Bipolar Disorder and Mood Stabilisers

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

Eric Lim

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.

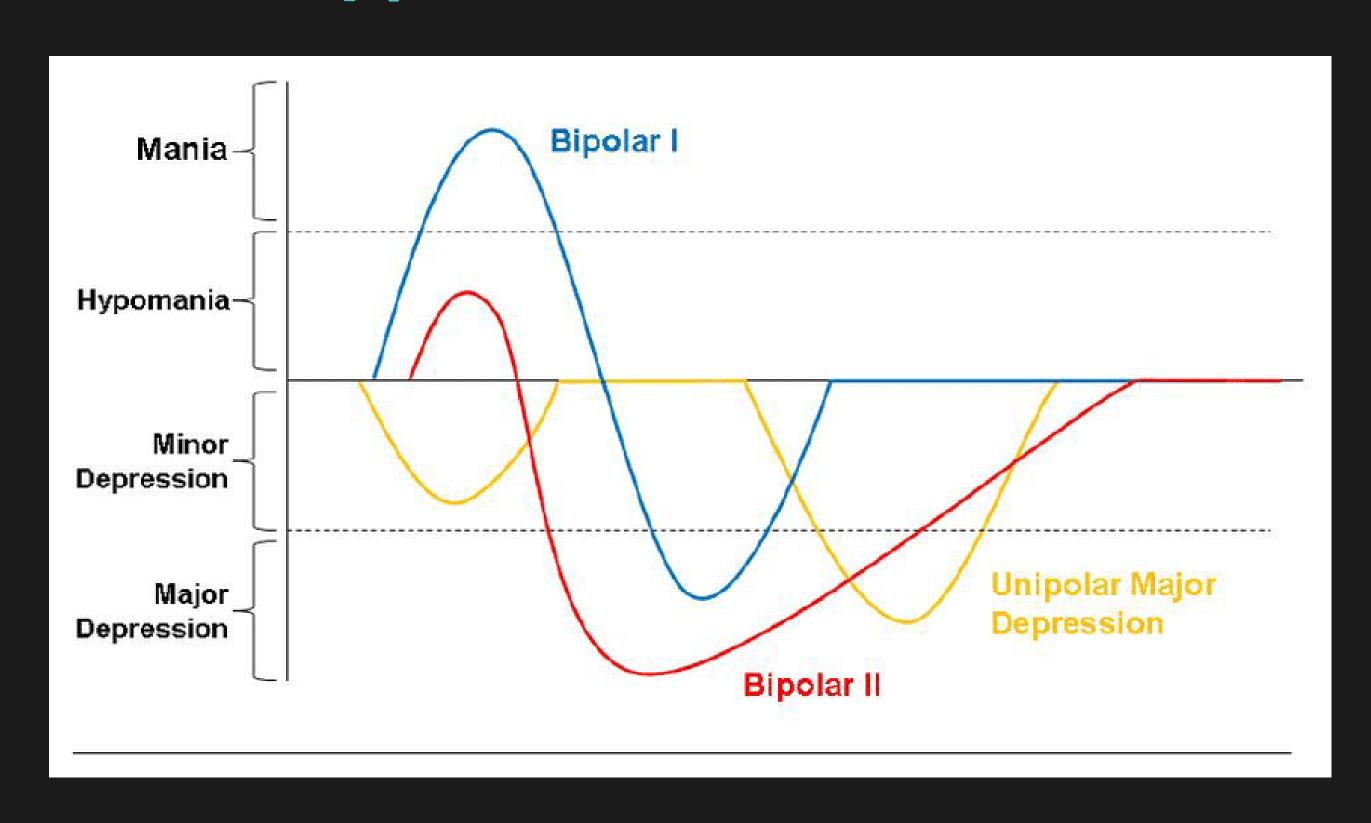Bipolar Disorder – Fact Sheet, Treatment Advocacy Center

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

Mood Stabilisers

The mainstay of bipolar treatment

Lithium

A salt, lithium carbonate. Used since 1948.

Lamotrigine (Lamictal)

An anticonvulsant. Originally used to treat seizures.

Quetiapine (Seroquel)

An antispsychotic. Also used to treat schizophrenia.

