

A nighttime photograph of a college campus. In the background, several tall, illuminated buildings with spires are visible against a dark sky. The middle ground shows a large, open lawn with many trees. In the foreground, a large group of students is gathered, some sitting on the grass and others standing, looking towards the camera or each other. The overall scene is dimly lit, with the primary light sources being the campus buildings and streetlights.

Modeling Stress with Social Media Around Incidents of Gun Violence on College Campuses

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Georgia Tech

Saha, K., & De Choudhury, M. (2017). Modeling stress with social media around incidents of gun violence on college campuses. *Proceedings of the ACM on Human-Computer Interaction*, 1(CSCW), 92., <https://dl.acm.org/citation.cfm?id=3134727>



Situated Communities



Mental Health Crisis Affects both individual and collective wellbeing

“3 out of 4 college students say they’re stressed!”

Liu, Wong, Yasui, Chen (2018)

Academic

Personal

Relationships

Social

Crisis Events



Crisis on College Campus: Gun Violence

175+ gun violence incidents on U.S. college campuses (2007-)

300+ casualties

Affects the psychological wellbeing of college students

Assessing Mental Health on College Campuses

Survey Instruments

Mental Health Care Statistics

Limitations:

- Scalability
- Biases (eg. retrospective recall)
- Stigma about availing mental healthcare
- Reactive
- Implementational difficulty

Advantages (Social Media Data):

- Large-scale and Longitudinal
- Self-recorded in the present
- Requires no active intervention

Social Media bridges some of these gaps

Our Work

*We leverage **social media** data to study the evolution of **stress** around **gun violence** incidents on **college campuses***



Research Questions

Identify stress expressions in social media

Temporal changes in stress expressions after gun violence on college campuses

Linguistic changes in stress expressions after gun violence on college campuses



/r/gatech chat here

↑ 15 ↓



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Submitted 1 month ago by [redacted] CS - 0x7E3 M - announcement
224 comments share save hide report crosspost

↑ 24 ↓



Phase One Megathread: Summer/Fall 2018 Edition

Submitted 12 days ago by [redacted] ME - 2019? M - announcement
244 comments share save hide report crosspost

↑ 30 ↓



What do i do about a professor who threatened me? self.gatech

Submitted 6 hours ago * by [redacted]
32 comments share save hide report crosspost

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Are there any body fat percentage monitors on campus? self.gatech

Submitted an hour ago by [redacted] E - 2018
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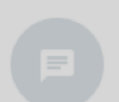
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Question for cyclists on campus self.gatech

Submitted 3 hours ago by [redacted]
4 comments share save hide report crosspost

↑ 0 ↓



Do you think you would have missed out going to your state school instead of GT? self.gatech

Submitted 37 minutes ago [redacted]
1 comment share save hide report crosspost

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Changing Threads in CS self.gatech

Submitted 3 hours ago by [redacted]
2 comments share save hide report crosspost

Online College Communities on Reddit

Search bar

Submit new content



gatech
14,196 readers, 272 here
(edit flair)

Hey there Techies, join the rally for procrastination. Long live reddit.

