Using A.I. for the Public Good

Joe Smyser, PhD MSPH

October, 2019

PGP | THE PUBLIC GOOD PROJECTS

Who we are

The Public Good Projects (PGP) is a public health nonprofit that specializes in using the tools and techniques of communication for large-scale public health programs.

PGP routinely creates disease surveillance systems and bots using AI. These systems often power behavior change campaigns.

Projects include:

- Sugar-sweetened beverages
- Tobacco products (including e-cigs)
- Mental health
- Low birth weight
- Opioids
- Alcohol
- School wellness
- Social isolation
- Vaccines
- **Reproductive health**

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Current Work in NJ

Tobacco Control

The Nicholson Foundation

Advancing Health and Promoting Opportunity

Trenton Health Team

New Jersey Prevention Network

SSB's

The Nicholson Foundation

Advancing Health and Promoting Opportunity

Trenton Health Team

Current Work in NJ

Tobacco Control

New Jersey Prevention Network

Trenton Health Team

SSB's

- Fruit drink mixes
- **7.9%** decrease in Passaic County,
  - **4.3%** decrease in NJ.

- Sodas / soft drinks
- **7.6%** decrease in Passaic County,
  - **1.7%** decrease in NJ.

- Sports drinks
- **7.1%** decrease in Passaic County,
  - **6.2%** decrease in NJ.

Media Monitoring

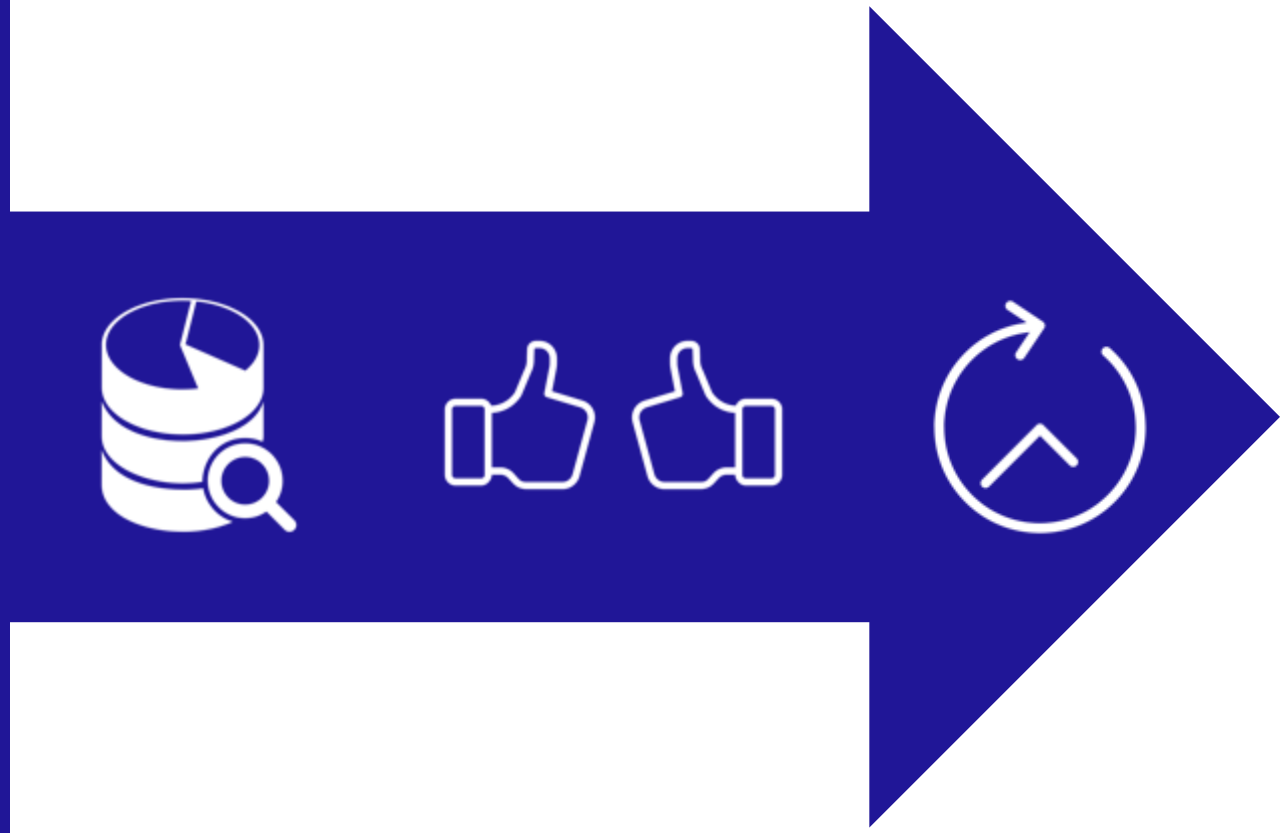
Media Monitoring

PGP collects and analyzes all publicly available media data in the U.S. for several priority health topics.

Media data include television, radio, print, online video, websites, and public social media.