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 explictly declared their bipolar subtype
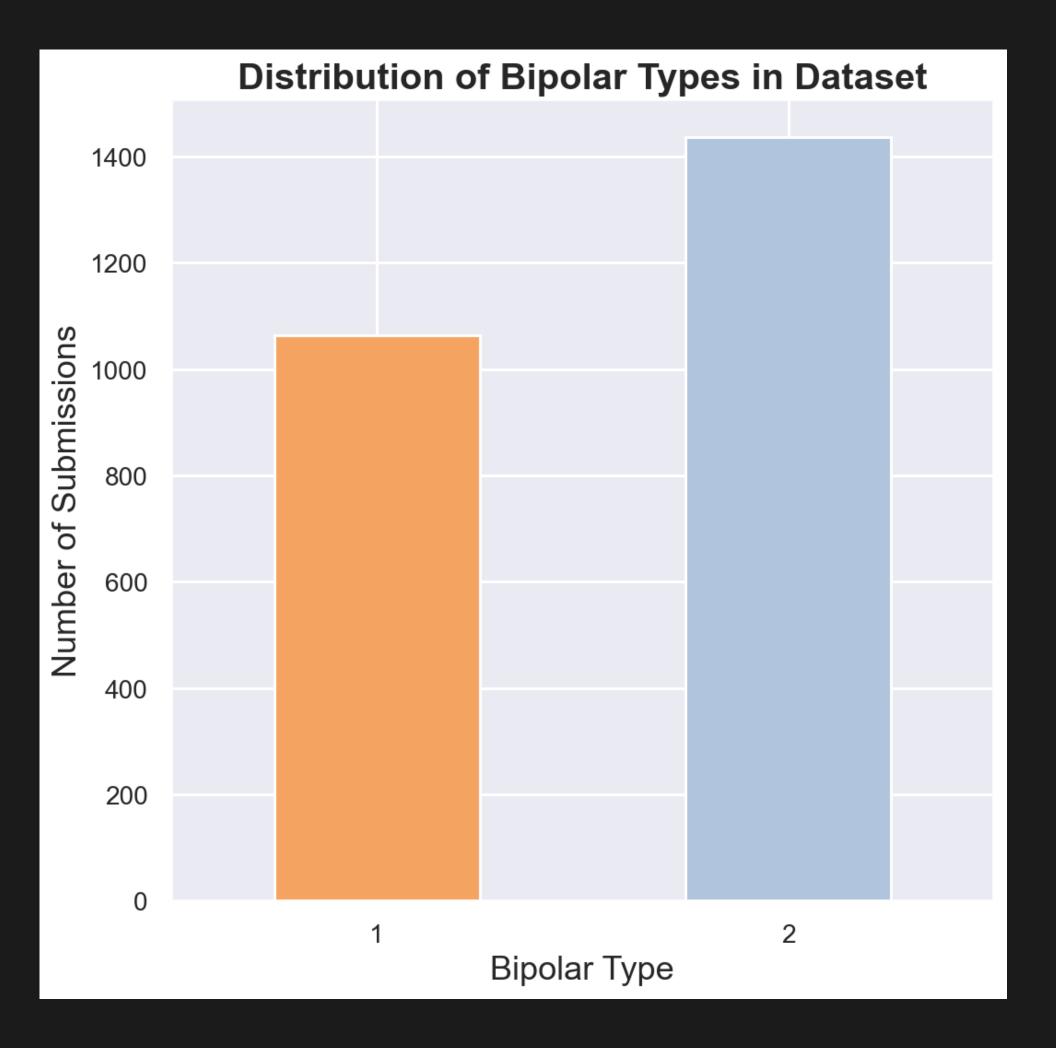
CLASSIFICATION OF POSTS
ACCORDING TO SUBTYPE
(MIN. 70% ACCURACY)

