Assessing ADHD from Tweets

Sharath C. Guntuku

Guntuku, S. C., Ramsay, J. R., Merchant, R. M., & Ungar, L. H. (2017). Language of ADHD in Adults on Social Media. *Journal of attention disorders*, 1087054717738083.

Motivation

Prevalence of ADHD	4.4% (8 million adults in US)
Male/Female Odds Ratio	1.6
Persons with ADHD symptoms who received a clinical diagnosis	~50% [Kessler et. al, 2006]
Persons who received a diagnosis and are in treatment	10% [Chamberlain et. al, 2016]

ADHD is underdiagnosed in Adults!?

Motivation

Challenges in diagnosis

Personal and societal stigma associated with getting a diagnosis.
[Asherson et al, 2012]

Educating healthcare professionals about appropriate screening and diagnostic evaluation strategies.

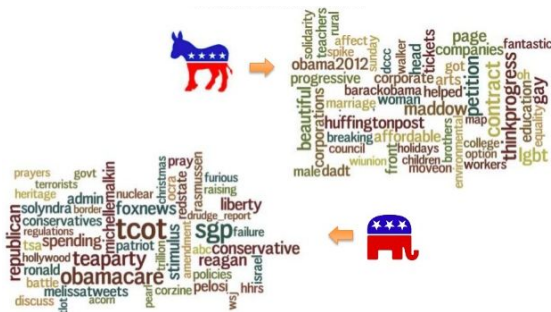# Motivation

Social media is shown to predict:

Gender

Age

Personality

OPENNESS   CONSCIENTIOUSNESS

THE BIG FIVE

NEUROTICISM   EXTRAVERSION

AGREEABLENESS

Political Orientation

Socio Economic Status

Goal

What does social media reveal about users with ADHD?

Specifically:

1. What do users with ADHD talk about?
2. What is the relationship b/w ADHD and other traits (personality & temporal orientation)?
3. Can we predict if symptoms associated with ADHD are present in a user or not based on their social media data?

Data Collection

Examples of
public statements

User A

I was diagnosed with ADHD in .. grade and ... the damage was done. I never trusted them ... never sought ... anyone's help.

User B

… I started smoking weed its keeps me calm and from killing ppl I was diagnosed with ADHD to why I', so lit...

Data Collection

Examples of
public statements

User A

I was diagnosed with ADHD in .. grade and ... the damage was done. I never trusted them ... never sought ... anyone's help.

User B

… I started smoking weed its keeps me calm and from killing ppl I was diagnosed with ADHD to why I', so lit...

Gathered public statements of diagnosis of ADHD (retrieved 1900 users) on Twitter

↓

Manually **verified** the **authenticity of diagnosis statements** and filtered spam/advertisements etc. (left with **1399 users**)