Methodology: Data Queries

Methodology: Results



PROJECT VCTR

Vaccine Communication Tracking & Response

Keyword Query

Standalone Words		
#antifluvaccine	#vaccinating	antivax
#antivacc	#vaccination	antivaxxer
#antivaccination	#vaccinations	antivaxxers
#antivaccine	#vaccine	flu shot
#antivaccines	#vaccinechoice	immunization
#antivax	#vaccinedamage	immunizations
#antivaxer	#vaccinedeath	pre-vax
#antivaxers	#vaccinefailure	pro-immunization
#antivaxmovement	#vaccinehesitant	pro-immunizations
#antivaxxer	#vaccineinjury	pro-vaccination
#antivaxxers	#vaccineprotection	pro-vaccine
#flushot	#vaccines	pro-vaccines
#fuckvaccines	#VaccinesCauseAIDs	pro-vax
#getvaccinated	#VaccinesCauseAutism	pro-vaxer
#GlobalVaccineSummit	#VaccinesCauseRegressiveAutism	pro-vaxers
#immunization	#vaccinescausesids	pro-vaxx
#immunizations	#vaccinesdangers	pro-vaxxer
#learntherisk	#vaccineskill	pro-vaxxers
#NoForcedVaccination	#vaccineskillandmaim	provaccine
#prevax	#Vaccinesuncovered	provaccines
#proimmunization	#vaccineswork	unvaccinated
#proimmunizations	#vaccinetruth	unvax
#provaccination	#vaccn	unvaxxed
#provaccine	#vaccschedule	vacc damage
#provaccines	#vacine	vacc schedule
#provax	#vacines	vacc'd
#provaxer	#vaxer	vacc'n
#provaxers	#vaxism	vaccinate
#provaxx	#vaxx	vaccinater
#provaxxer	#vaxxed	vaccinates
#provaxxers	#VaXXedII	vaccinating
#StopforcedVaccination	#vaxxer	vaccination
#StopMandatoryVaccina	anti-flu-vaccine	vaccinations
#unvaccinated	anti-vacc	vaccine
#unvax	anti-vaccination	vaccine hesitant
#unvaxxed	anti-vaccine	vaccine protection
#vaccd	anti-vaccines	vaccine-hesitant
#vaccdamage	anti-vax	vaccines
#vaccinate	anti-vaxer	vacine
#vaccinater	anti-vaxers	vacines
#vaccinates	antivaccination	vaxer
#vaccinateus	antivaccine	vaxx

Co-Occurring (vax, vacc, vacci, #vax, #vacc, #vacci, #vax) +							
#acuteflaccidmyelitis	#Malaria	#whoopingcough	HIV	swine flu	#Paralysis	#choice	poisons
#Adenovirus	#measel	#yellowfeaver	HIV/AIDS	swineflu	#paralyze	#cdcwhistleblow	pro health
#afm	#measle	#yellowfever	HPV	TB	#paralyzed	#notgoingaway	pro-health
#AIDS	#measles	#zika	influenza	Td	#paralyzes	#provenright	pro-health
#Anthrax	#measlesmumpsrubella	acute flaccid myelitis	IPV	TDaP	#paranoid	#YourBestShot	promoter
#anti-flu	#meesel	Adenovirus	lyme	tetanus	#poison	adverse	promoters
#BCG	#meesels	afm	Malaria	tuberculosis	#poisoning	afraid	rejecter
#Bird flu	#meningitis	AIDS	measel	typhoid	#poisonous	autism	rejecters
#cancer	#meningococcal	Anthrax	measle	varicella	#poisons	autistic	scare
#chickenpox	#MMR	anti-flu	measles	whooping cough	#prohealth	booster	scared
#cholera	#MMR2	BCG	measles-mumps-ru	yellow feaver	#promoter	conspiracy	scaremongering
#Diphtheria	#MMRII	Bird flu	meesel	yellow fever	#promoters	contagious	scares
#Diptheria	#MMRtwo	cancer	meesels	zika	#rejecter	coverage	scary
#DPT	#MMRV	chicken pox	meningitis	#adverse	#rejecters	delayed	seizure
#DTap	#mumps	chickenpox	meningococcal	#afraid	#scare	delayer	seizures
#dtp	#mumps	cholera	MMR	#autism	#scared	delayers	side effects
#DTPa	#NOS	Diphtheria	MMR 2	#autistic	#scaremongering	epidemic	side-effects
#DTwP	#OPV	Diptheria	MMR II	#booster	#scares	fear	skeptic
#Encephalitis	#Papillomavirus	DPT	MMR two	#conspiracy	#scary	fearmongering	skeptical
#flu	#Pentavalent	DTap	MMRV	#contagious	#seizure	fever	toxic
#fluenza	#pertussis	DTP	mumps	#coverage	#seizures	Globulin	toxin
#Flushot	#Pneumococcal	dtp	mumps	#delayed	#sideeffects	herd	trustworthy
#flustrain	#polio	DTPa	NOS	#delayer	#skeptic	hesitancy	uncertain
#flustrains	#poliovirus	DTwP	OPV	#delayers	#skeptical	hestitant	unconclusive
#foodasmedicine	#pox	Encephalitis	Papillomavirus	#epidemic	#toxic	ignorance	unsafe
#gardasil	#rabies	flu	Pentavalent	#fear	#toxin	ignorant	untrustworthy
#guardasil	#Rotavirus	flu strain	pertussis	#fearmongering	#trustworthy	illness	virus
#H1N1	#rubela	flu strains	Pneumococcal	#fever	#uncertain	illnesses	reaction
#H7n9	#rubella	fluenza	polio	#Globulin	#unconclusive	needle	allergin
#HAV	#shingle	Flushot	poliovirus	#herd	#unsafe	needles	allergy
#HBV	#Shingles	food as medicine	pox	#hesitancy	#untrustworthy	neurological dan	pro-informed consent
#hepatitis	#SIDS	gardasil	rabies	#hestitant	#virus	outbreak	informed consent
#HEV	#smallpox	guardasil	Rabies	#ignorance	#reaction	outbreaks	pro kids
#Hexavalent	#suddeninfantdeathsyndr	H1N1	Rotavirus	#ignorant	#allergin	pandemic	pro-kids
#Hib	#swineflu	human papplioma	rubela	#illness	#allergy	Paralysis	pro-medical freedom
#HIV	#TB	H7n9	rubella	#illnesses	#proinformedcon	paralyze	medical freedom
#HIV/AIDS	#Td	HAV	shingle	#needle	#informedconsen	paralyzed	risk aware
#HPV	#TDaP	HBV	Shingles	#needles	#prokids	paralyzes	mandate
#humanpappiloma	#tetanus	hepatitis	SIDS	#neurologicaldar	#promedicalfreec	paranoid	choice
#influenza	#tuberculosis	HEV	small pox	#outbreak	#medicalfreedom	poison	
#IPV	#typhoid	Hexavalent	smallpox	#outbreaks	#riskaware	poisoning	
#lyme	#varicella	Hib	sudden infant death	#pandemic	#mandate	poisonous	

