

Investigating relationship between racial sentiments on social media and mental health among black population

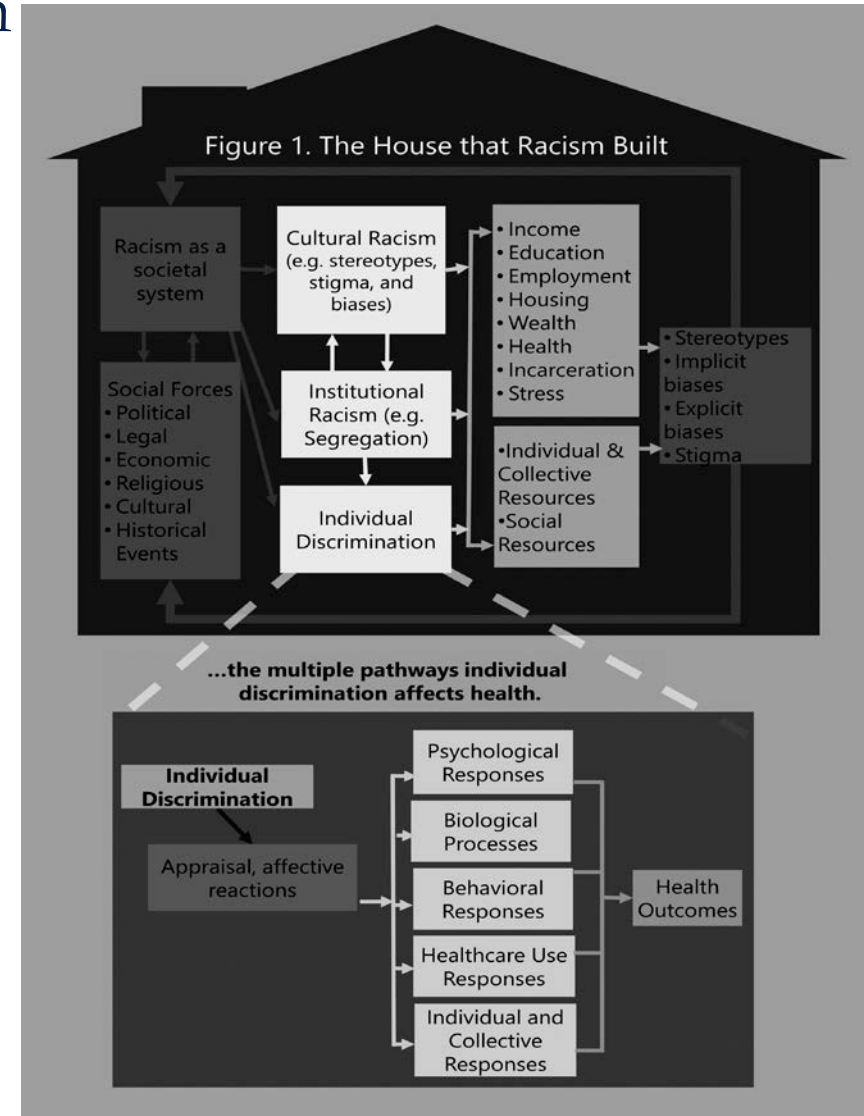
PRISM Conference - Dec 4, 2020

Overview

- Pathways linking racial attitudes and mental health
- Case Study: Racial Sentiments during George Floyd's Killing
- Evidence:
 - State Level Racial Sentiment using Twitter Data
 - Mental Health Outcomes using Household Pulse Survey