↓

Downloaded 3200 most recent tweets from each user (total of **1.3 million tweets**) using **Twitter API.**
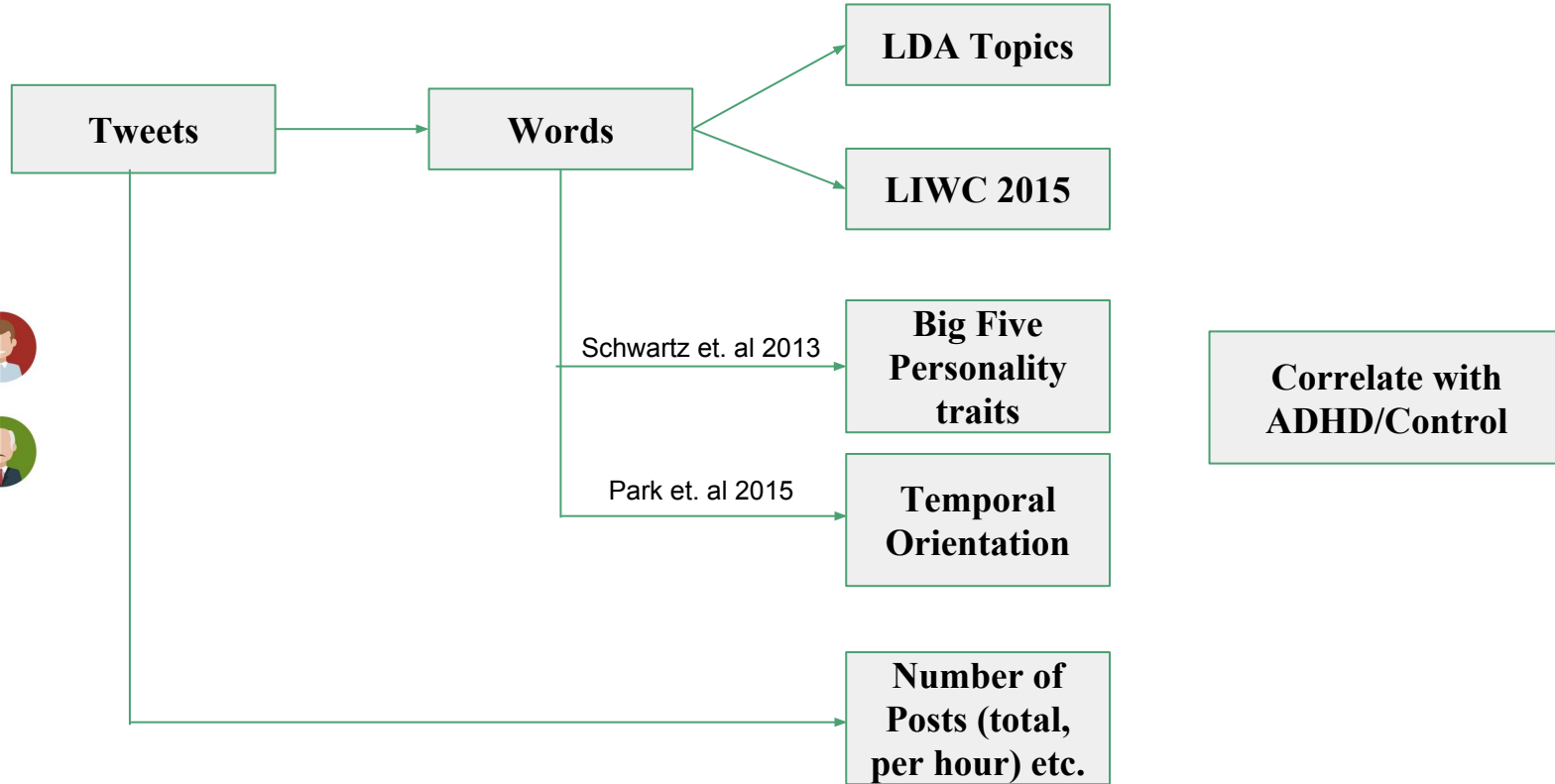
↓

Discarded re-tweets, and non-English/non-US tweets. **Restricted posting period** to 1st January 2012 to 30th October 2016.

↓

Matched with a control group of users based on age, gender and posting period.

Data

	ADHD (1024)	Control (1024)
Age		
-- Min -- Max -- Avg	15 yrs 45 yrs 23 yrs	15 yrs 45 yrs 23 yrs
Num. Females	637	639

Language Processing

Correlation with words and phrases

Correlation with Topics

Correlation with Topics

Emotional Dysregulation

Faraone et al. 2015;
Surman et al. 2011

Self-Criticism

Knouse, et. al., 2013

Exhaustion

Rogers, et. al., 2017

Anxiety

Substance (Ab)use

Mitchell, et al., 2016

Correlations with LIWC

Cognitive Processes		Pearson *r*
Insight	think, know, consider	0.56
Tentative	maybe, perhaps, guess	0.45
Differentiation	hasn't, but, else	0.42

Affective Processes		Pearson *r*
Anger	hate, kill, pissed	0.52
Negative Emotions	hate, worthless, enemy	0.49
Anxiety	nervous, afraid, tense	0.30
Sadness	grief, cry, sad	0.11

