

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



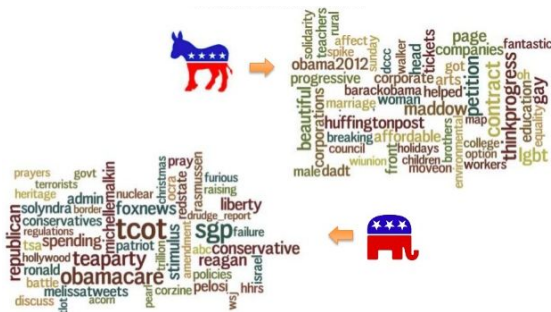
Age



Personality



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

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



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**.

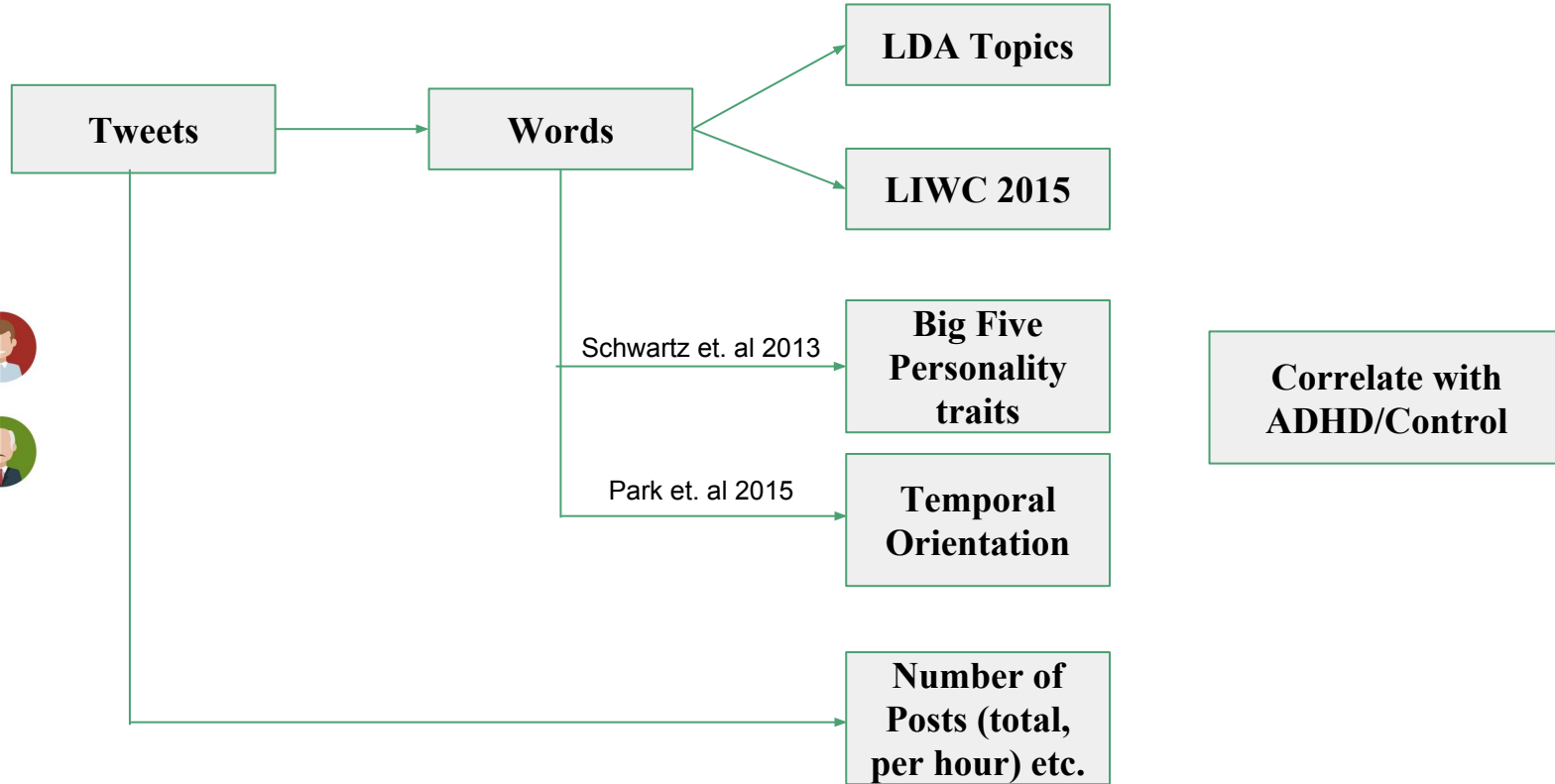
Discarded re-tweets, and non-English/non-US tweets.
Restricted posting period to 1st January 2012 to 30th October 2016.