Useful Links

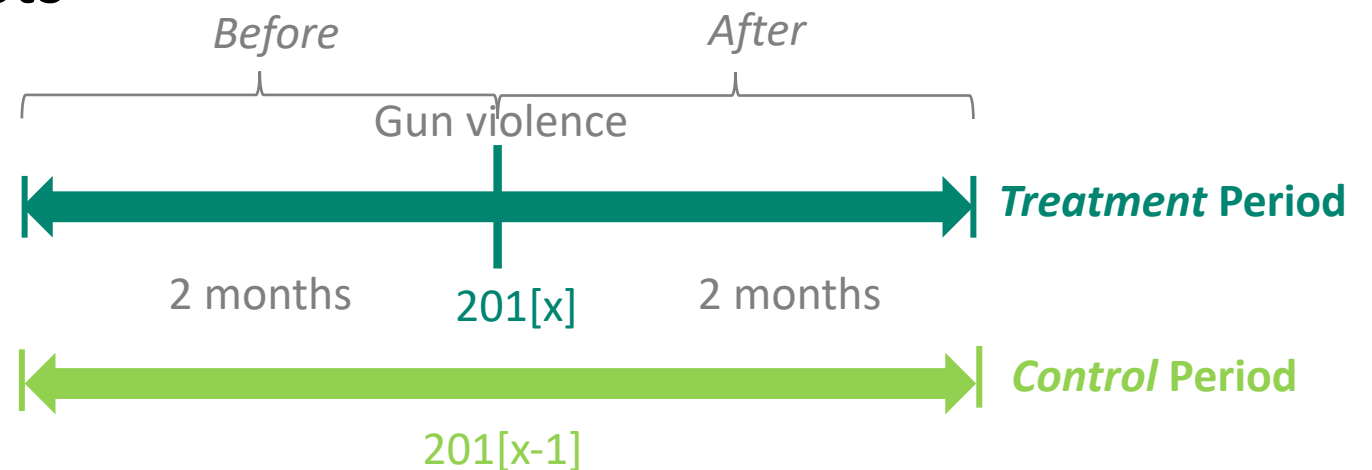
- GT FAQ
- Official GT iOS App
- GT IRC
- GT Buses for iOS for Android
- GT Homepage
- GT Protips
- /r/Atlanta
- /r/ACC
- /r/RamblinWreck for GT Sports

Subreddit Rules:

- Don't be a jerk.
- Don't troll or flame
- In order to avoid redundant posts: 8

Data

- 12 subreddits of colleges where gun violence occurred between 2012 and 2017
- *Treatment Period*: 2mo. before and 2mo. after each event
- *Control Period*: Similar period in the previous year
- Google BigQuery to collect the dataset
- Net dataset: 113,337 posts




Research Question 1

Inferring Stress
Expression

Stress Classifier (High and Low Stress)

- + *r/stress*
- Non-Mental Health subreddits (*r/movies*, *r/music*, *r/aww*, *r/Jokes*, etc.)

COMMUNITY DETAILS

 r/Stress

4.0k Subscribers | 3 Online

r/stress is a subreddit dedicated to discussion of the causes of stress and stress management techniques

*“Feel like I am burning out (again...)
Help: what do I do?”*

*“I have been way too lax, and unfocused,
taking way too long for basic assignments
or just not finishing them, which evolves
into not submitting them.”*

Stress Classifier

- 5000 n -gram & 3 sentiment Features
- SVM Classifier
- Accuracy: 0.82 k -fold cross-validation ($k=5$)
- Machine labeled stress in college dataset

Top Features

<i>stress</i>	<i>luck</i>	<i>meet</i>
<i>try</i>	<i>breathing</i>	<i>life</i>
<i>work</i>	<i>techniques</i>	<i>sleep</i>
<i>anxiety</i>	<i>exercise</i>	<i>problems</i>
<i>focus</i>	<i>meditation</i>	<i>control</i>
<i>help</i>	<i>body</i>	<i>job</i>

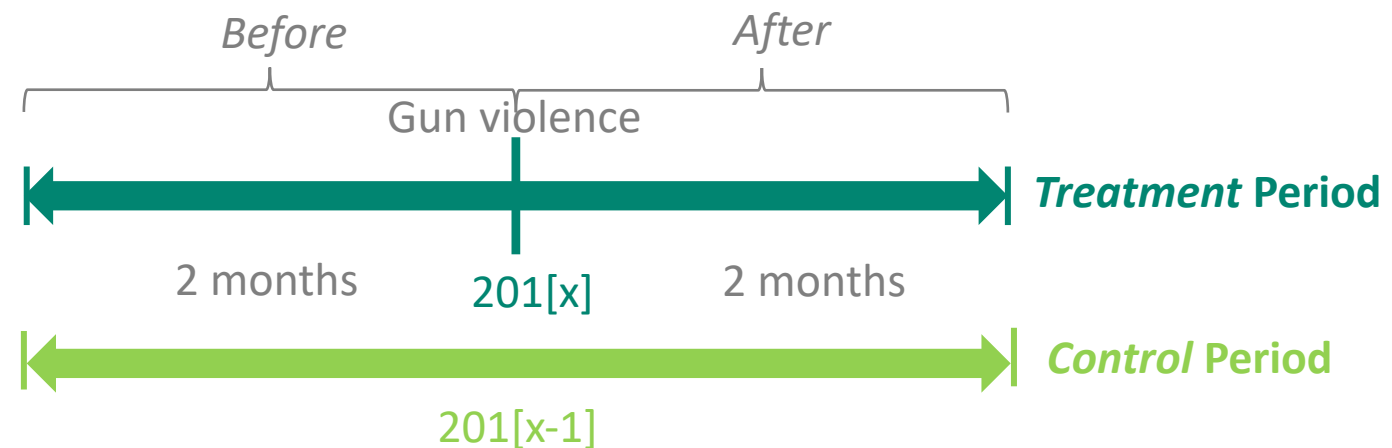
Validated on college subreddit dataset: 82% accuracy