Pathways linking racial sentiments and mental health

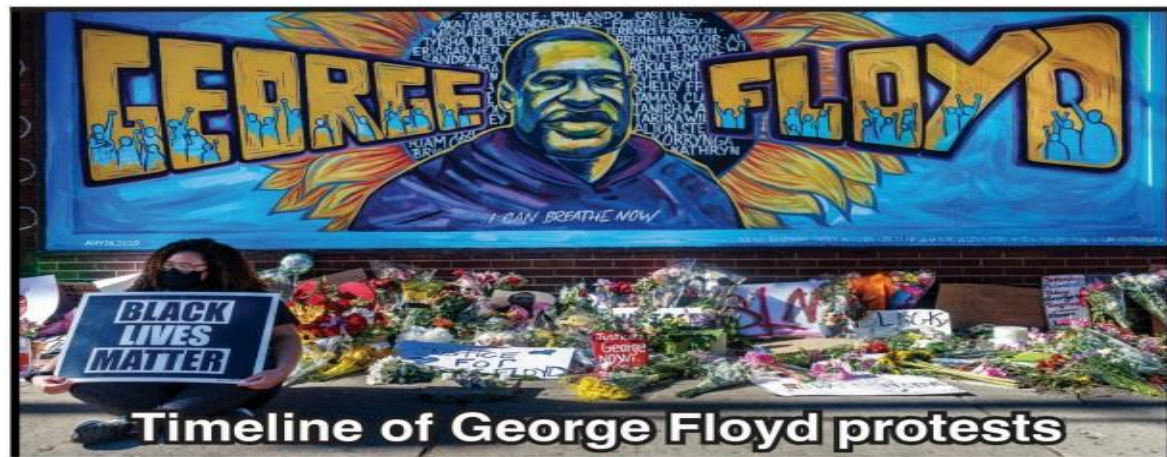
- Racism is recognized as a mental health issue because racism can cause trauma.
- Research shows link between racism and mental health.
- Both perceived and experienced racism can adversely affect the mental health outcomes.
- Police violence towards a group could be a result of structural or institutional racism.
- Police brutality incidences towards black are example of individual discrimination result of institutional racism and are being recognized as a public health concern in the Unites States.



Research Question

We are interested in investigating how racial sentiments could affect the mental health of the targeted population

This study is investigating the impacts of change in racial sentiments on social media with respect to George Floyd's killing on the mental health outcomes among black population.



Timeline of George Floyd protests



■ **May 25:** *George Floyd* dies after being handcuffed and pinned to ground by white officer *Derek Chauvin* in Minneapolis.

Footage shows officer kneeling on Floyd's neck as he is heard saying repeatedly, "*I can't breathe*"

■ **May 26:** Four officers involved in Floyd's arrest are fired as protests begin in Minneapolis

■ **May 27:** Protests spread to major cities across U.S., including Los Angeles and Memphis. Protests in Minneapolis turn violent with looting and arson attacks

■ **May 28:** National Guard troops activated in Minnesota

■ **May 29:** In tweet later hidden by Twitter for "glorifying violence", *President Donald Trump* calls protesters "thugs" and says "when the looting starts, the shooting starts". *Chauvin charged with third-degree murder and second-degree manslaughter*



■ **May 30-31:** Huge, peaceful demonstrations across U.S. later escalate into widespread riots and looting in many cities. National Guard deployed in numerous states



■ **Jun 1:** *Trump* threatens to send in military to quell civil unrest. Police use tear gas to clear peaceful protesters to allow

Trump to pose in front of damaged church



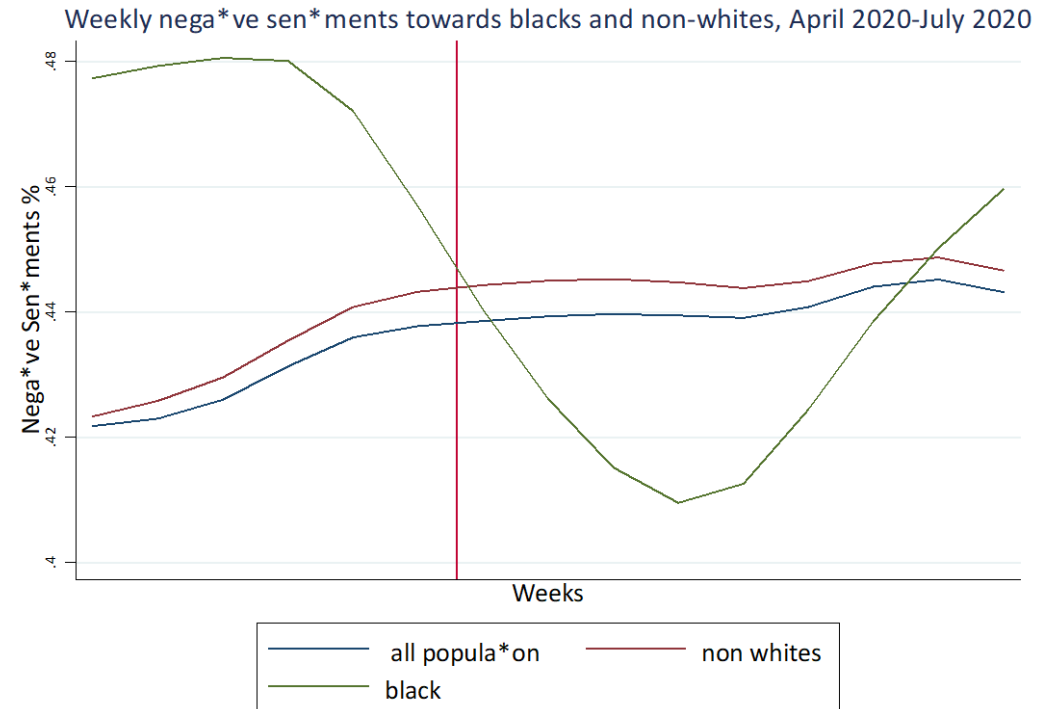
■ **Jun 2:** Protesters defy city curfews as demonstrations spread internationally