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

Data

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

Language Processing



Correlation with words and phrases



Correlation with Topics

Emotional Dysregulation

f**king
crap
hell
f**k
piece
actual
f**ked
s**t
trash
outta
shut
bulls**t
fucks
sake

Self-Criticism

low
key
human
high
amount
level
quality
expectations
confidence
ability
form
higher

lose
losing
lost
business
crazy
mentally
minds
ill
mind
control
emotionally
wouldn't
completely
blown
ed

point
difference
happening
reason
that's
there's
wrong
problem
what's
problems
whats
word
worse
isn't
blah

Exhaustion

judge
dont
matter
exist
talk
doesn't
honestly
worry
understand
care
anymore
don't
forget
bother
act

Anxiety

hope
scared
happen
you'll
won't
i'll
die
end
afraid
death
regret
panic
doubt
attack

Substance (Ab)use

cigarette
smells
smoking
weed
smell
smoked
drink
roll
blunt
air
quit
crack
breath
cigarettes

Correlation with Topics

Emotional Dysregulation

Faraone et al.
2015;
Surman et al.
2011

f**king
crap
hell
f**k
piece
actual
fucks
bulls
shut
trash
outta
sake
f**k
t

Self-Criticism

Knouse, et. al.,
2013

levels
point
amount
level
quality
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low
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Exhaustion

Rogers, et. al.,
2017

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Anxiety

attack
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Substance (Ab)use

Mitchell, et al.,
2016

cigarette
cigarettes
smells
blunt
air
quit
crack
breath
smoking
weed
smoke
smell
smoked
drink
roll

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	
<i>Openness</i>	<i>0.22</i>
<i>Agreeableness</i>	<i>-0.27</i>
Conscientiousness	<i>-0.07</i>
Extraversion	<i>-0.04</i>
Neuroticism	<i>-0.07</i>

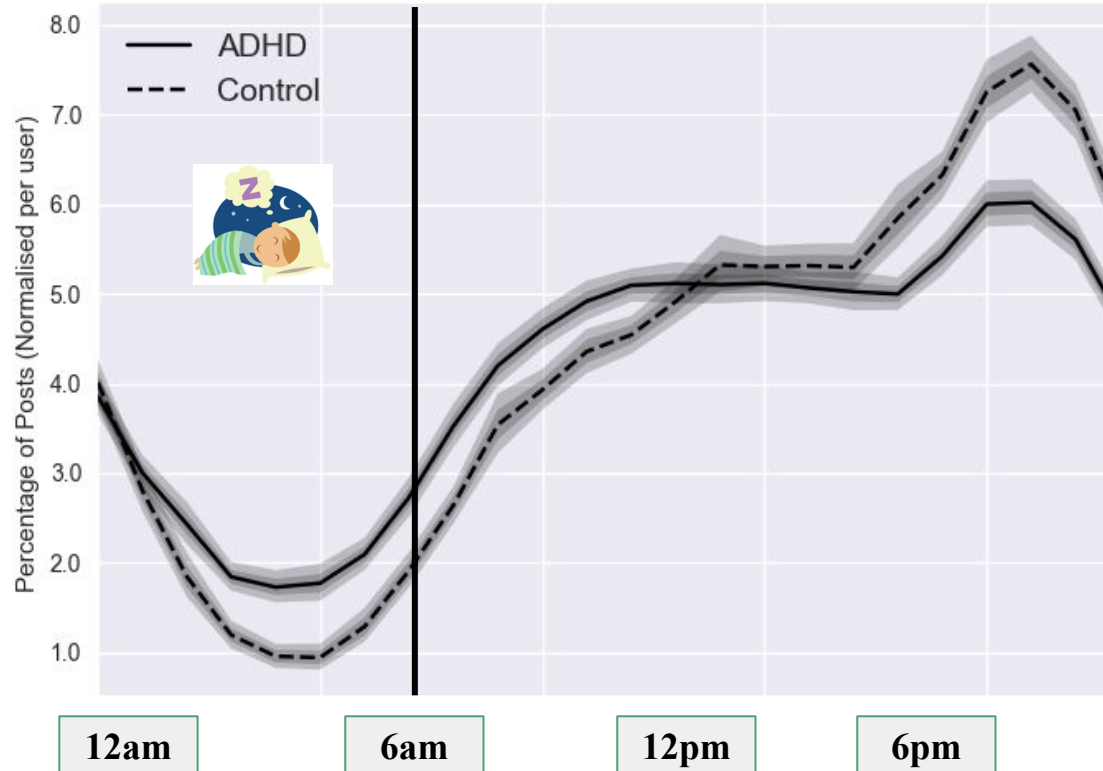
(Gomez & Corr, 2014; Van Dijk et al., 2017)

