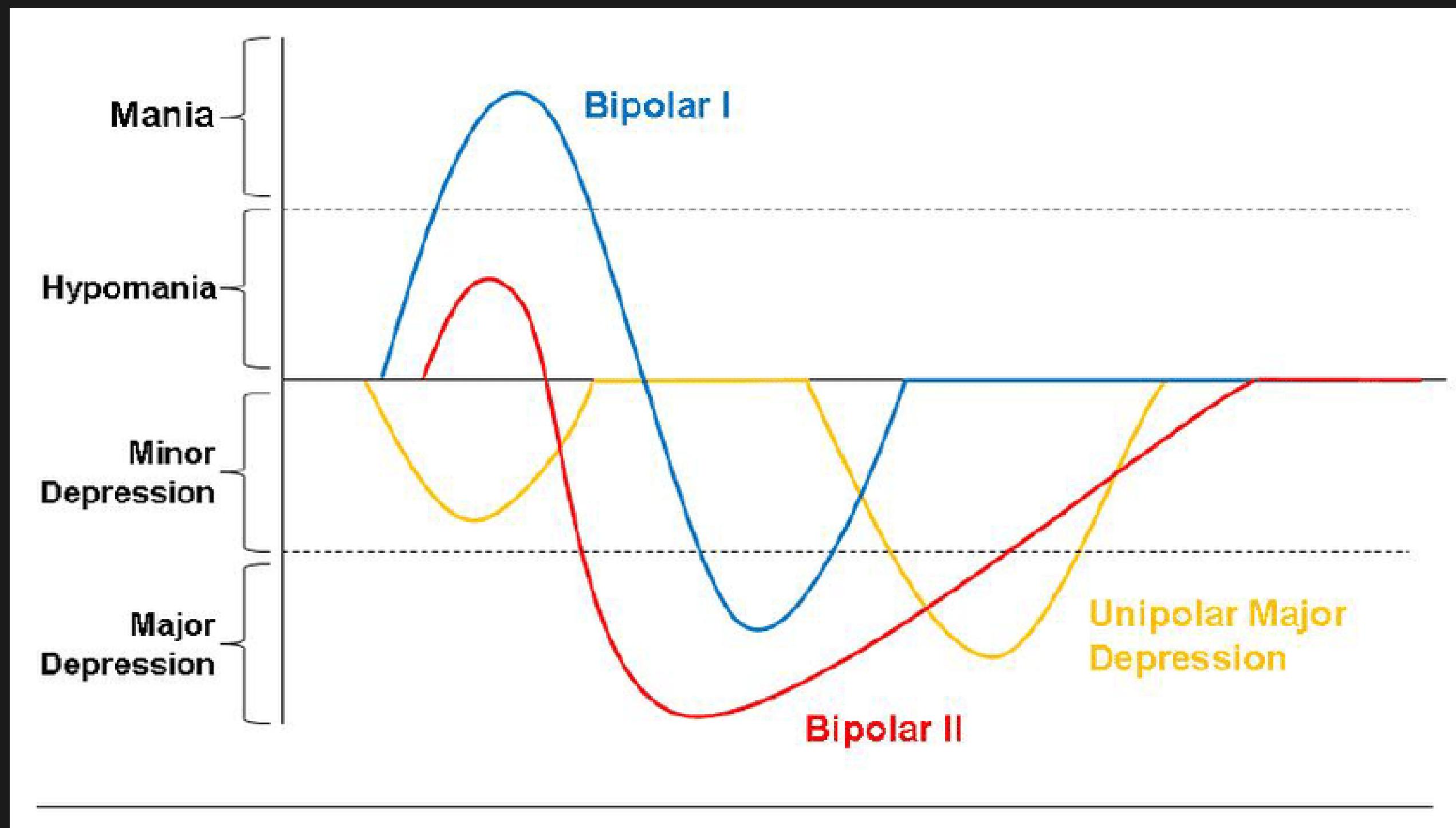
**The rate is 10–30 times higher than the corresponding suicide rate in the general population.**

Suicide Risk in Bipolar Disorder: A Brief Review. Medicina. 2019.

**There is double the risk of death from all causes as compared to the general population.**

A systematic review and meta-analysis of premature mortality in bipolar affective disorder. Acta psychiatrica Scandinavica. 2015.

# Bipolar Subtypes



## Lithium

A salt, lithium carbonate. Used since 1948.

.....

## Lamotrigine (Lamictal)

An anticonvulsant. Originally used to treat seizures.

# Mood Stabilisers

The mainstay of bipolar treatment

.....

## Quetiapine (Seroquel)

An antipsychotic. Also used to treat schizophrenia.

# What does one do?

There are a number of paths for individuals with bipolar.

## Seek professional help

Combination of medication  
and therapy

Misdiagnosis is common

## Join communities

Online, such as the r/bipolar  
subreddit

In-person support groups

## Remain untreated

Stigma

Cost

# The Project

To explore the 2 **bipolar** subtypes in the context of 3 main **mood stabilisers**

NLP ANALYSES OF POSTS  
FROM R/BIPOLAR

Posts containing the words 'lithium', 'lamotrigine'/'lamictal',  
'quetiapine'/'seroquel'

Of these, only posts where the author explicitly declared their bipolar subtype

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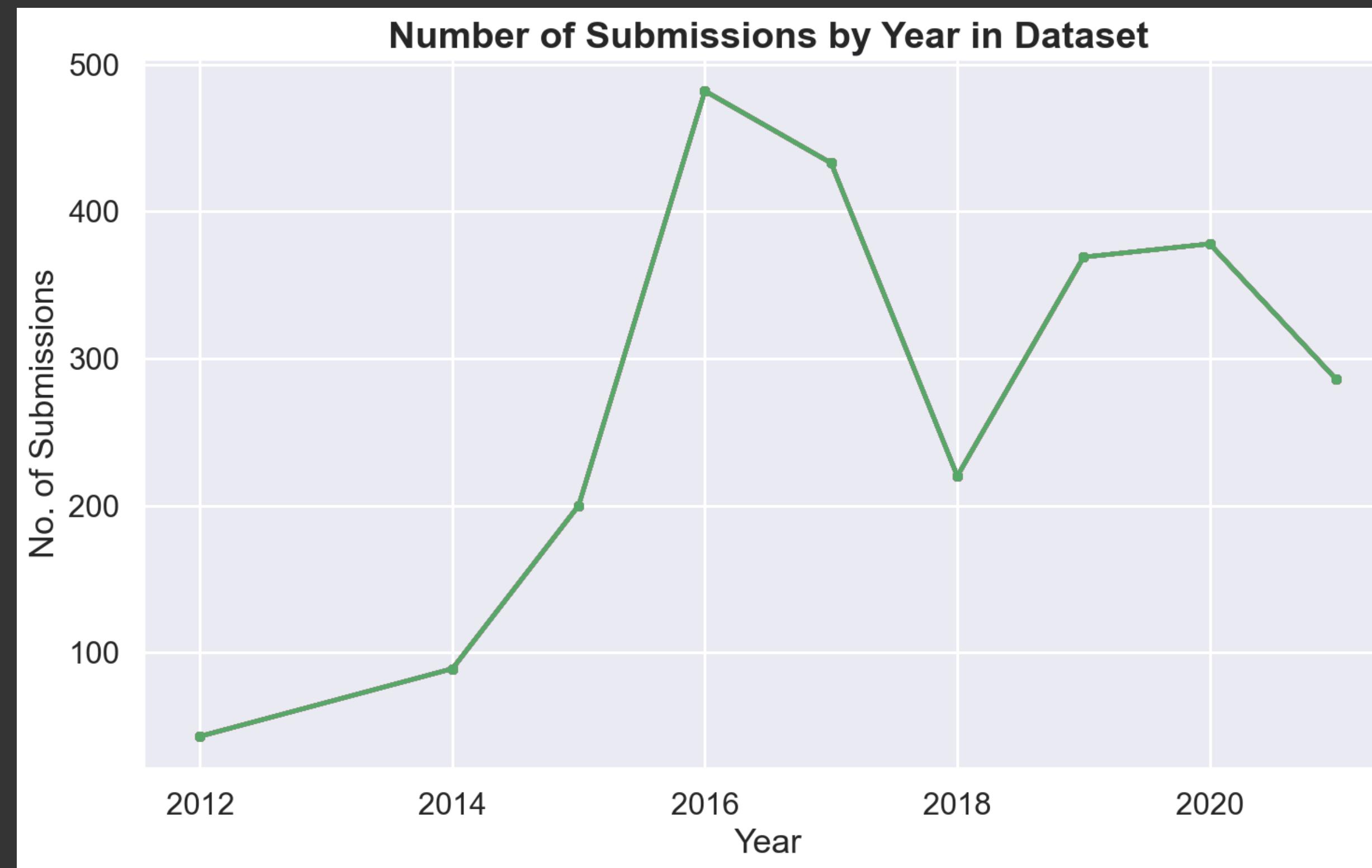
CLASSIFICATION OF POSTS  
ACCORDING TO SUBTYPE  
(MIN. 70% ACCURACY)