■ **Jun 3:** Charge against *Chauvin* elevated to second-degree murder. Three other officers face counts of aiding and abetting murder

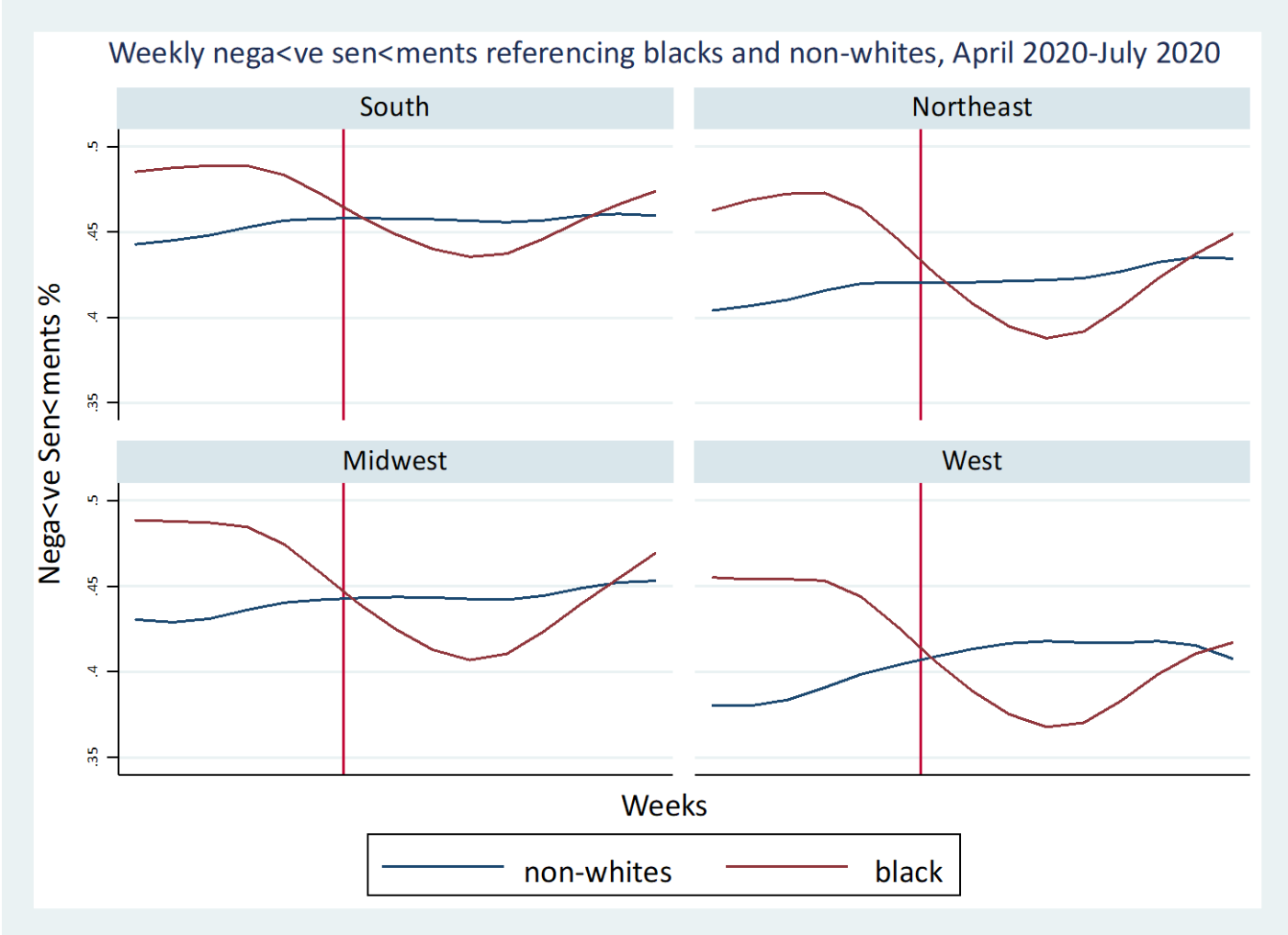
Sources: ABC News, BBC, AP, Reuters Pictures: Associated Press, Getty Images © GRAPHIC NEWS