Research Questions

How do personal variables like religious and political beliefs correlate with vaccination content?

How does employment status and occupation correlate with vaccination content (ie, nurses, doctors, lawmakers, etc) ?

How are automated accounts (bots) amplifying messages related to vaccination?

- What are the types of messages they promote?
- Which resonate most with individuals?
- What is the path of misinformation from human to bot, and bot to human?

What types of pro-vaccination mentions are:

- Most positively received, and by whom?
- Most negatively received/attacked, and by whom?

What types of pro-vaccination messaging would resonate most with different groups of individuals?

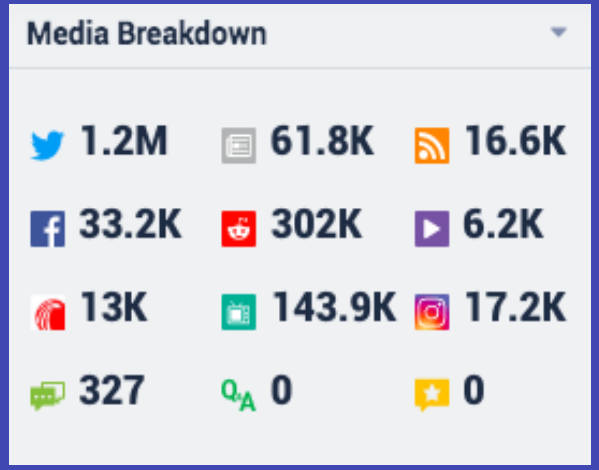
Questions for users

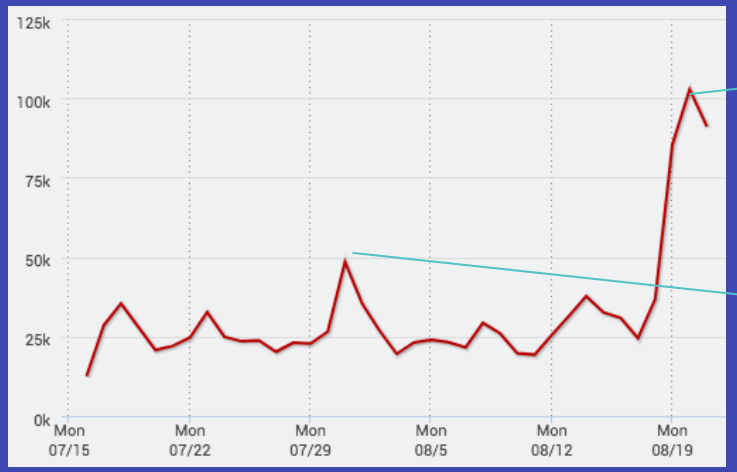
1. What would you want answered with these data?
2. What research questions would you add or examine?
3. What are common problems that you wish you had answers to?
4. How can these insights be actionable for individuals working on vaccination at various levels?

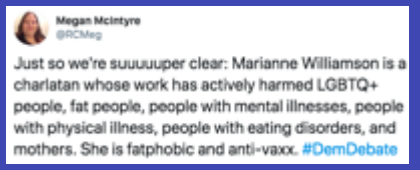
Preliminary Results

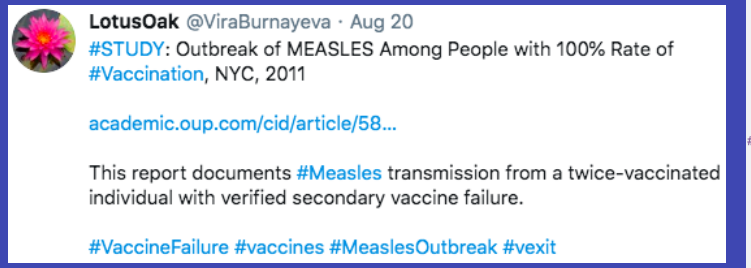
Initial national-level analysis suggests that the public frames vaccinations in several distinct ways. These themes can fluctuate day by day, and by geography (city by city, state by state). The top themes that appear to be surfacing are:

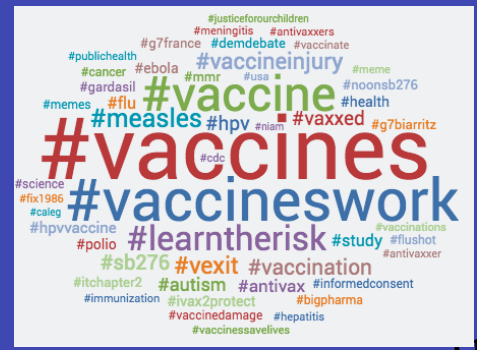
- **Advocacy: Pro-vaccination**
- **Advocacy: Anti-vaccination**
- **The government's role in vaccination (often related to election campaign platforms)**
- **Research & clinical trials**
- **Vaccinations & school environment (often framed around "back to school" vaccination requirements)**
- **Policy & regulations**
- **Pharmaceutical industry**
- **Religion and religious freedom**
- **Family**
- **Conversation directed toward notable public health agencies (CDC, FDA)**