Authors have only declared their subtype for ~10% of posts on r/bipolar

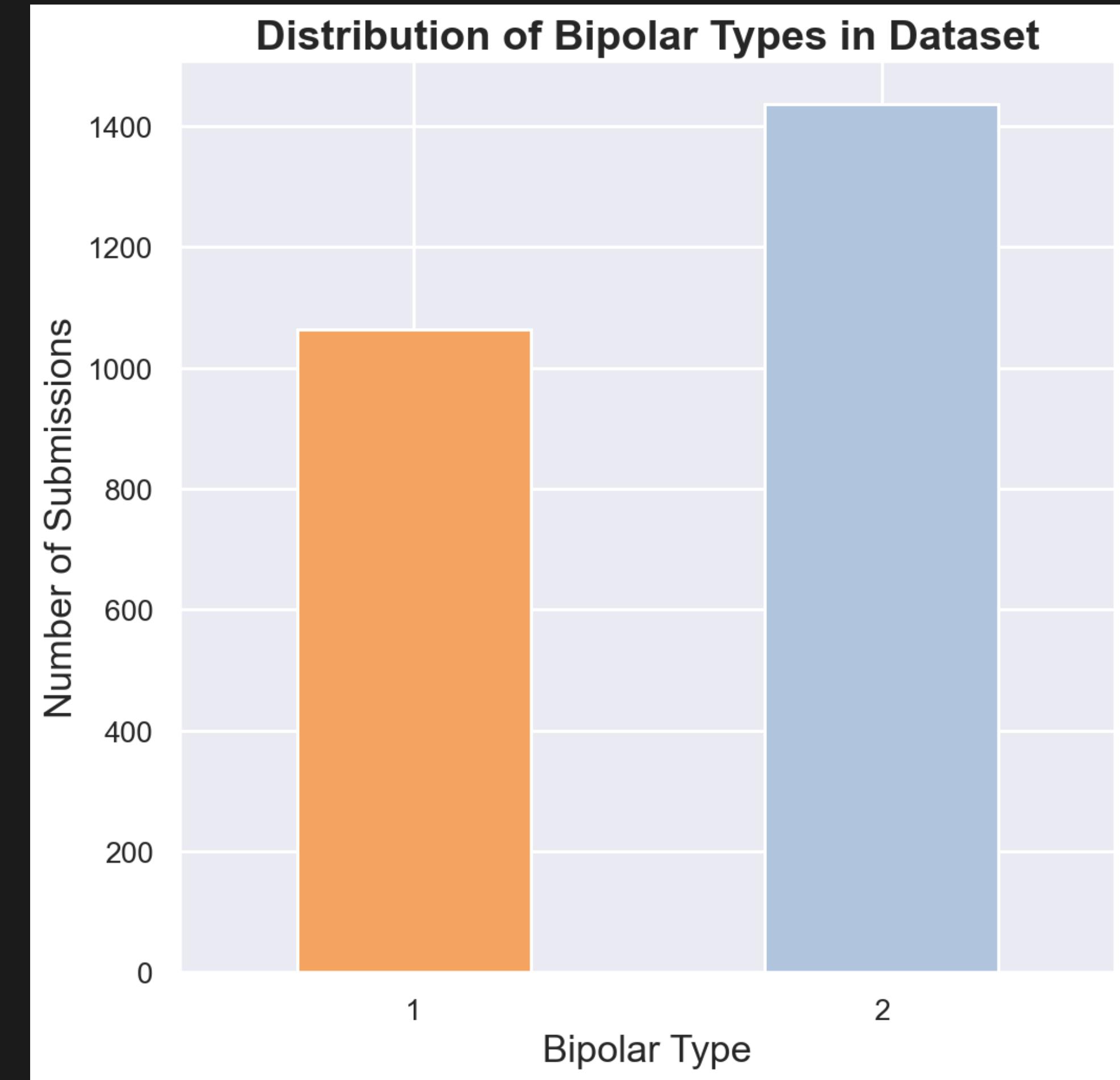
TARGET AUDIENCE

The project is expected to benefit clinicians and potentially individuals with the disorder