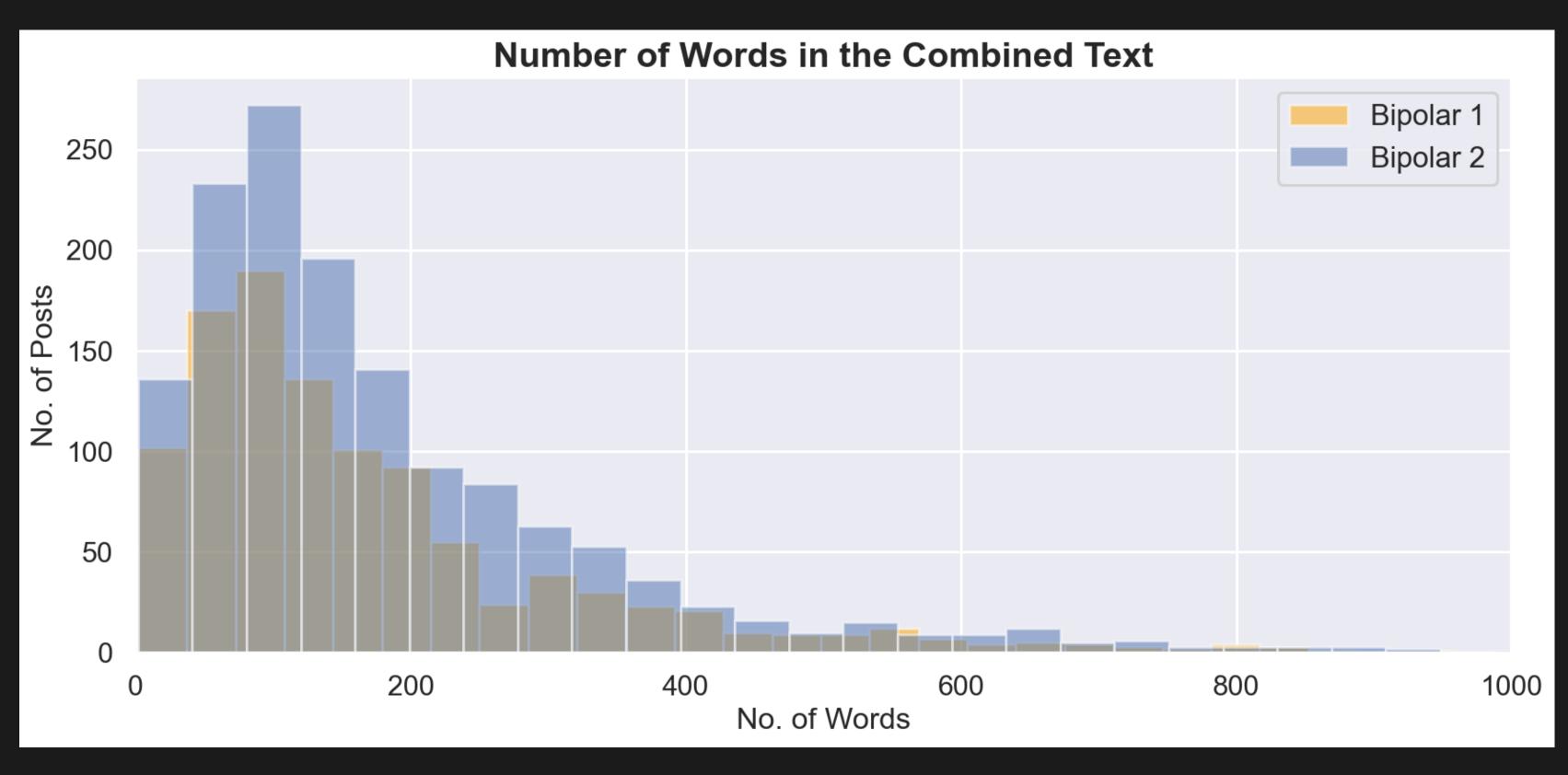Authors have only declared their subtype for ~10% of posts on r/bipolar

TARGET AUDIENCE

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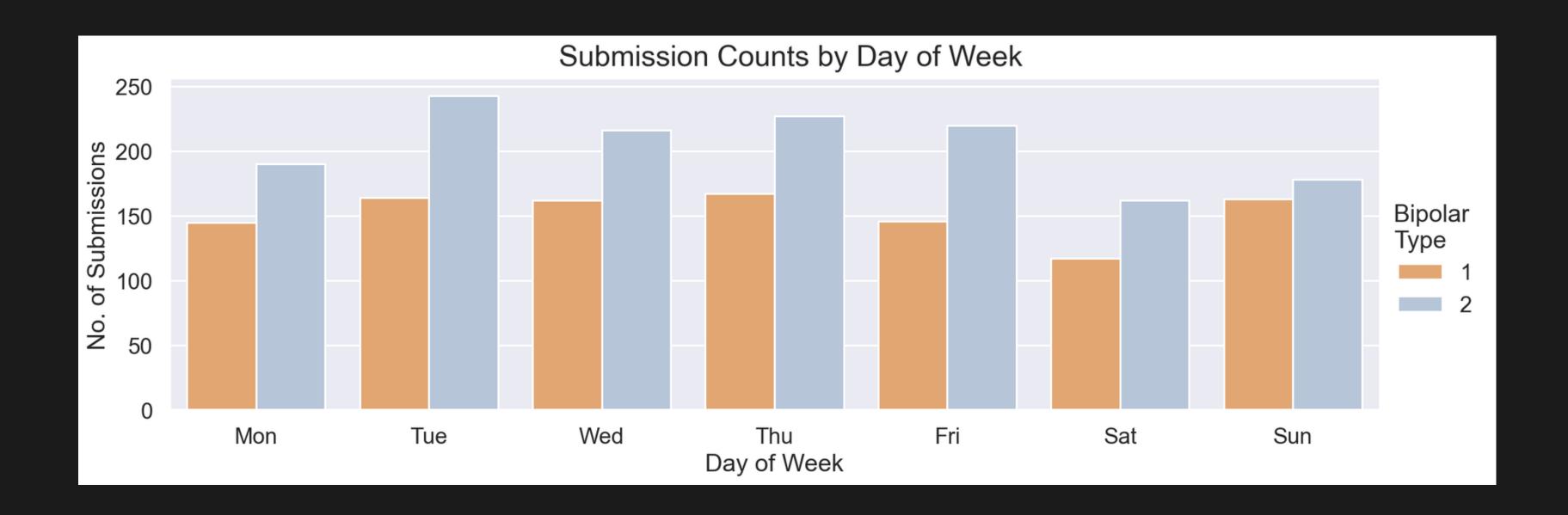
Bipolar Subtypes