All correlations are Simes corrected, p<0.05

Correlation with other traits

Big-Five Personality	
Openness	*0.22*
Agreeableness	-0.27
Conscientiousness	*-0.07*
Extraversion	*-0.04*
Neuroticism	*-0.07*

Temporal Orientation	
Present	-0.05
Past	0.2
Future	-0.16

Number of Posts	*0.53*

(Gomez & Corr, 2014; Van Dijk et al., 2017)

Pearson r, Simes corrected, p<0.05

Diurnal Posting Frequency
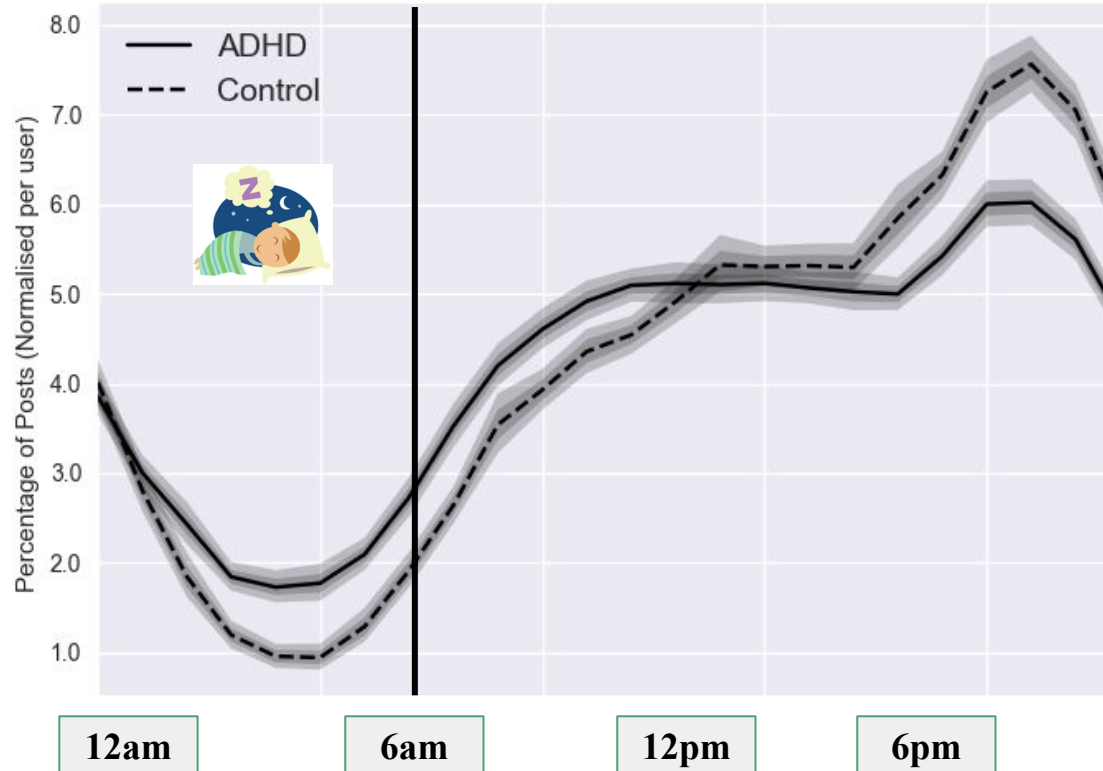
Predicting ADHD from language
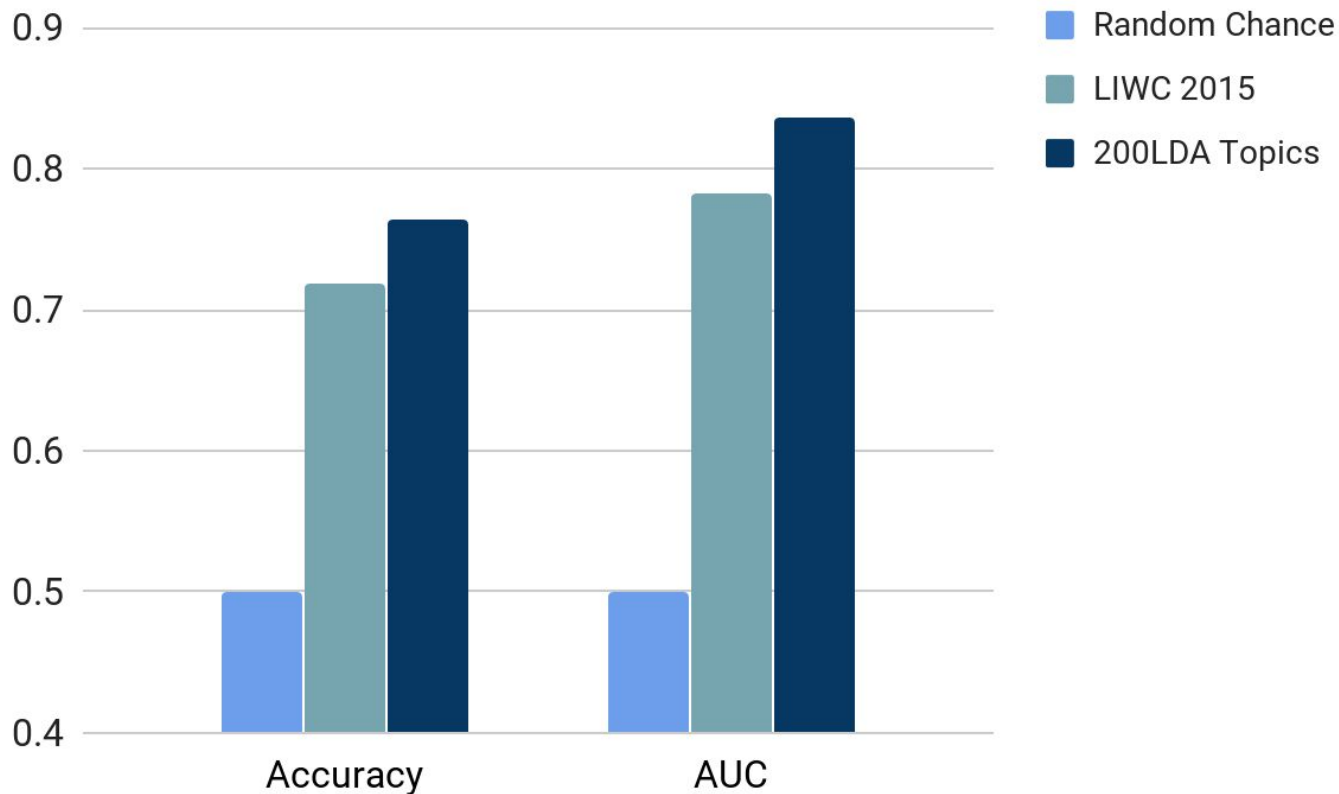
Conclusion and Future Work

Twitter can reveal quite a bit about people with ADHD
- tweet out messages related to self-criticism and lack of self-regulation
- post more about the past, and late at night between 12am-6am.

Conclusion and Future Work

Twitter can reveal quite a bit about people with ADHD
- tweet out messages related to self-criticism and lack of self-regulation
- post more about the past, and late at night between 12am-6am

Going forward
- Developing simple intervention and personalized feedback tools monitoring ADHD symptoms based on their social media activity.
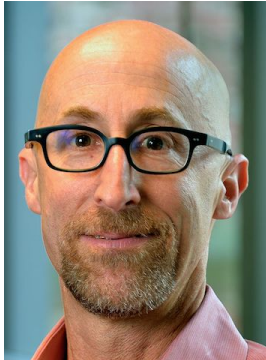
Thank you!

Sharath Chandra Guntuku
sharathg@sas.upenn.edu
@sharathguntuku

Guntuku, S. C., Ramsay, J. R., Merchant, R. M., & Ungar, L. H. (2017). Language of ADHD in Adults on Social Media. *Journal of attention disorders*, 1087054717738083.