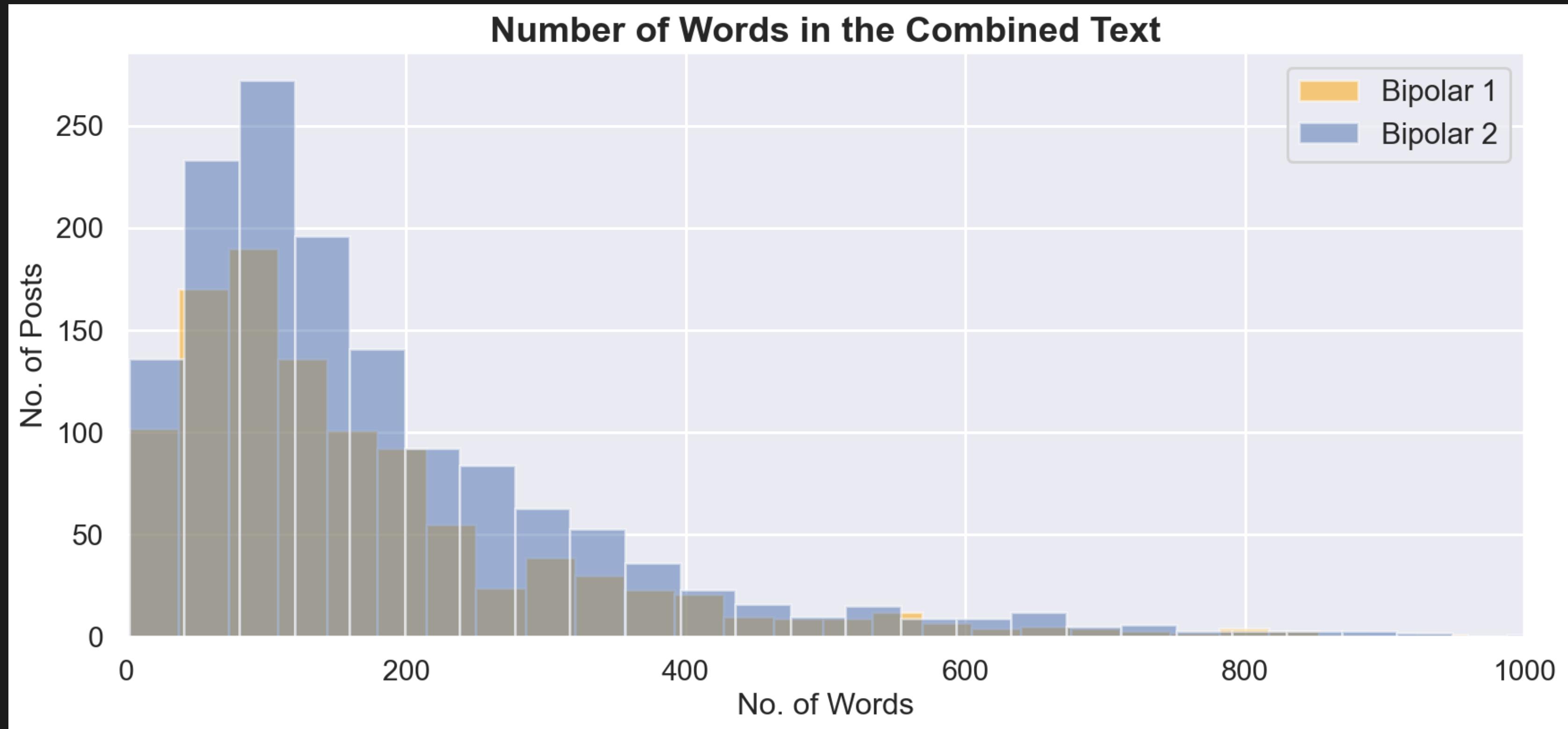
# Submissions by Year



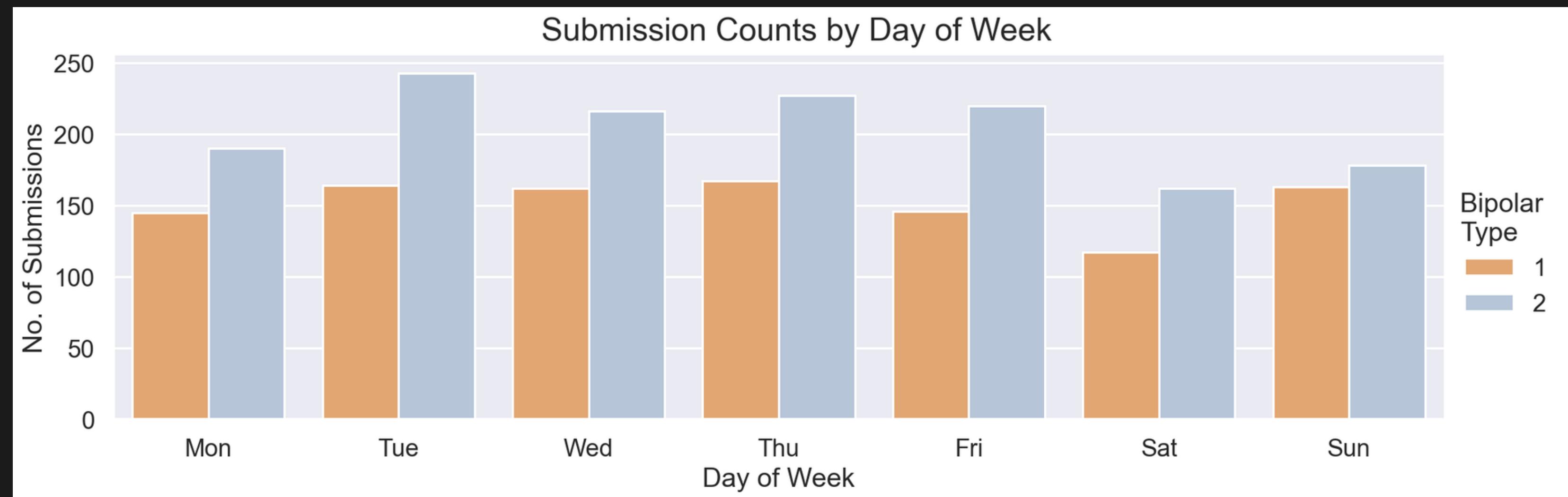
# Bipolar Subtypes



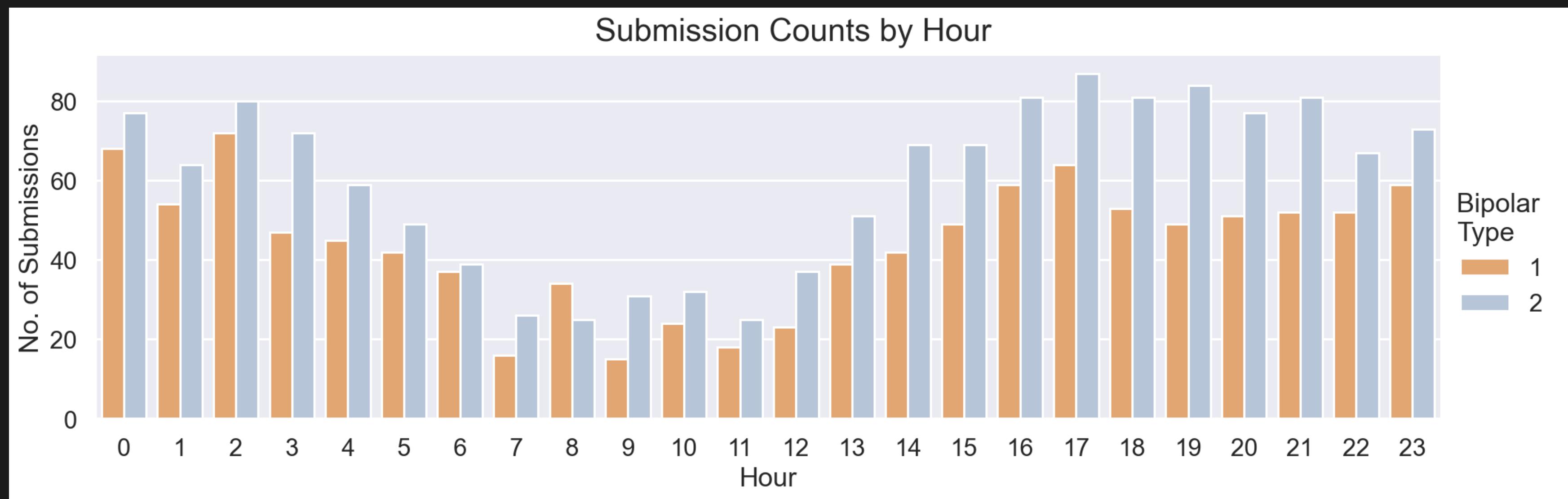
# Length of text



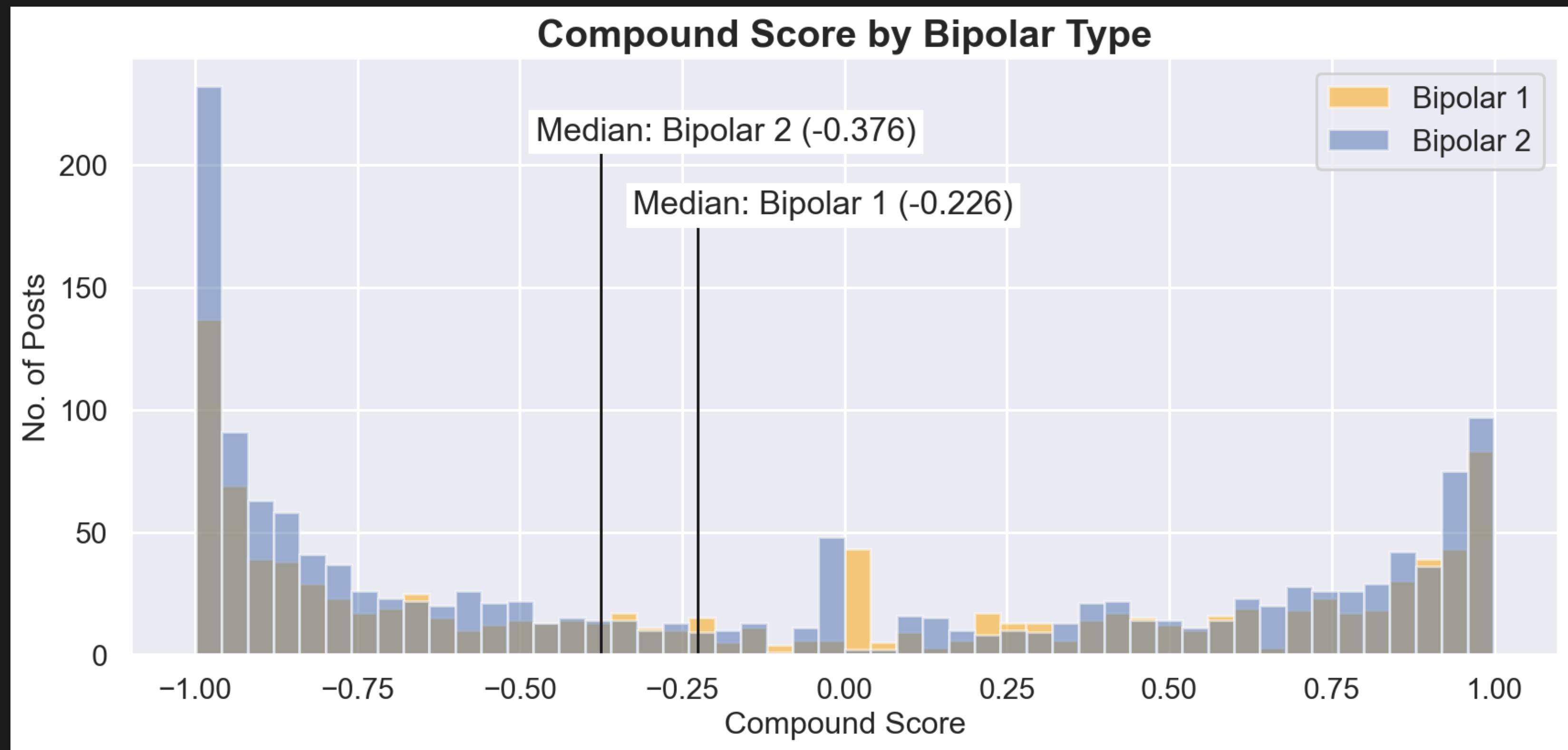
# Counts by Day of Week



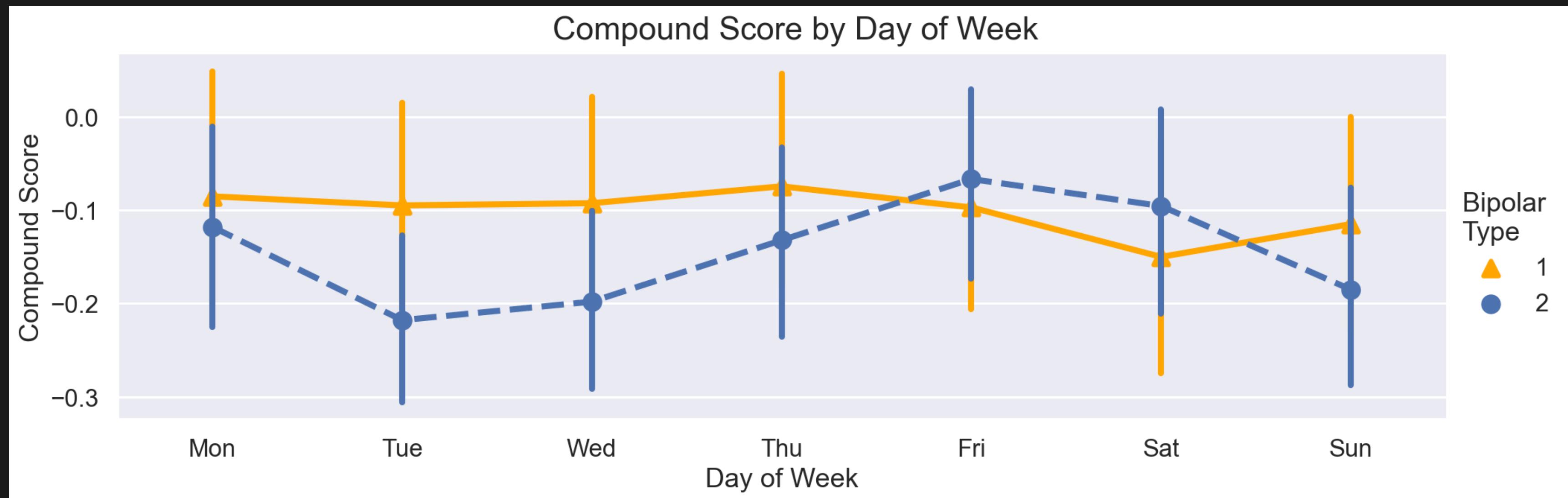
# Counts by Hour



# Sentiment Analysis



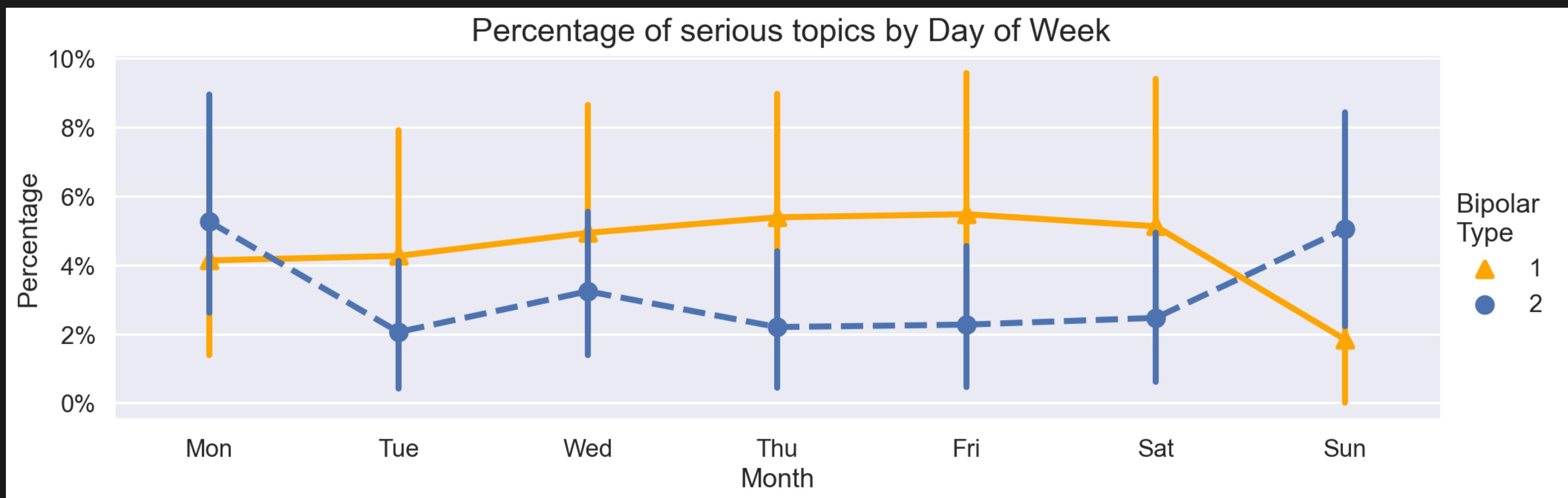
# Sentiment Analysis by Day of Week



# Defining Serious Topics

None	Drug Use
Med Question	Caution - Manic Trigger
99 Problems/Rant/Story	Art
General	Misleading Title
General Question	Interesting Link
Advice	Caution - Self Harm
Discussion Starter	Amazeballs
Good News	Self-Harm Trigger
Suicidal Thoughts Trigger	General Question/Advice
Caution - Suicidal Thoughts	STAR WARS SPOILER
Caution - Depression Trigger	Sexual Abuse Trigger Warning
Dangerous Behavior Warning	Domestic Abuse Trigger Warning
Meme	

# Serious Topics by Day of Week



# Which Season has the highest suicide rate?



Spring

Summer

Autumn

Winter

## Why Do Mania and Suicide Occur Most Often in the Spring?

[Chul-Hyun Cho](#) and [Heon-Jeong Lee](#)

► Author information ► Article notes ► Copyright and License information [Disclaimer](#)

This article has been [cited by](#) other articles in PMC.

Symptoms of mental illness often become worse during the spring season. In disorders, the phrase “spring fever” has a different meaning. Previous studies have shown that the incidence of mania peaks during the spring in both the Northern and Southern Hemispheres. Previous studies have indicated that suicide rates also peak during the spring season in the Northern Hemisphere. One possible cause may be the sudden increase in the duration and amount of sunlight is a possible cause.

[Int J Environ Res Public Health.](#) 2012 Feb; 9(2): 531–547.