Length of text
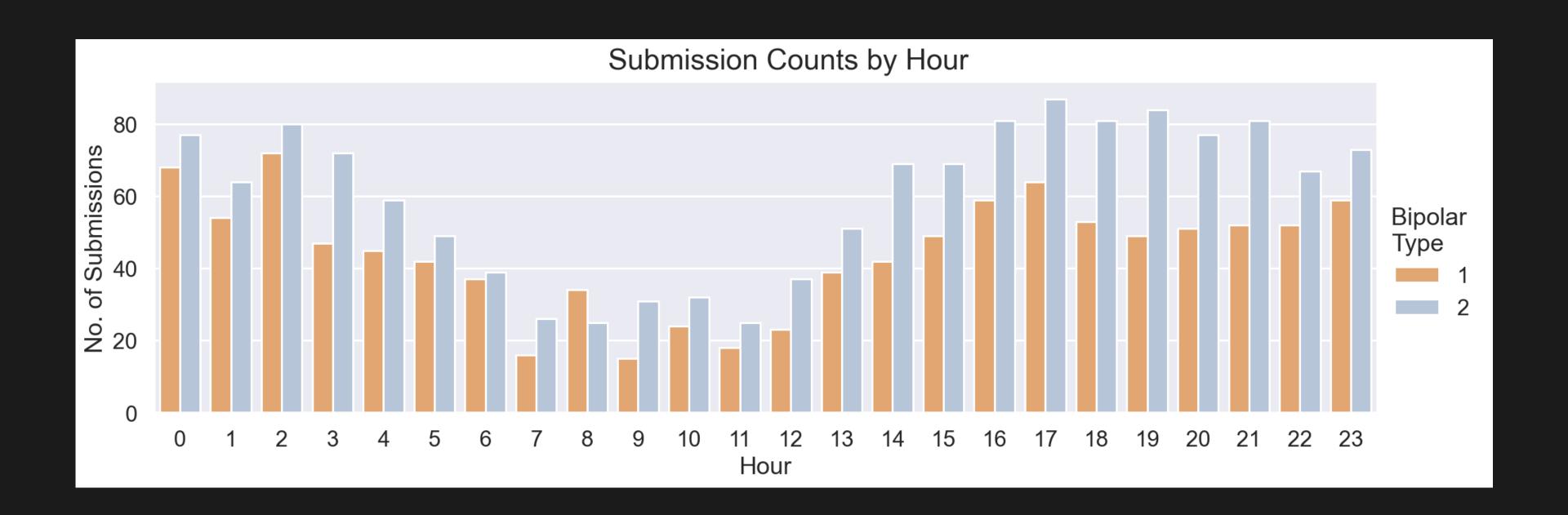
Number of Words in the Combined Text