Temporal Orientation	
Present	-0.05
Past	0.2
Future	-0.16

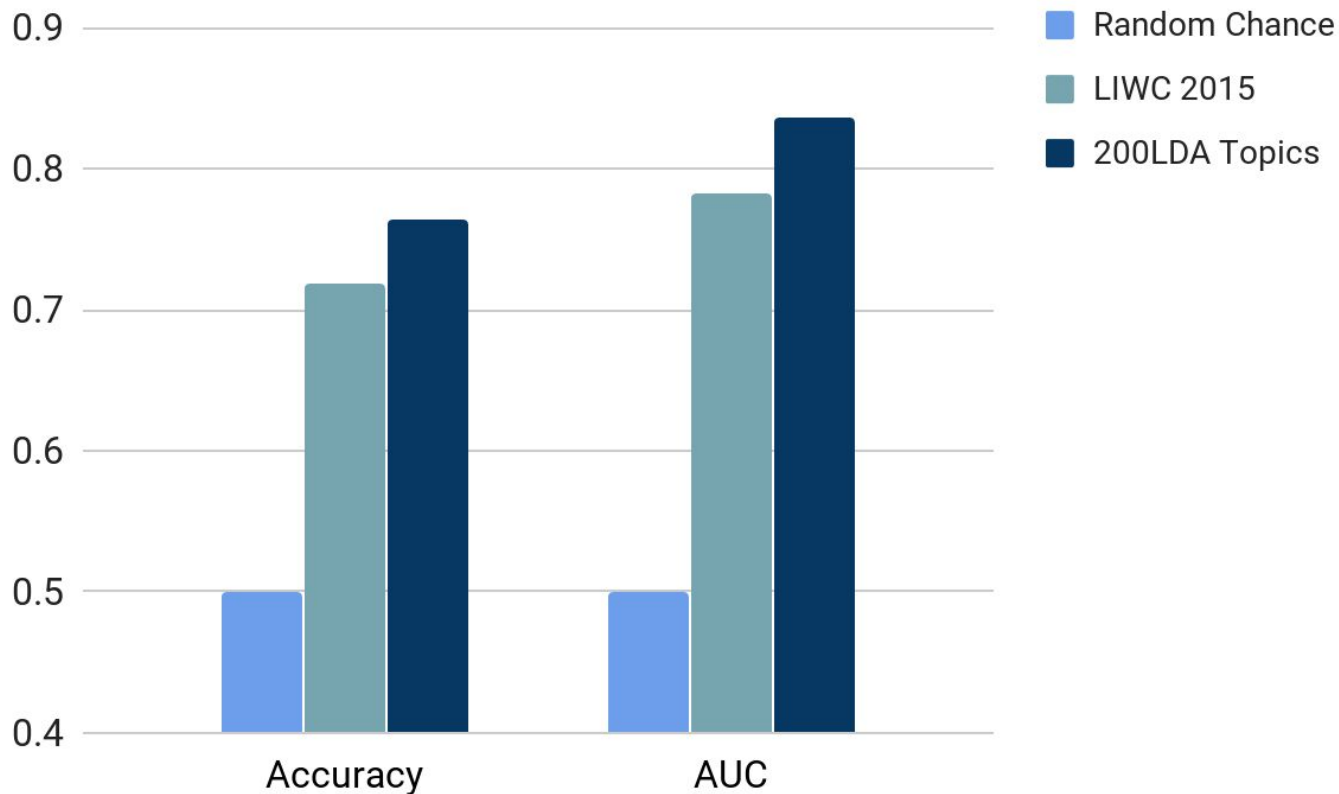
Number of Posts	<i>0.53</i>
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Pearson r, Simes corrected, $p < 0.05$

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.

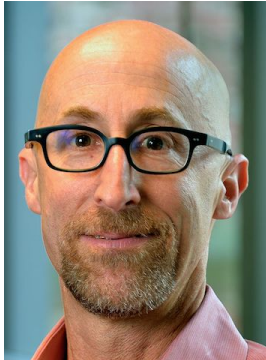
Conclusion and Future Work

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Going forward

- Developing simple intervention and personalized feedback tools monitoring ADHD symptoms based on their social media activity.



Thank you!



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