Published online 2012 Feb 14. doi: [10.3390/ijerph9020531](https://doi.org/10.3390/ijerph9020531)

## Seasonality of Suicidal Behavior

[Jong-Min Woo](#),<sup>1,2</sup> [Olaoluwa Okusaga](#),<sup>3,4</sup> and [Teodor T. Postolache](#)<sup>3,4,\*</sup>

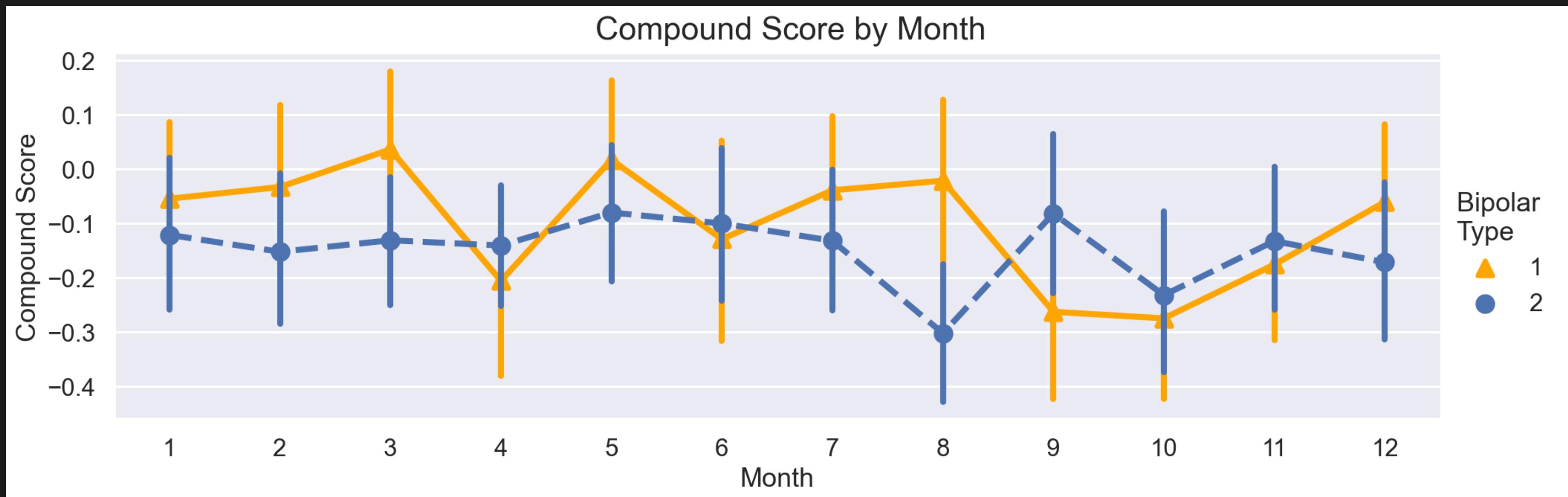
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## Abstract

A seasonal suicide peak in spring is highly replicated, but its specific cause is unknown. This study aims to review the literature on suicide risk factors which can be associated with seasonal variation of suicides. We performed a systematic review of published articles from 1979 to 2011. Such risk factors include environmental determinants such as temperature, humidity, and light exposure, as well as physical, chemical, and biological factors. We also summarized the influence of potential risk factors on seasonal variation of suicides. Seasonal variation of suicides is a complex phenomenon influenced by multiple factors. Further research is needed to identify the specific causes of seasonal variation of suicides.

# Sentiment Analysis by Month



Epub 2007 Jan 3.