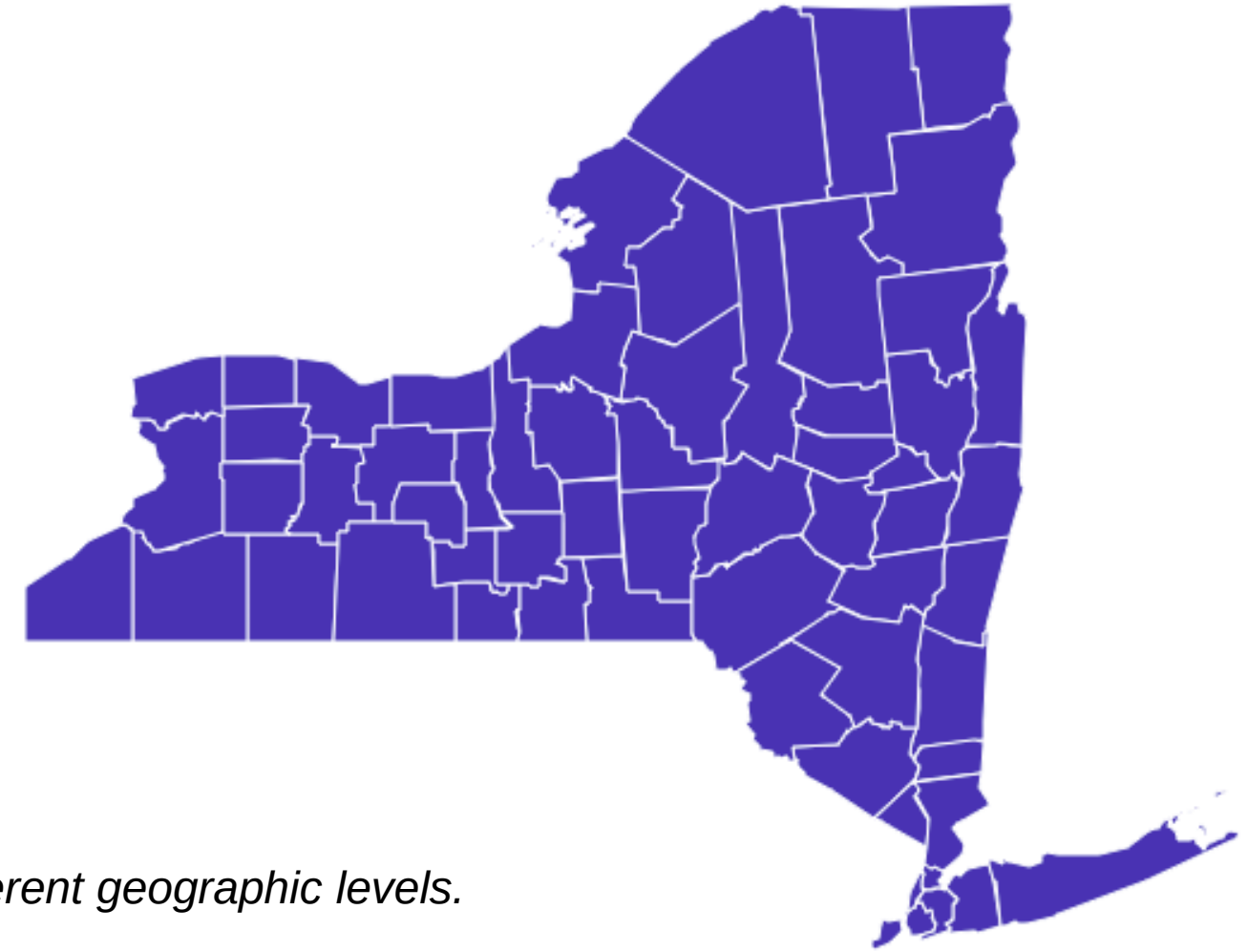
Geographic Analysis

New York State

Total Mentions

39,809

Total Mentions



Upstate

Total Mentions

7,423

Total Mentions

New York City

Total Mentions

9,715

Total Mentions

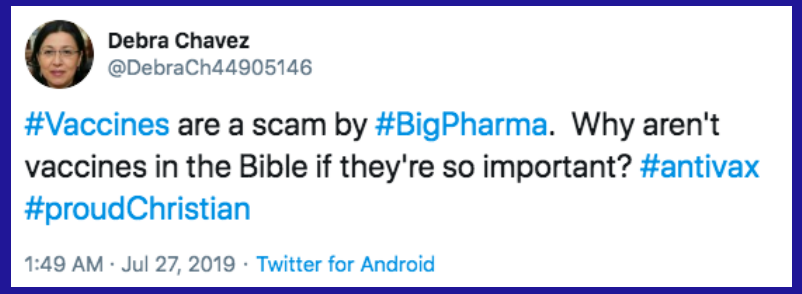
Next Steps:

Look at themes at different geographic levels.