Counts by Day of Week
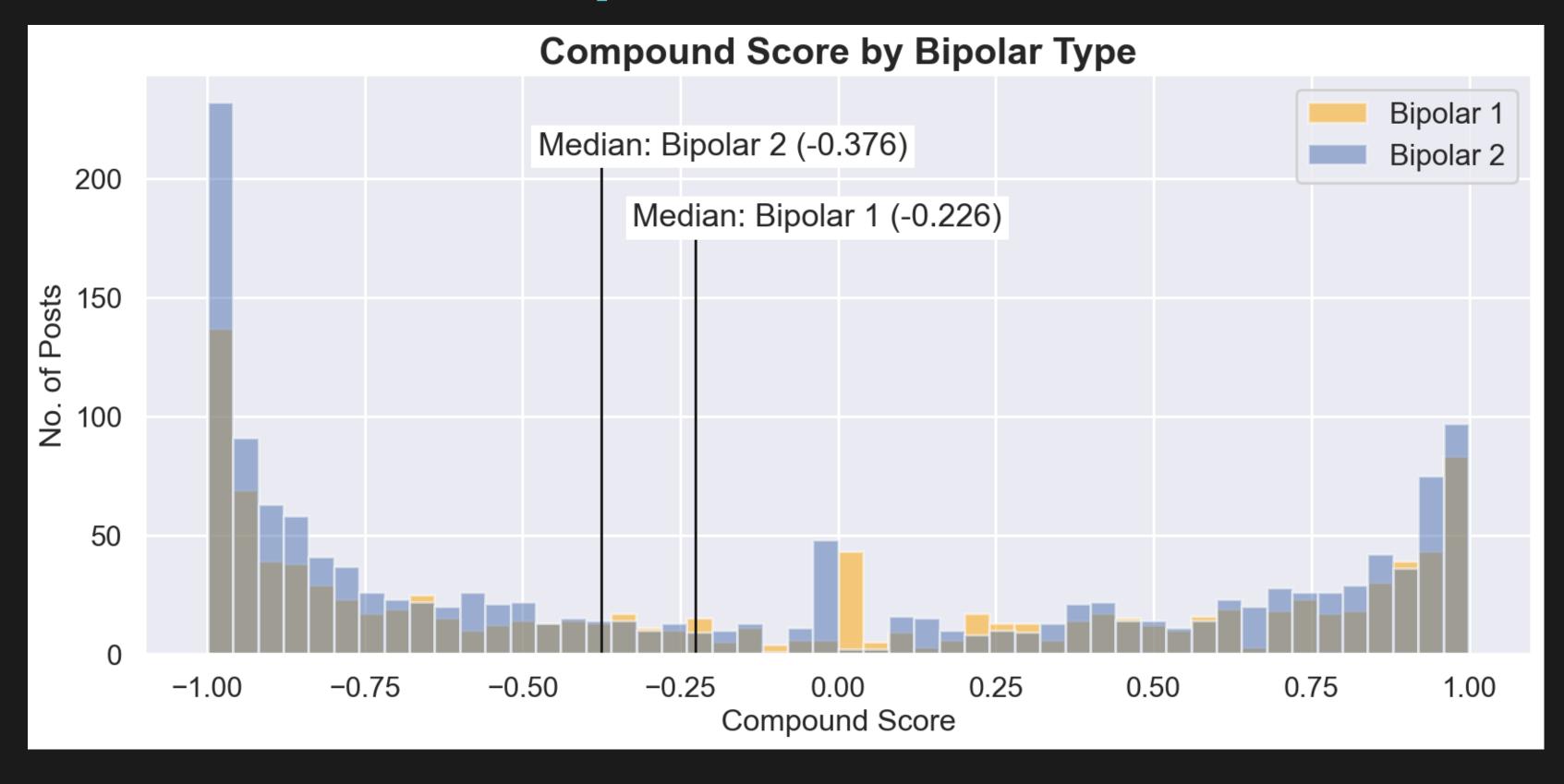
Submission Counts by Day of Week

Counts by Hour
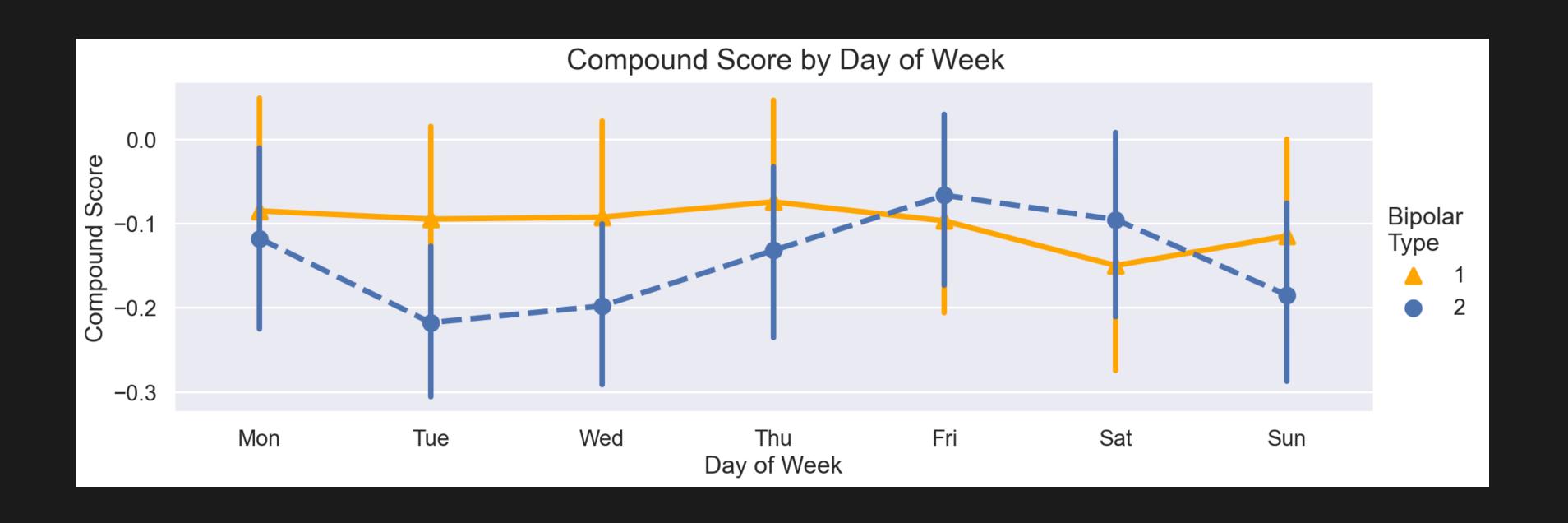
Submission Counts by Hour