# Autumn peak in shooting suicides of children and adolescents from northern Finland

Anniina Lahti <sup>1</sup>, Pirkko Räsänen, Kaisa Karvonen, Terttu Särkioj

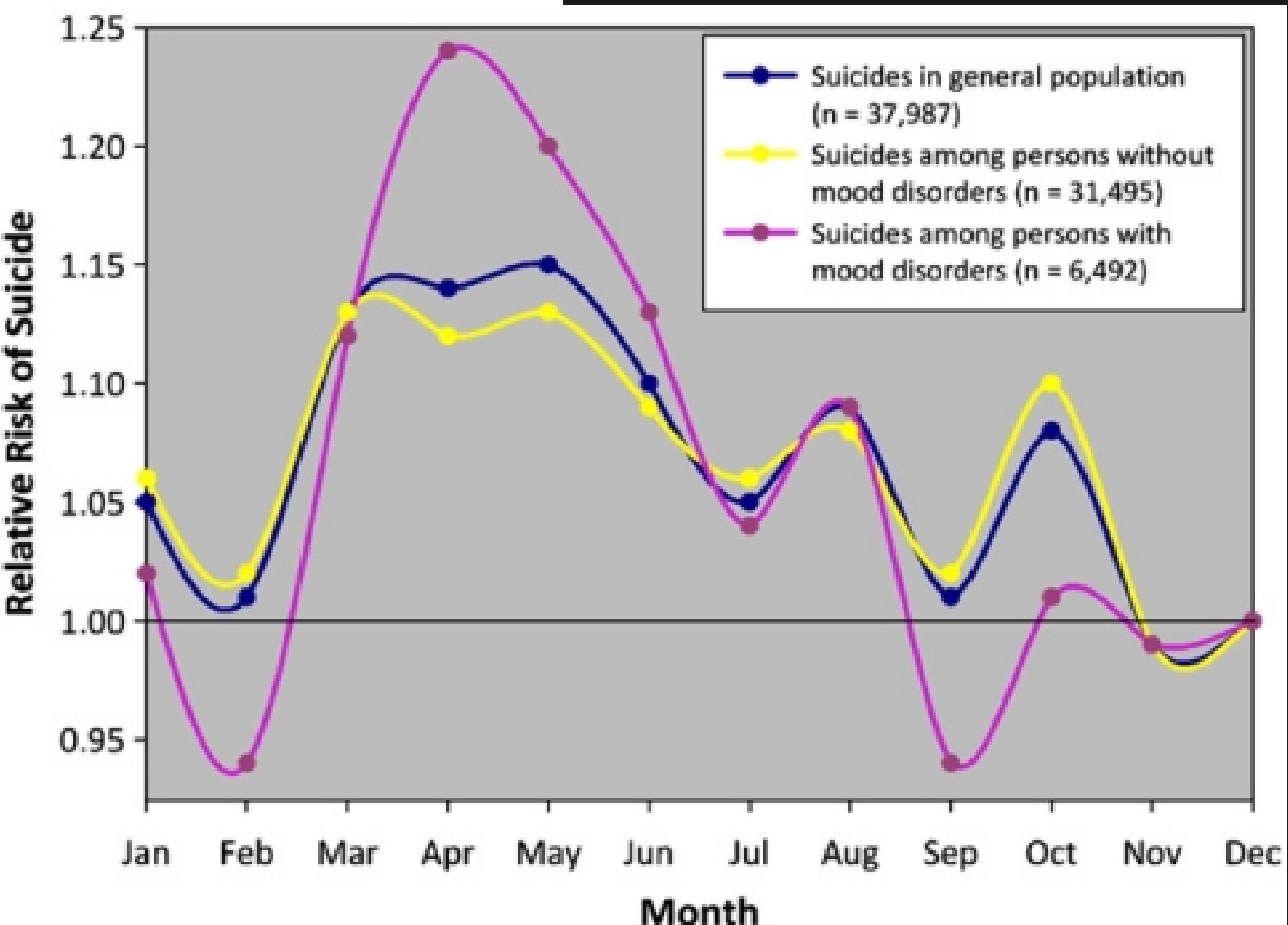
Helinä Hakko

Affiliations + expand

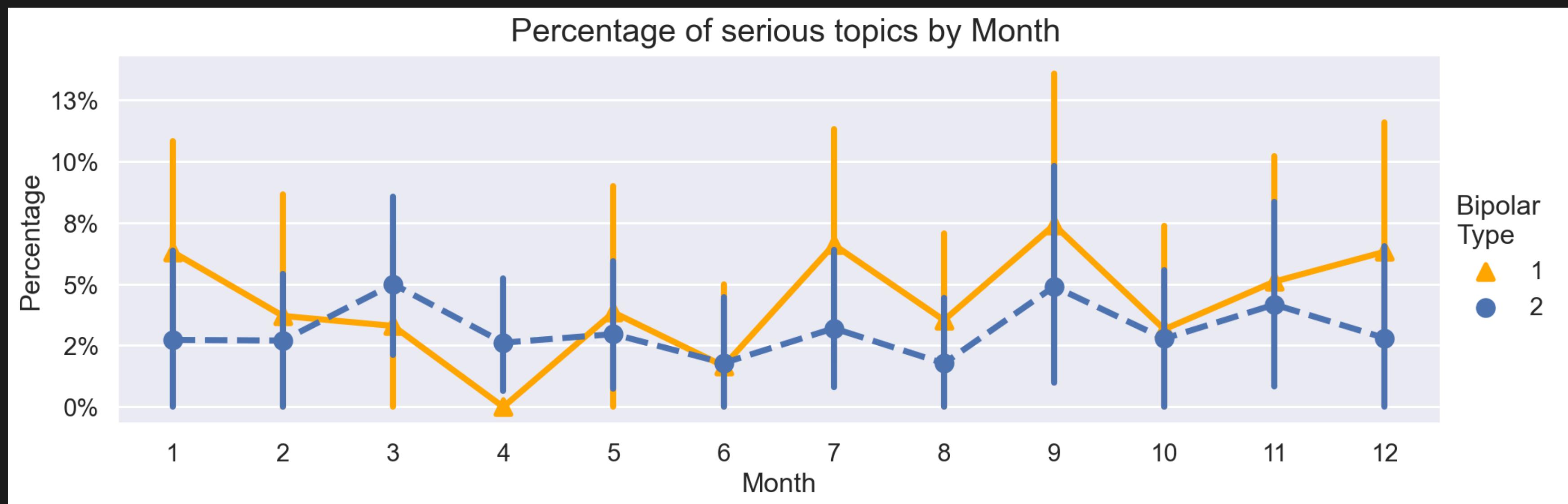
PMID: 17199100 DOI: 10.1159/000098265

## Seasonality of Suicidal Behavior

Jong-Min Woo,<sup>1,2</sup> Olaoluwa Okusaga,<sup>3,4</sup> and Teodor T. Postolache<sup>3,4,\*</sup>