At-Risk Groups

Anti-Vaccination

Religious conservatives



Homeopathic believers (often politically liberal)

Political conservatives

Political liberals

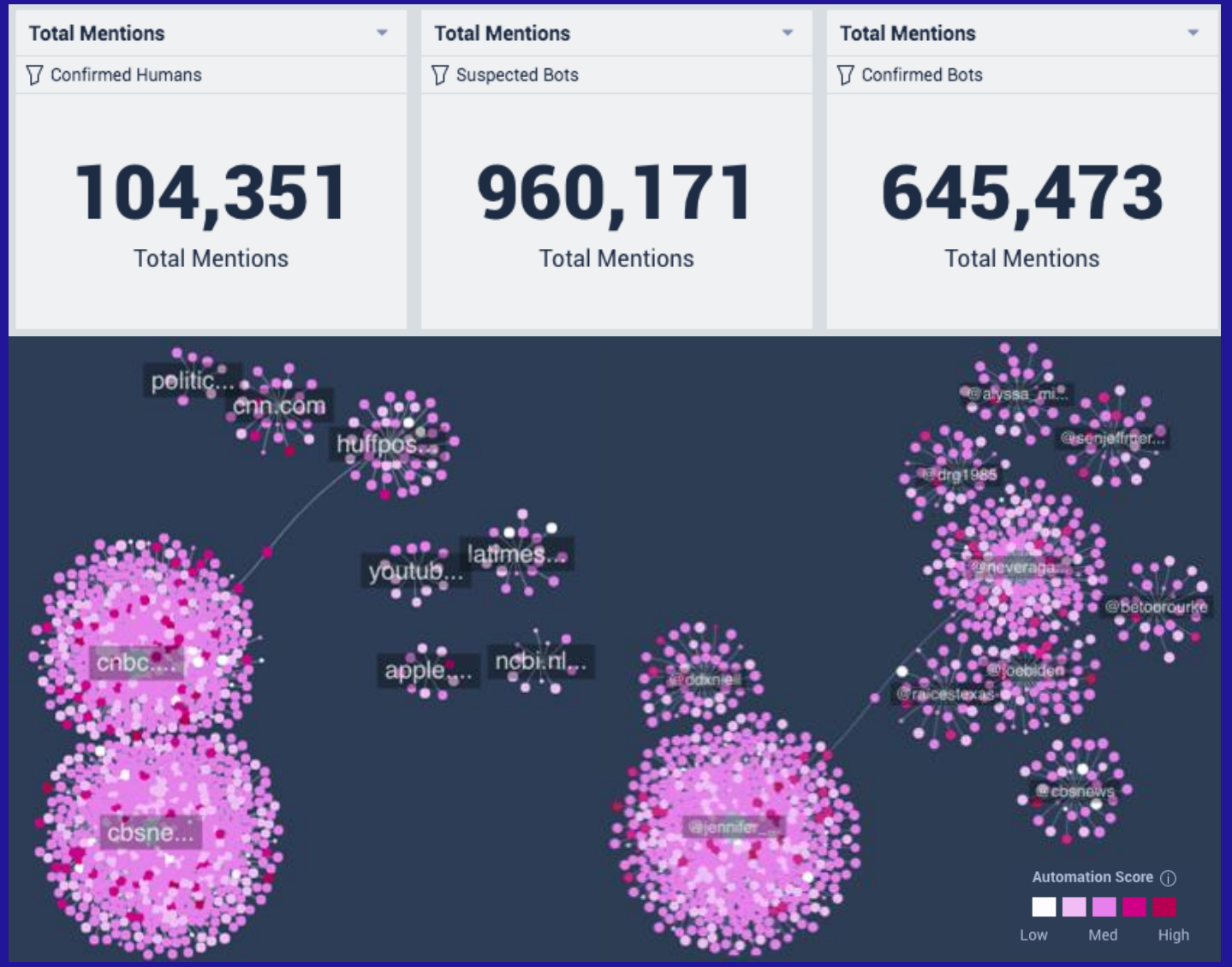
Pro-Vaccination

Next Steps: Correlate affiliations with vaccination volume and themes. Begin to create counter messaging strategy for groups.

Automated Accounts (Bots)

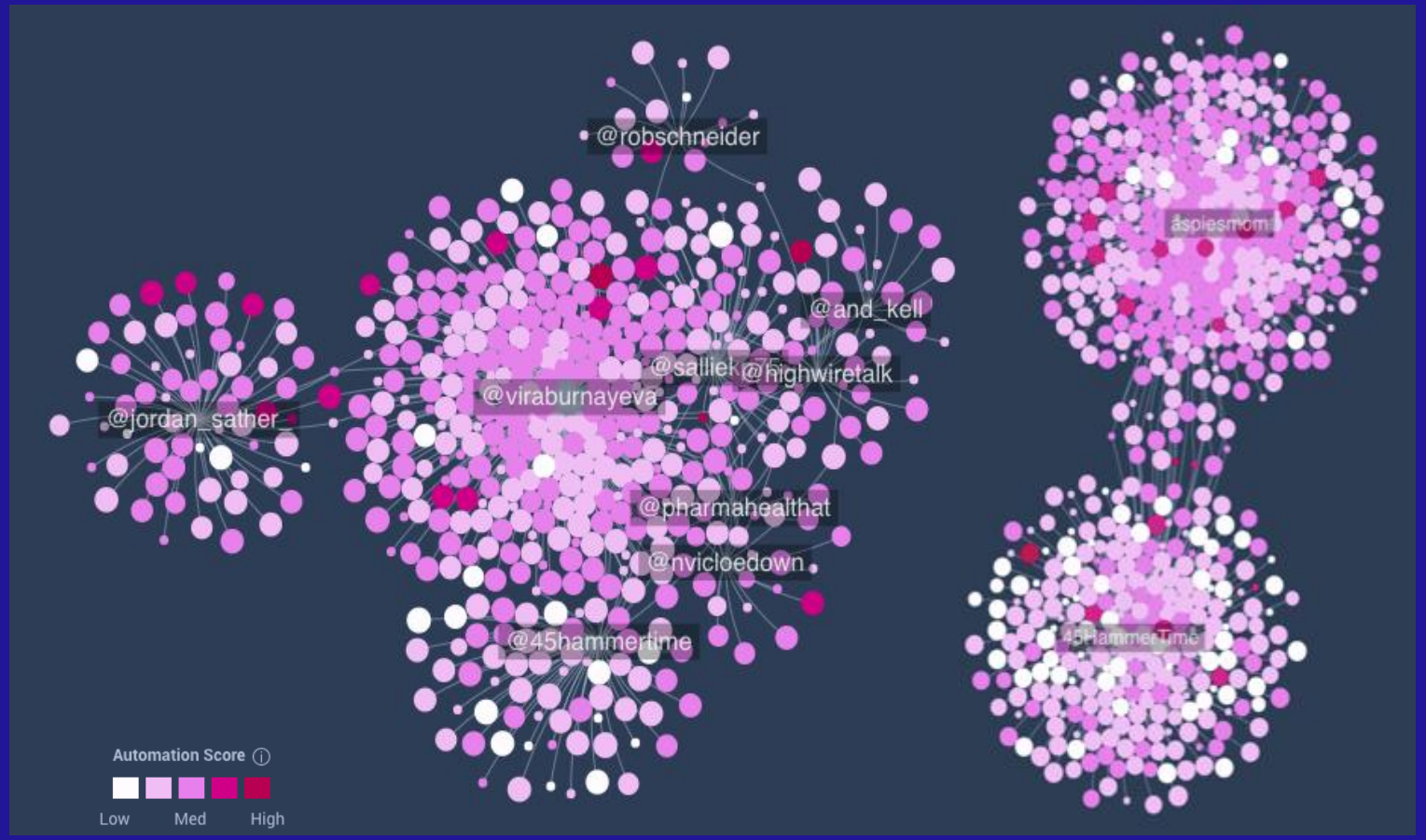
Amount and flow of conversation from humans, suspected bots, and confirmed bots