Research Question 2

Temporal Dynamics of
Stress Expression

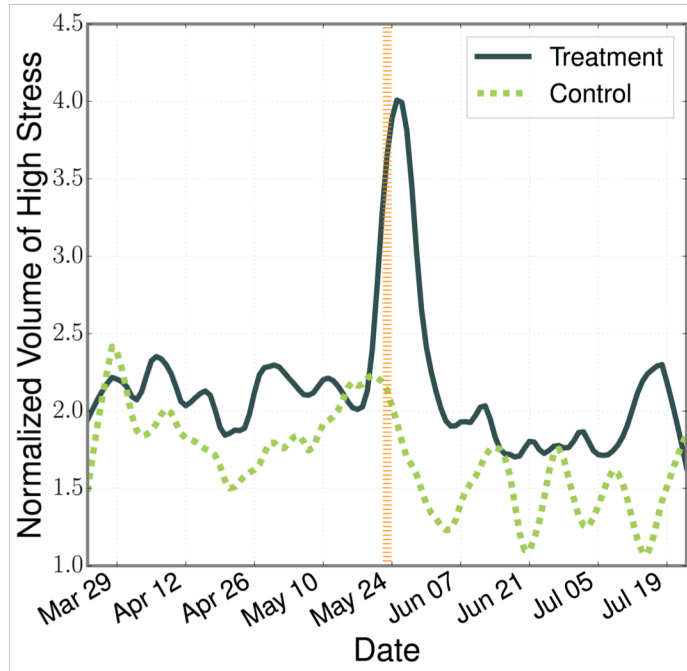
High stress posts as a Time Series

- Time domain
 - Compare *Treatment vs. Control*
Controls for academic calendar, local, seasonal etc. factors.
 - Compare *Before vs. After*
Relative changes as trends.
- Frequency domain
Disruption in the periodicities