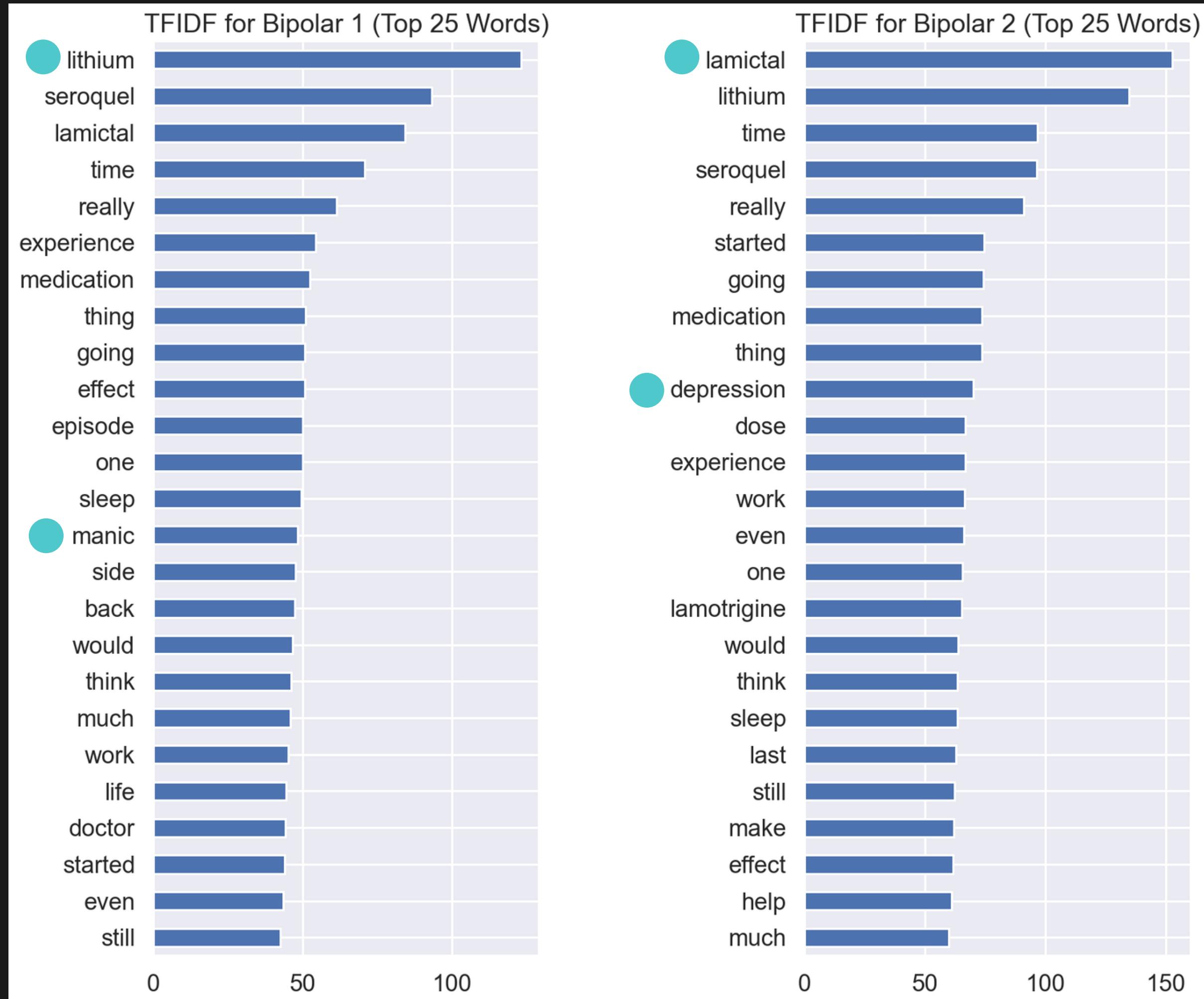
# Serious Topics by Month



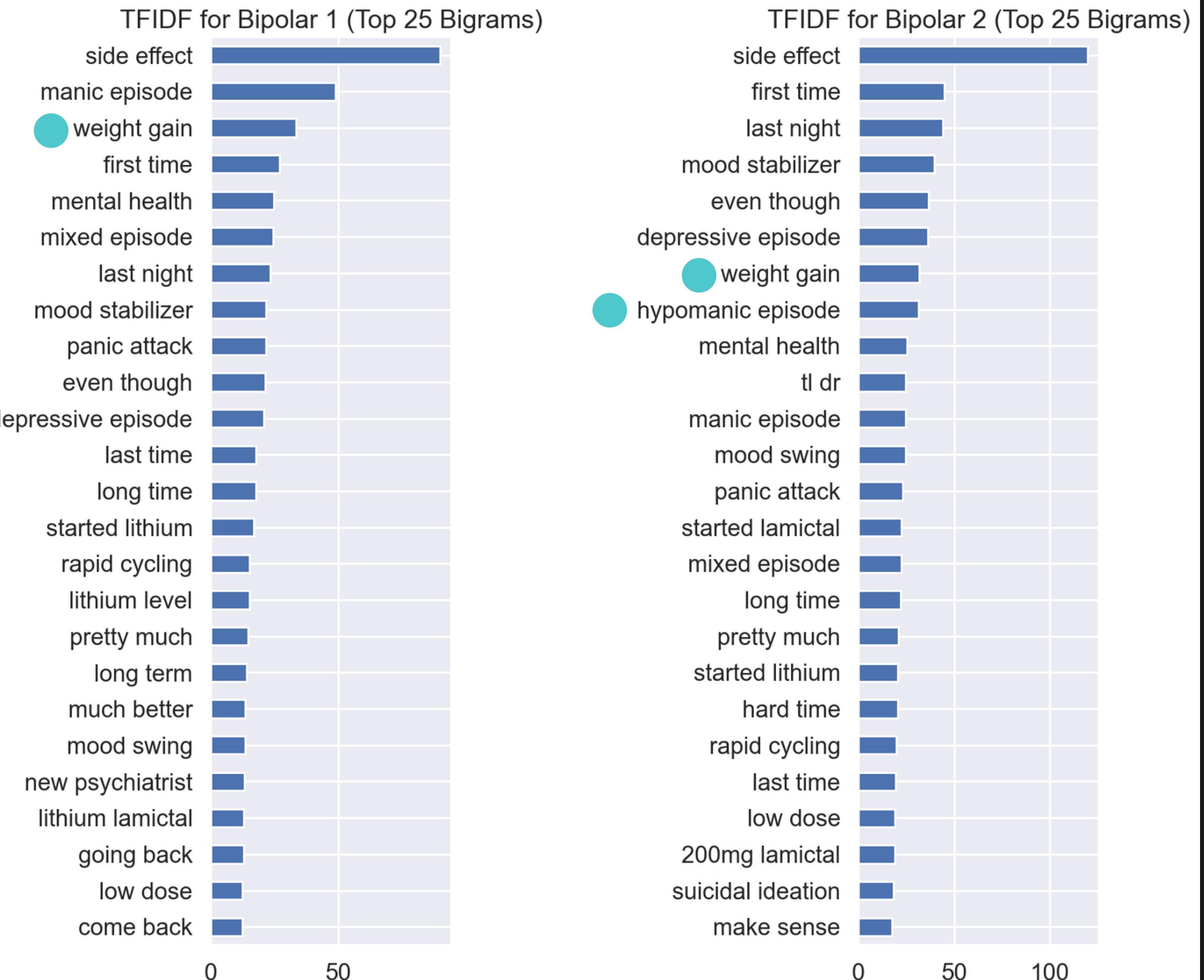
# Word Counts

Stopwords filtered

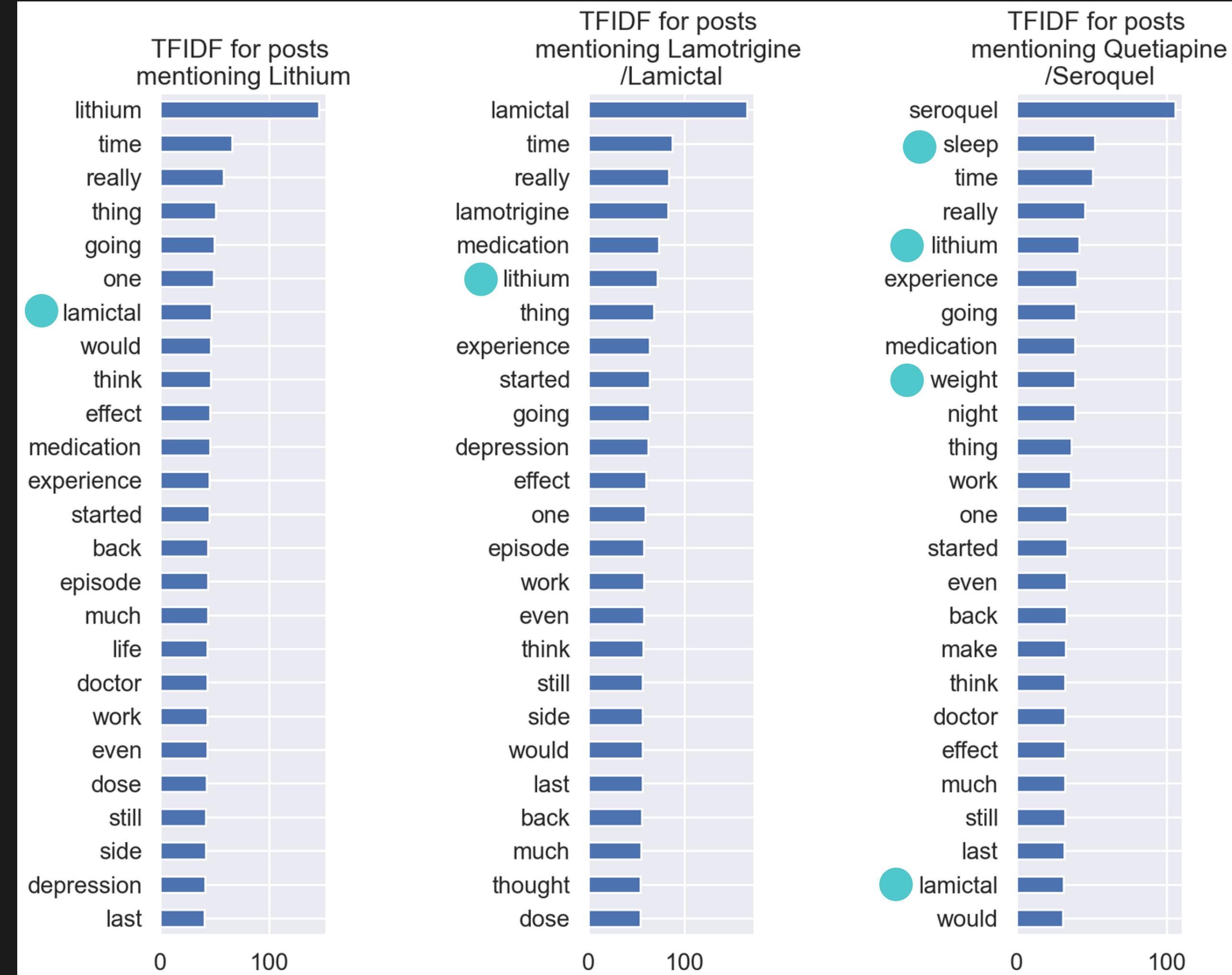
'feel', 'feeling', 'like', 'take',  
 'taking', 'go', 'get', 'got',  
 'bipolar', 'day', 'days', 'month',  
 'months', 'year', 'years', 'week',  
 'weeks', 'ago', 'med', 'meds',  
 'know', 'anyone', 'want', 'else',  
 'also', 'since'



# Bigrams



# Mood Stabilisers



" Does Seroquel make it hard to wake up? I've been extremely late for work three times since starting Seroquel. I've never had problems being late before and I'm not typically a heavy sleeper.

But lately, I could sleep through a tornado."

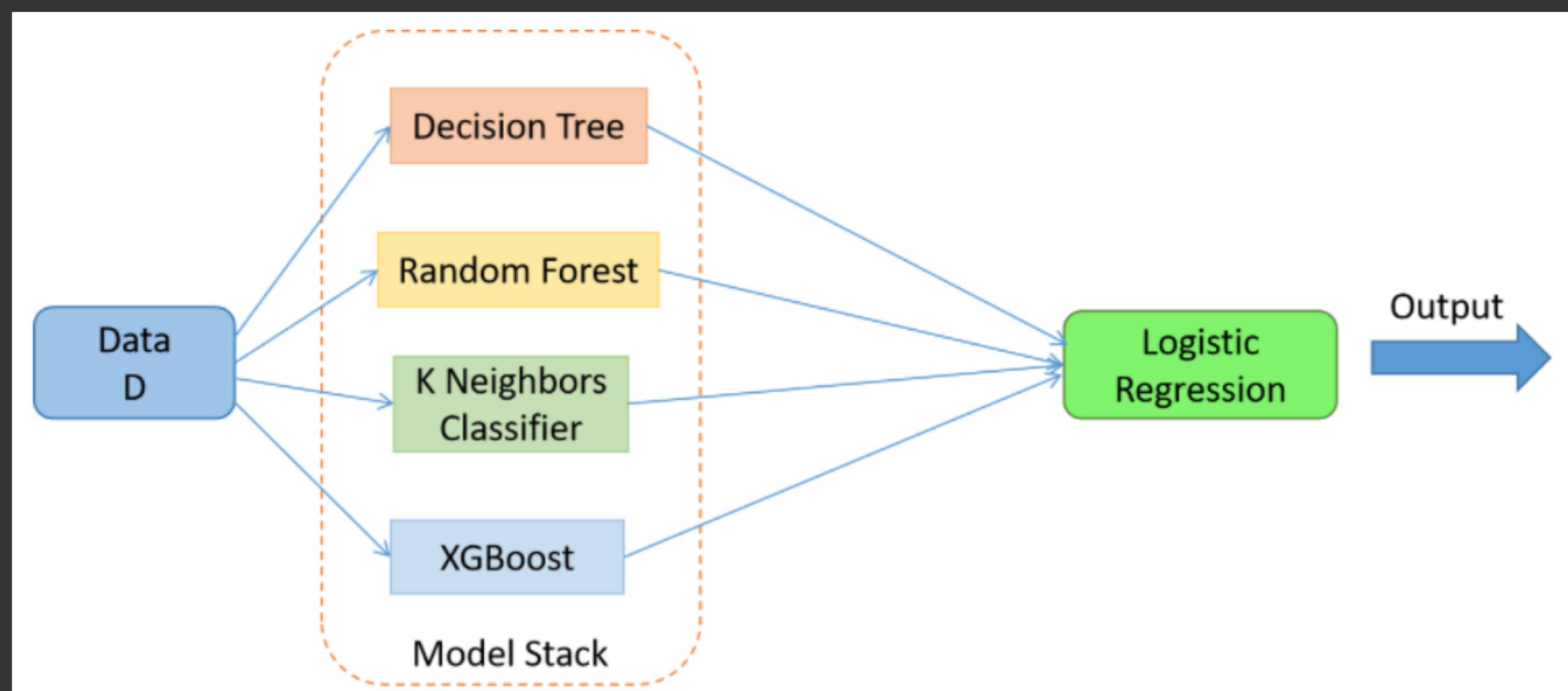
" Is it possible to gain weight from Seroquel only a week after it's being increased? I gained 6 pounds in one week. I don't understand because I feel like I am eating the exact same. Also, I am actually excessing more. The only thing that is different is that my Seroquel increased by 150mg. So now I'm taking 200mg. Please give advice, I really want to be proactive in making sure I don't gain weight. I will stop the medication if this side effect happens..."