- Software gives a score of 1 (Human) to 100 (Bot) to each Twitter user in the database.
  - The score is based on the frequency/ timing of posts, number of posts, number of followers, engagement with other accounts, as well as machine learning technologies.
- PGP's analysis allows for a comparison of conversations that originate from confirmed humans, suspected bots, and confirmed bots.
- Comparisons can be made across all data collected, to examine the volume and scope, different themes, as well as the flow of conversation between bots and humans.



Anti-Vaccination Bot Networks

- Bots can function in conjunction with one another through networks.
- This graphic shows a representation of anti-vaccination networks that are driven by bots.
  - Certain bots have large human followings (@Hammer_Time)
  - Lines connecting circles show the ways that accounts are connected to bots.



Next Steps: Examine what types of content bots are most frequently promoting, major themes in their conversation, and strategies for counter messaging.

Opioid Crisis

PGP Monitoring

OPIOIDS

Total Mentions

1.3M
Total Mentions

Average Counts

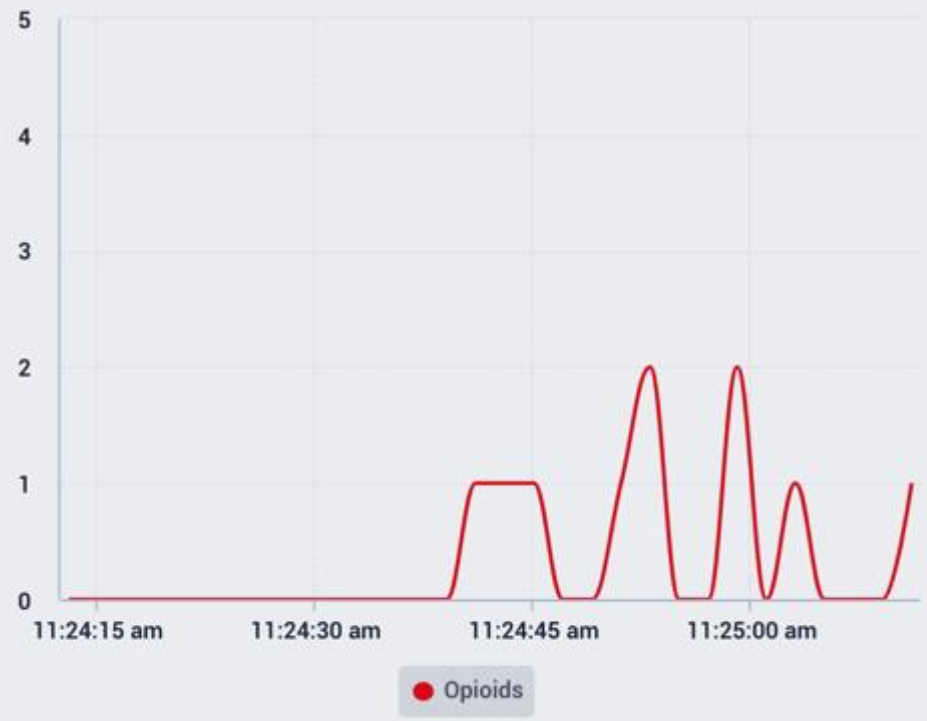
45,473
Average Per Day

1,895
Average Per Hour

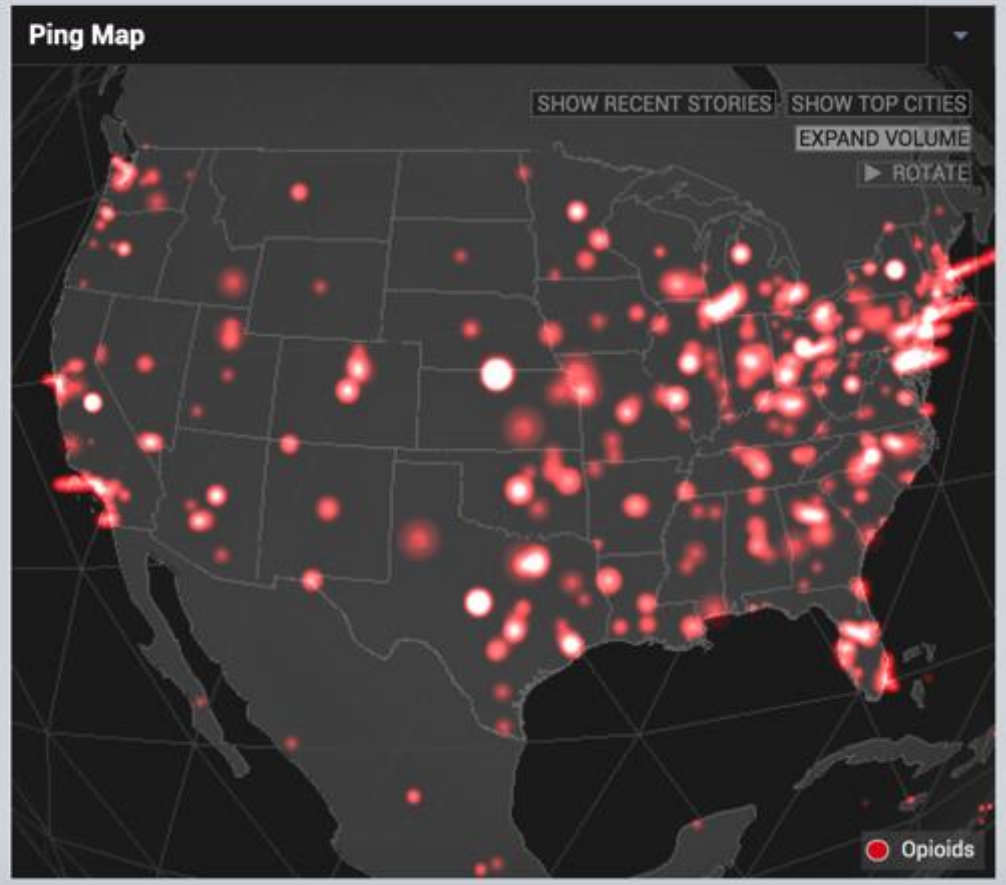
Media Breakdown

1,123,114	37,930	5,898
10,390	124,544	81
6,090	26,863	5,286
140	0	0

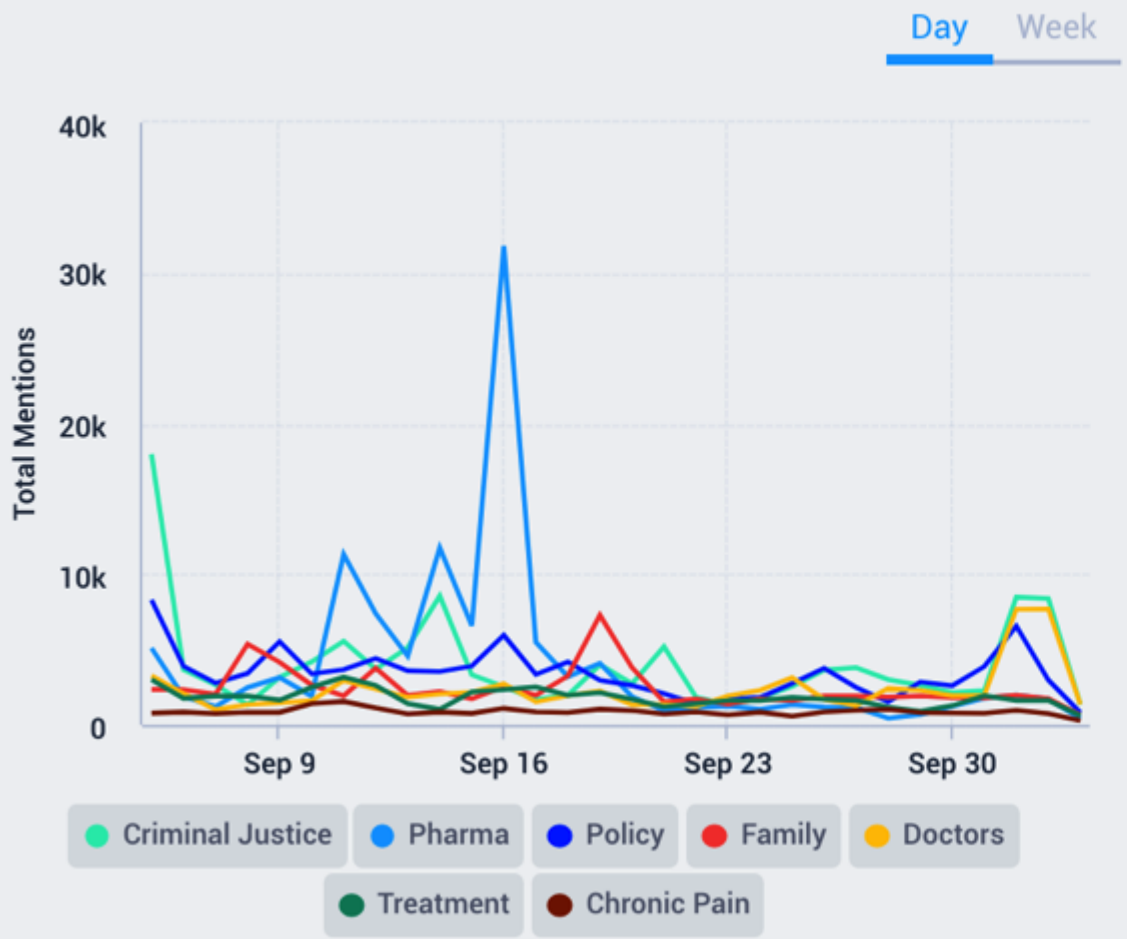
Realtime Mentions



Ping Map



Total Mentions by Issue



Top Issues

All | Positive | Negative | Neutral

Criminal Justice	120,524
Pharma	119,916
Policy	102,575
Family	72,745
Doctors	70,090
Treatment	53,826
Chronic Pain	26,017