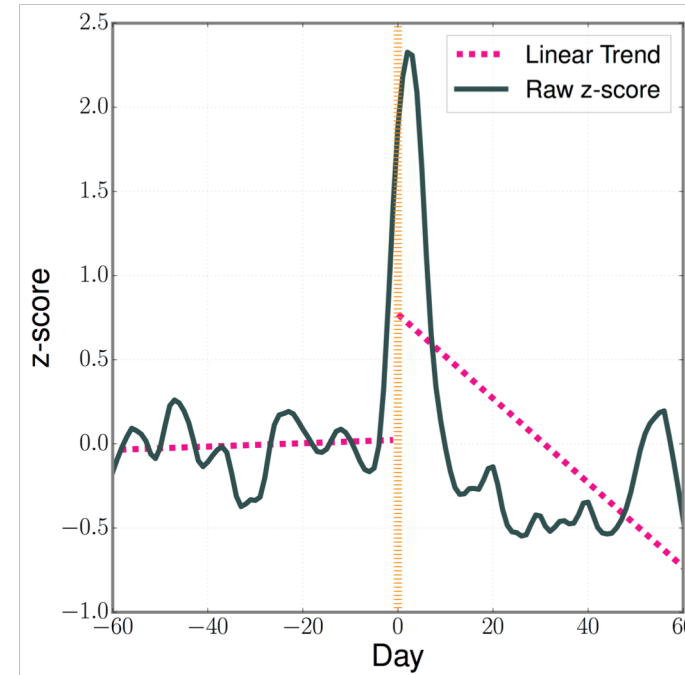


Time Domain Analysis of Stress Expressions

Treatment vs. Control



Before-After Change Analysis



Stress experiences throughout the year, but sudden increase after gun-violence

Research Question 3

Linguistic Dynamics of
Stress Expression

- Psycholinguistic characterization
- Incident-specific lexical analysis

Psycholinguistic Characterization

INCREASE

Anger
N. Affect
Sadness
Swear
Feel
Bio
Health
Death
Health
Home
Family
Friends

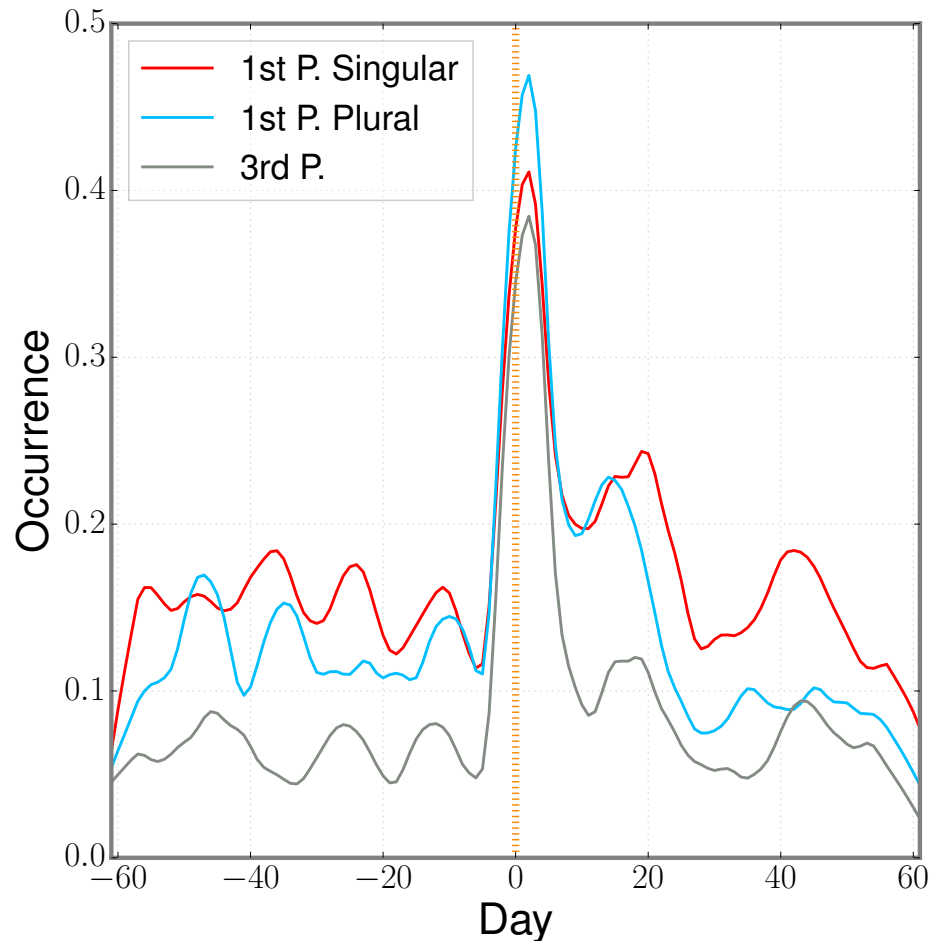
DECREASE

P. Affect
Causation
Inhibition
Hear
Insight
See
Preposition
Future Tense
Present Tense
Money
Achievement

*“I guess since campus is a gun free zone we are all f*ked.”*

“I hope that no one is seriously killed or is injured.”