# Modelling

Engineered features did not improve the model, so only text was used

Text was vectorised using either Count or TFIDF Vectorisation

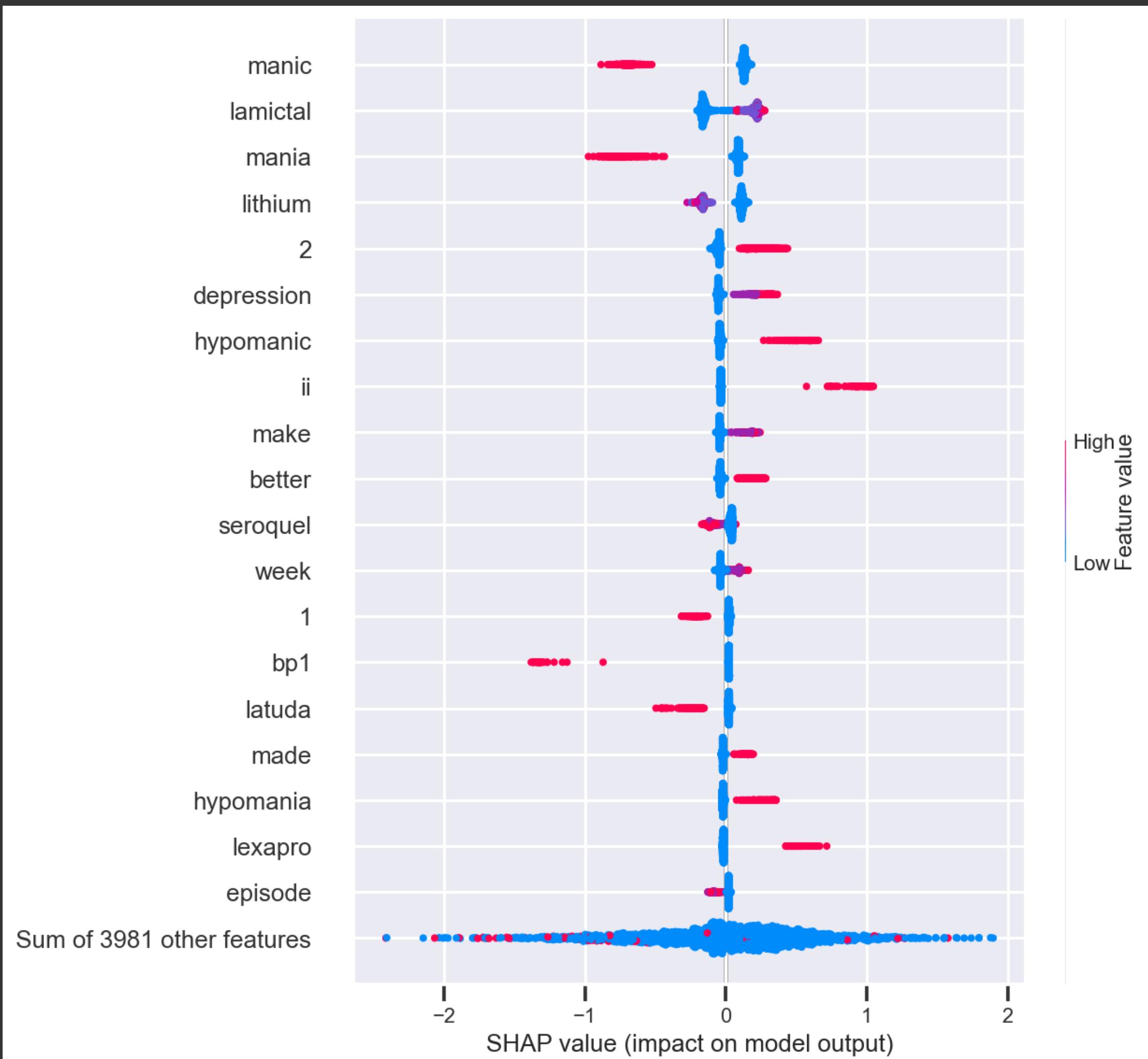
Tried stacking models



# Classifier Results

Model	Vectorization	Test Accuracy	Cross-Val Training Accuracy (5-fold)	Training Accuracy	F1 Score (Bipolar 1)	F1 Score (Bipolar 2)	ROC AUC
CatBoost Classifier	Count	0.72	0.69	0.89	0.61	0.78	0.78
Random Forest	Count	0.65	0.65	1.00	0.44	0.75	0.71
CatBoost + XGBoost + LGBM Classifiers	TFIDF	0.71	0.67	0.68	0.59	0.78	0.68
LogisticRegression + KNeighborsClassifier + DecisionTreeClassifier + SVC + MultinomialNB	TFIDF	0.69	0.65	0.99	0.03	0.73	0.71

# Feature Importances



# Key Takeaways

## Bipolar Type 1

- Monitor during April (as well as Sept-Oct)
- Effect of seasons
- Manic or mixed instability

## Bipolar Type 2

- Monitor during Aug and Oct
- Monitor on weekends
- Depression

## Both

- Weight gain is a concern
- Side effects are a general concern
- People want to compare or find out others' experiences

# Future Directions

- 01 **Different scope**  
We are only scratching the surface
- 02 **Psychoeducation**  
Q&A verified by medical professionals
- 03 **Data Labelling**  
90% of posts on the subreddit are not labelled with author subtype

# Concluding Words

Thank  
You

None	1631
Med Question	303
99 Problems/Rant/Story	124
General	123
General Question	88
Advice	55
Discussion Starter	34
Good News	22
Suicidal Thoughts Trigger	21
Caution - Suicidal Thoughts	17
Caution - Depression Trigger	15
Dangerous Behavior Warning	14
Meme	11
Drug Use	10
Caution - Manic Trigger	9
Art	6
Misleading Title	4
Interesting Link	2
Caution - Self Harm	2
Amazeballs	2
Self-Harm Trigger	2
General Question/Advice	2
STAR WARS SPOILER	1
Sexual Abuse Trigger Warning	1
Domestic Abuse Trigger Warning	1

# Defining Serious Topics

```
# List of flairs for serious topics
serious_flairs = ['Suicidal Thoughts Trigger',
                   'Caution - Suicidal Thoughts',
                   'Caution - Depression Trigger',
                   'Dangerous Behavior Warning',
                   'Drug Use',
                   'Caution - Manic Trigger',
                   'Caution - Self Harm',
                   'Self-Harm Trigger',
                   'Sexual Abuse Trigger Warning',
                   'Domestic Abuse Trigger Warning']
```

0	2408
1	92

# Confusion Matrix