State Level Racial Attitudes Measurements

- 1 % random sample of publicly available U.S. race-related tweets from April 2020 – July 2020 using Twitter’s Streaming Application Programming Interface (API).
- Sentiment analysis was performed using Support Vector Machines (SVM), a supervised machine learning model to label the tweets as expressing negative or positive sentiment.
- Weekly State-Level Racial Sentiments was used as an exposure



State Level Racial Attitudes Measurements by Region



Study Design

- **Household Pulse Survey - weekly cross-sectional survey emergency data collected by Census Bureau**
- Unit of analysis is the individual.

Outcomes

- **Mental Health Indicators:**
 - *Anxiety* – frequency of anxiety over past 7 days
 - *Worry* – frequency of worry over past 7 days
 - *Feeling down* – frequency of feeling down over past 7 days
 - *Low Interest* – frequency of having little interest in things over past 7 days
- **General Health Status**

Table 1: Household Pulse Survey: Week

Week	Dates
Week 1	April 23 - May 5
Week 2	May 7 - May 12
Week 3	May 14 - May 19
Week 4	May 21 - May 26
Week 5	May 28 - June 2
Week 6	June 4 - June 9
Week 7	June 11 - June 16
Week 8	June 18 - June 23
Week 9	June 25 – July 30
Week 10	July 2 – July 7
Week 11	July 9 – July 14
Week 12	July 16 – July 21

Regression Analysis: Continuous Exposure

- The continuous exposure would capture weekly fluctuations in the racial sentiments around the period of GF killing calculated using Twitter data and investigate the effect of this on the mental health among different race groups.
- $MH_i = \beta_0 + \beta_1 \text{Weekly State Level Negative Racial Sentiments} + \alpha \text{IndividualChar} + \gamma \text{RegionFE} + \delta \text{WeekFE} + \text{clustervar}$
- Individual Char = Age, sex, marital status, education level, income

Preliminary Results

Table 1: Association of Weekly State Level Negative Racial Sentiments towards black on Mental Health Outcomes on black

VARIABLES	WORRY	ANXIETY	LOST INTEREST	FEELING DOWN	GENERAL HEALTH
Weekly State Level Negative Racial Sentiments towards black	1.130** [0.062 - 2.197]	0.409 [-0.683 - 1.500]	0.638 [-0.410 - 1.686]	0.637 [-0.433 - 1.707]	-0.248 [-1.088 - 0.591]
Northeast	0.046** [0.002 - 0.090]	0.039 [-0.010 - 0.089]	0.012 [-0.040 - 0.063]	-0.004 [-0.049 - 0.042]	0.002 [-0.038 - 0.043]
Midwest	0.027 [-0.010 - 0.064]	0.020 [-0.017 - 0.056]	0.001 [-0.038 - 0.040]	-0.016 [-0.054 - 0.023]	-0.006 [-0.039 - 0.028]
West	0.055 [-0.015 - 0.126]	0.070* [-0.003 - 0.143]	0.045 [-0.034 - 0.124]	0.042 [-0.035 - 0.119]	-0.049 [-0.111 - 0.013]
Constant	0.148 [-0.388 - 0.684]	0.537* [-0.013 - 1.087]	0.335 [-0.190 - 0.859]	0.286 [-0.266 - 0.838]	1.028*** [0.596 - 1.460]
Observations	46,392	46,420	46,349	46,446	46,470
R-squared	0.073	0.055	0.060	0.073	0.086