Psycholinguistic Characterization: Temporal

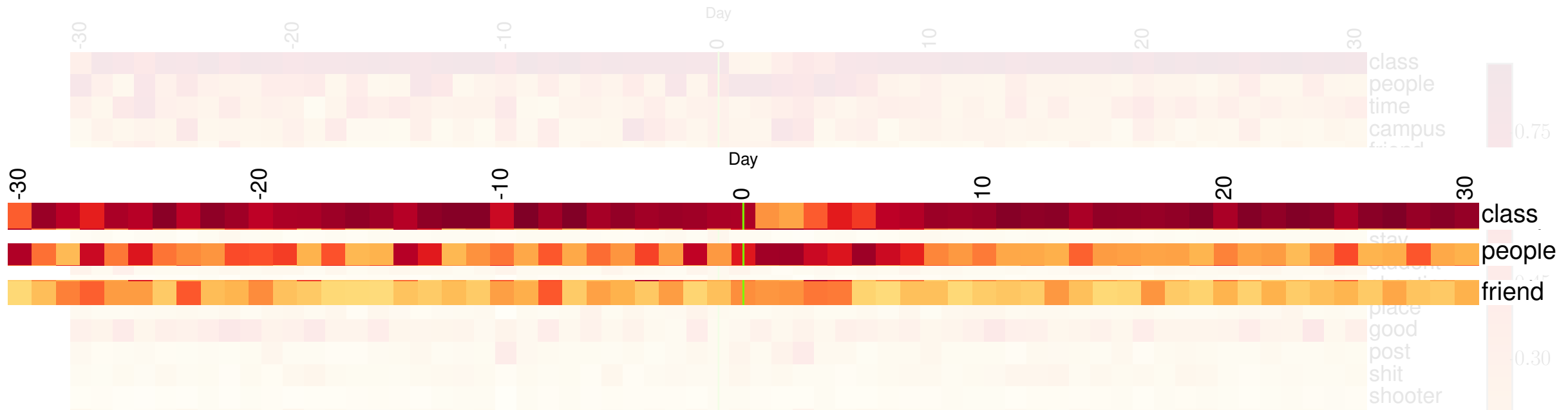


Pronoun usage

- Depressed-or-dealing with crisis
- Increased concern at traumatic event
- Collective Identity
- Sense-of-community

Cohn et al. (2004), Pennebaker et al. (2003)

Lexical Analysis



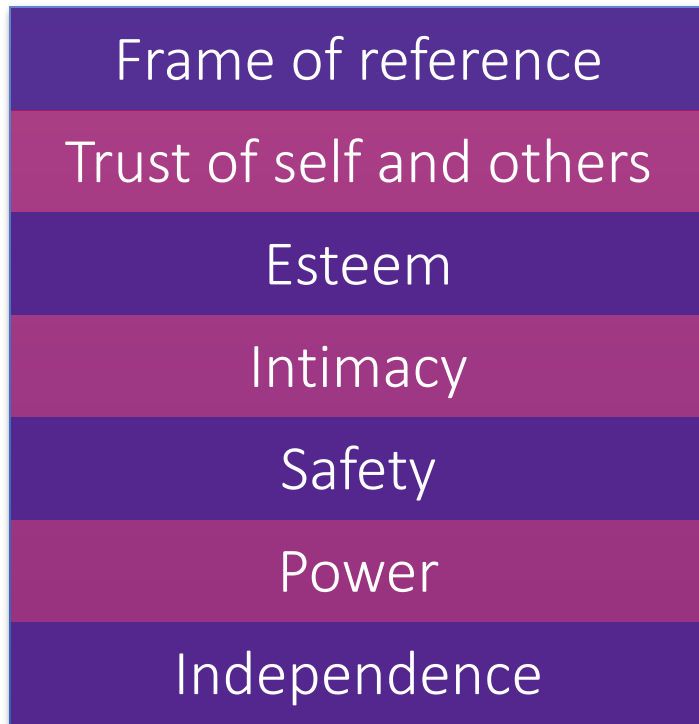
Incident Specific Keywords: *r/fsu: safe, shooting, strozier, news, library, shooter, friends, victims, stay, post, time, people, information*

Summary of Findings

- Built a Stress Classifier on social media
- Examined *Temporal* and *Linguistic* dynamics of stress around gun violence on college campuses
- Immediate rise in the volume of High Stress posts
- Emergence of collective identity, and seeking solidarity in friends
- Decreased *cognitive processing*, and *academic- & career-* related conversations
- Increased *self-attention*, *social orientation*, *death- & family-* related conversations

Students experience chronic stress throughout, but acute stress after gun violence on college campuses

Evidence of Impact on the Community



Constructivist Self Developmental Theory

Psychological need areas that can be affected and disrupted by crises.

*McCann and Pearlman (1993)

Implications

- No clinical assessment
- Socio-psychological response after crises
- Quantify impacts and severity of crises
- Population-centric tracking tools
- Informed policy-making on campuses



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Thank You!

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