Sentiment Analysis

Compound Score by Bipolar Type
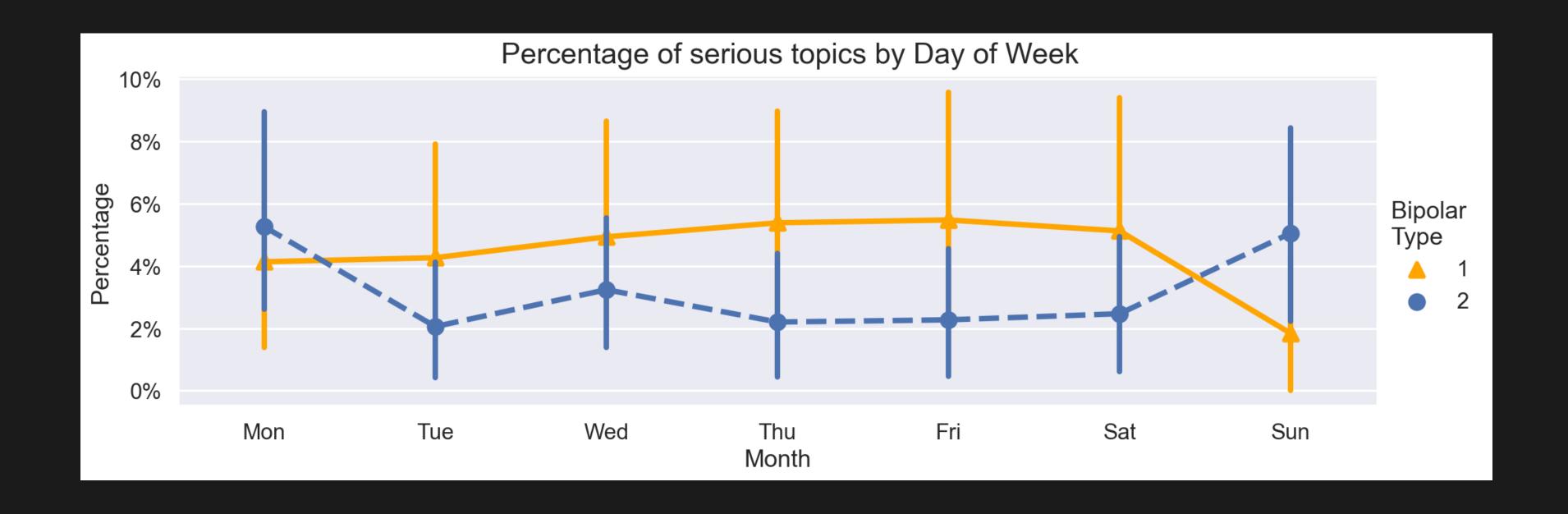
Sentiment Analysis by Day of Week

Compound Score by Day of Week

Serious Topics by Day of Week

Percentage of 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

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Symptoms of mental illness often become worse during the spring season.
disorders, the phrase "spring fever" has a different meaning. Previous studi
incidence of mania peaks during the spring in both the Northern and South
studies have indicated that suicide rates also peak during the spring season
the sudden increase in the duration and amount of sunlight is a possible cau

Seasonality of Suicidal Behavior

Jong-Min Woo,[1,2] Olaoluwa Okusaga,[3,4] and Teodor T. Postolache[3,4,*]