Preliminary Results

Table 2: Association of Weekly State Level Positive Racial Sentiments towards black on Mental Health Outcomes on black

VARIABLES	WORRY	ANXIETY	LOST INTEREST	FEELING DOWN	GENERAL HEALTH
Weekly State Level Positive Racial Sentiments towards black	-3.594** [-7.089 - -0.100]	-1.361 [-5.102 - 2.380]	-0.935 [-4.275 - 2.404]	-1.535 [-5.255 - 2.185]	0.359 [-2.464 - 3.182]
Northeast	0.035* [-0.004 - 0.074]	0.036* [-0.007 - 0.079]	-0.003 [-0.052 - 0.046]	-0.014 [-0.055 - 0.027]	0.008 [-0.028 - 0.044]
Midwest	0.025 [-0.011 - 0.061]	0.019 [-0.018 - 0.056]	-0.007 [-0.046 - 0.032]	-0.020 [-0.058 - 0.018]	-0.003 [-0.035 - 0.029]
West	0.009 [-0.032 - 0.050]	0.054*** [0.017 - 0.091]	0.014 [-0.032 - 0.059]	0.013 [-0.028 - 0.055]	-0.037* [-0.074 - 0.000]
Constant	0.846*** [0.709 - 0.983]	0.791*** [0.641 - 0.942]	0.687*** [0.549 - 0.824]	0.661*** [0.514 - 0.808]	0.891*** [0.786 - 0.997]
Week time trends	Yes	Yes	Yes	Yes	Yes
Observations	46,392	46,420	46,349	46,446	46,470
R-squared	0.073	0.055	0.060	0.073	0.086

Preliminary Results

Table 3: Association of Weekly State Level Negative Racial Sentiments towards non-whites on Mental Health Outcomes in general population

VARIABLES	WORRY	ANXIETY	LOST INTEREST	FEELING DOWN	GENERAL HEALTH
Weekly State Level Negative Racial Sentiments towards all minorities	0.176 [-0.430 - 0.782]	0.002 [-0.547 - 0.551]	0.354 [-0.268 - 0.976]	0.763*** [0.189 - 1.337]	0.093 [-0.393 - 0.579]
Black	0.005 [-0.006 - 0.016]	-0.050*** [-0.063 - -0.038]	-0.027*** [-0.037 - -0.018]	-0.050*** [-0.061 - -0.038]	-0.017*** [-0.026 - -0.009]
Asian	0.031*** [0.016 - 0.046]	-0.043*** [-0.062 - -0.025]	0.006 [-0.013 - 0.025]	0.001 [-0.014 - 0.016]	-0.011* [-0.023 - 0.001]
Other races	0.044*** [0.029 - 0.059]	0.018** [0.004 - 0.032]	0.033*** [0.020 - 0.046]	0.024*** [0.012 - 0.037]	-0.049*** [-0.063 - -0.035]
Northeast	0.003 [-0.021 - 0.027]	0.025** [0.004 - 0.046]	0.015 [-0.007 - 0.038]	0.036*** [0.012 - 0.059]	0.029*** [0.010 - 0.047]
Midwest	-0.025*** [-0.038 - -0.012]	-0.009 [-0.021 - 0.003]	-0.021*** [-0.032 - -0.009]	-0.006 [-0.018 - 0.007]	0.014*** [0.004 - 0.023]
West	0.011	0.022* [0.004 - 0.046]	0.024* [-0.032 - -0.009]	0.045*** [-0.018 - 0.007]	0.021** [0.004 - 0.023]
Constant	0.690*** [0.423 - 0.956]	0.904*** [0.660 - 1.147]	0.503*** [0.230 - 0.776]	0.328** [0.076 - 0.580]	0.777*** [0.565 - 0.989]
Observations	620,019	620,182	619,799	620,409	620,571
R-squared	0.102	0.092	0.081	0.085	0.094

Next Steps

Thank You !!!

Undergoing work with Dr. Yulin Hswen and Dr. Thu Nguyen