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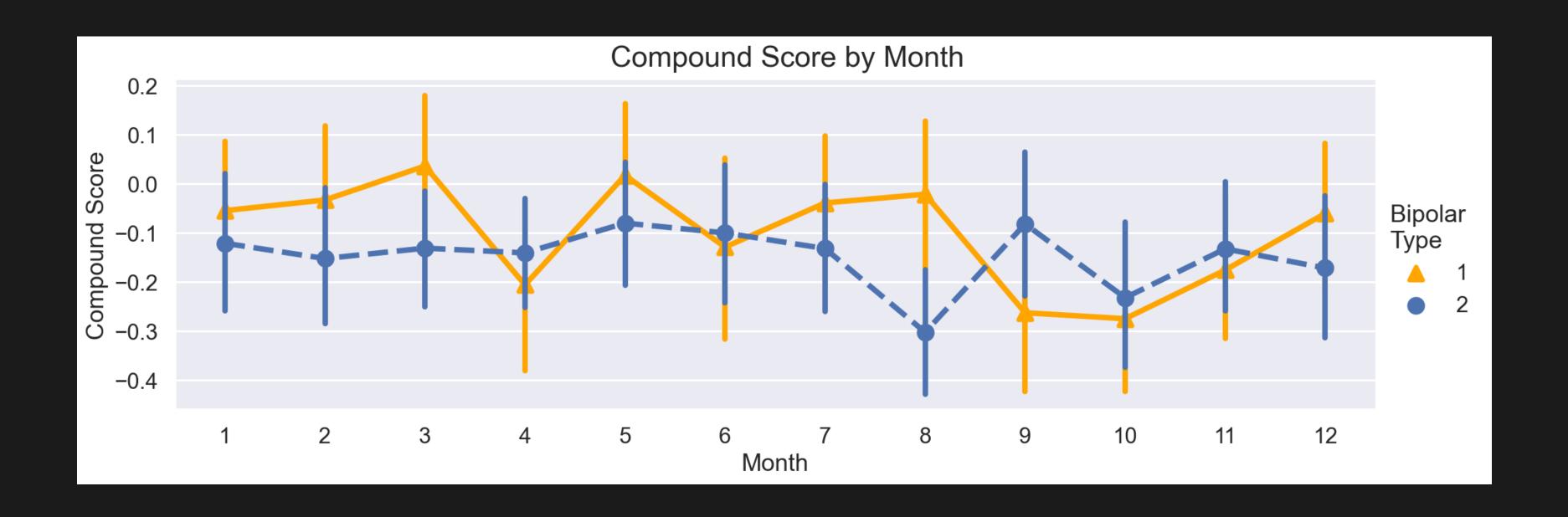
Abstract

A seasonal suicide peak in spring is highly replicated, but its specific cause is unknown
literature on suicide risk factors which can be associated with seasonal variation of suic
published articles from 1979 to 2011. Such risk factors include environmental determin
physical, chemical, and biological factors. We also summarized the influence of potent
clinical characteristics such as age, gender, month of birth, socioeconomic status, meth

Sentiment Analysis by Month

Compound Score by Month

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

Anniina Lahti [1], Pirkko Räsänen, Kaisa Karvonen, Terttu Särkioj Helinä Hakko

Affiliations + expand

Seasonality of Suicidal Behavior

Jong-Min Woo,[1,2] Olaoluwa Okusaga,[3,4] and Teodor T. Postolache[3,4,*]

Serious Topics by Month

Percentage of serious topics by Month

Word Counts

Stopwords filtered

TFIDF for Bipolar 1 (Top 25 Words)

- lithium
- seroquel
- lamictal
- time
- really
- week
- experience
- medication
- thing
- going
- effect
- one
- episode
- sleep
- manic
- side
- back
- would
- think
- much
- work
- feeling
- life
- doctor
- year

TFIDF for Bipolar 2 (Top 25 Words)

- lamictal
- lithium
- seroquel
- time
- really
- week
- thing
- medication
- going
- started
- depression
- experience
- even
- work
- dose
- one
- since
- lamotrigine
- would
- think
- sleep
- still
- make
- last
- got

Bigrams

TFIDF for Bipolar 1 (Top 25 Bigrams)

side effect
manic episode
weight gain
first time
last night
week ago
mood stabilizer
mixed episode
mental health
year ago
even though
panic attack
month ago
depressive episode
two week
day ago
last time
long time
started lithium
rapid cycling
pretty much
last week
lithium level
much better
long term

TFIDF for Bipolar 2 (Top 25 Bigrams)

side effect
first time
last night
mood stabilizer
week ago
depressive episode
year ago
even though
last week
two week
weight gain
hypomanic episode
month ago
mental health
day ago
tl dr
panic attack
manic episode
mood swing
started lamictal
mixed episode
long time
pretty much
since started
hard time

Mood Stabilisers

TFIDF for posts mentioning Lithium

lithium
time
really
week
thing
going
one
🔵 lamictal
would
since
effect
medication
think
experience
doctor
back
much
started
feeling
episode
work
got
life
side
even

0   100

TFIDF for posts mentioning Lamotrigine /Lamictal

lamictal
time
lamotrigine
really
week
medication
🔵 lithium
thing
experience
started
going
depression
effect
one
since
even
work
think
episode
side
still
would
back
last
much

0   100

TFIDF for posts mentioning Quetiapine /Seroquel

seroquel
🔵 sleep
time
really
🔵 lithium
experience
going
night
🔵 weight
medication
week
thing
work
even
started
back
one
make
think
still
doctor
much
got
effect
last

0   100

"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..."

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
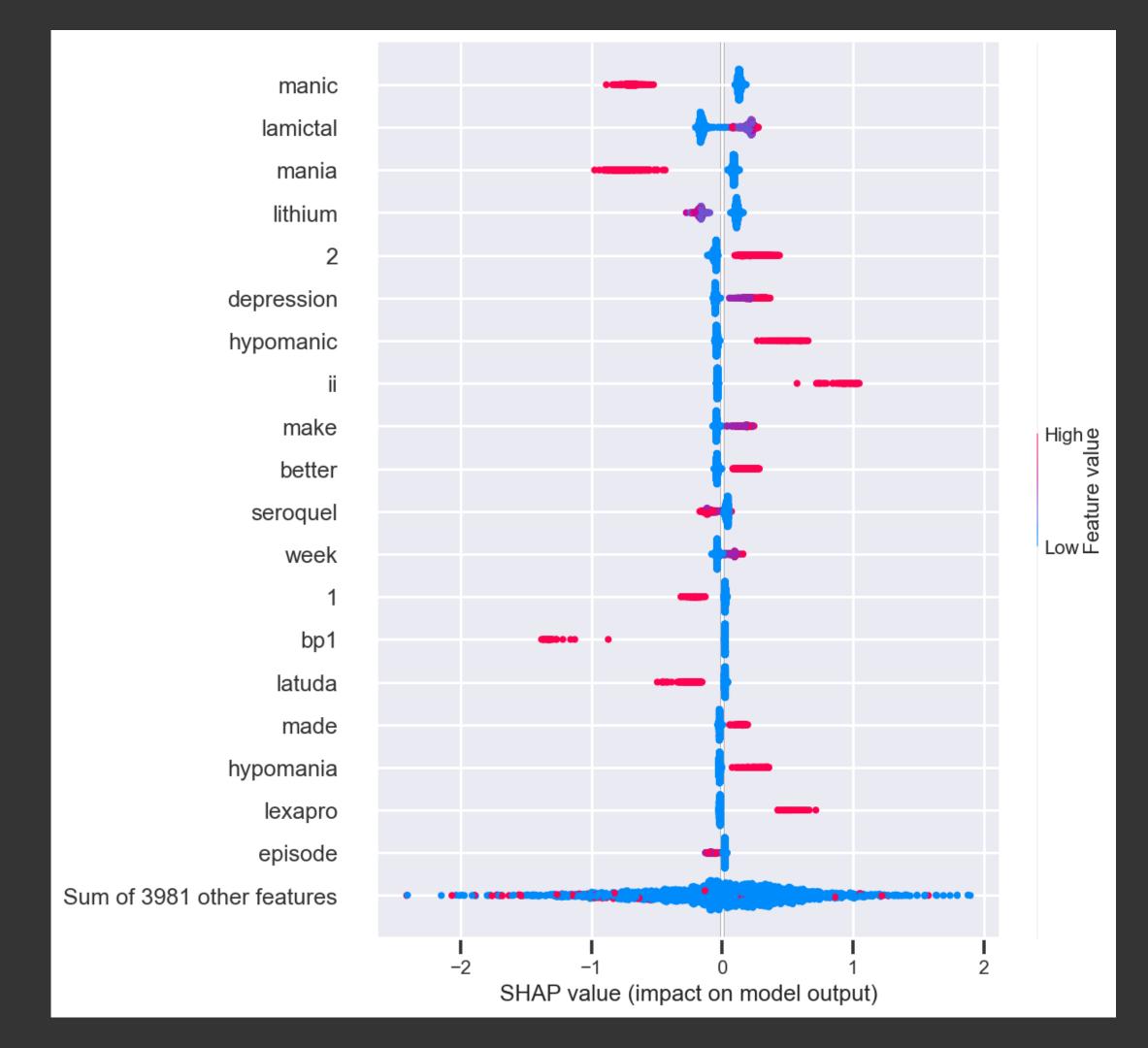
In-person support groups

Remain untreated

Stigma

Cost

Modelling 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

Key Takeaways

Bipolar Type 1

- Monitor during April (as well as Sept-Oct)
- 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

Thank You

Confusion Matrix