Total Mentions by Issue

Top Issues

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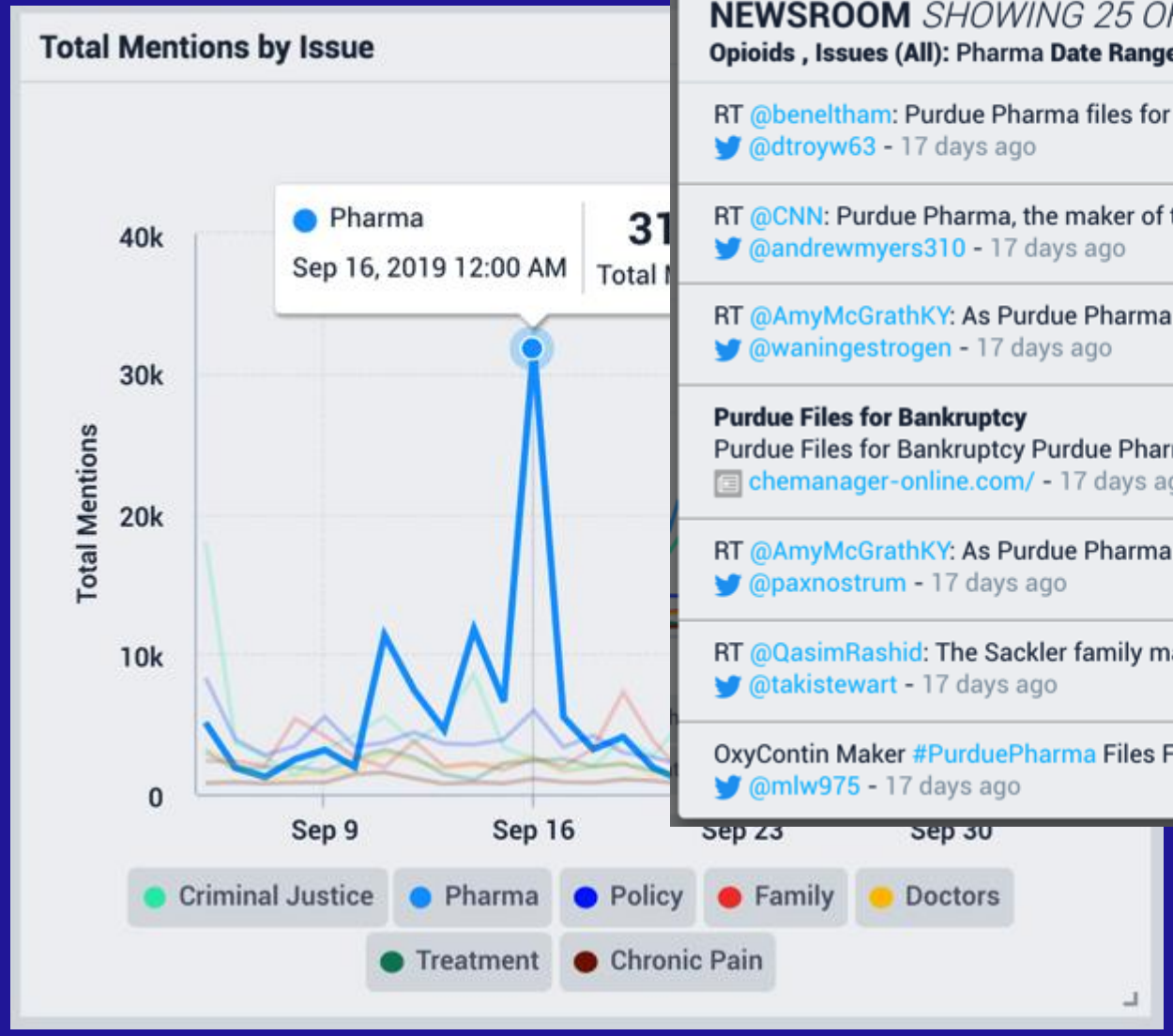


NEWSROOM *SHOWING 25 OF 31797 STORIES*

Opioids , Issues (All): Pharma **Date Range:** 09/16/2019 (EDT)

RT @beneltham: Purdue Pharma files for bankruptcy with a partial deal aimed at resolving thousands of state, local lawsu ... More
@dtroyw63 - 17 days ago

RT @CNN: Purdue Pharma, the maker of the painkiller OxyContin, said it has filed for bankruptcy as part of a plan to set ... More
@andrewmyers310 - 17 days ago

RT @AmyMcGrathKY: As Purdue Pharma files for bankruptcy, we must hold the company—and the Sackler family that owns it—ac ... More
@waningestrogen - 17 days ago

Purdue Files for Bankruptcy
Purdue Files for Bankruptcy Purdue Pharma, the drugmaker under fire for triggering an opioid crisis in the US, has file ... More
chemanager-online.com/ - 17 days ago

RT @AmyMcGrathKY: As Purdue Pharma files for bankruptcy, we must hold the company—and the Sackler family that owns it—ac ... More
@paxnostrum - 17 days ago

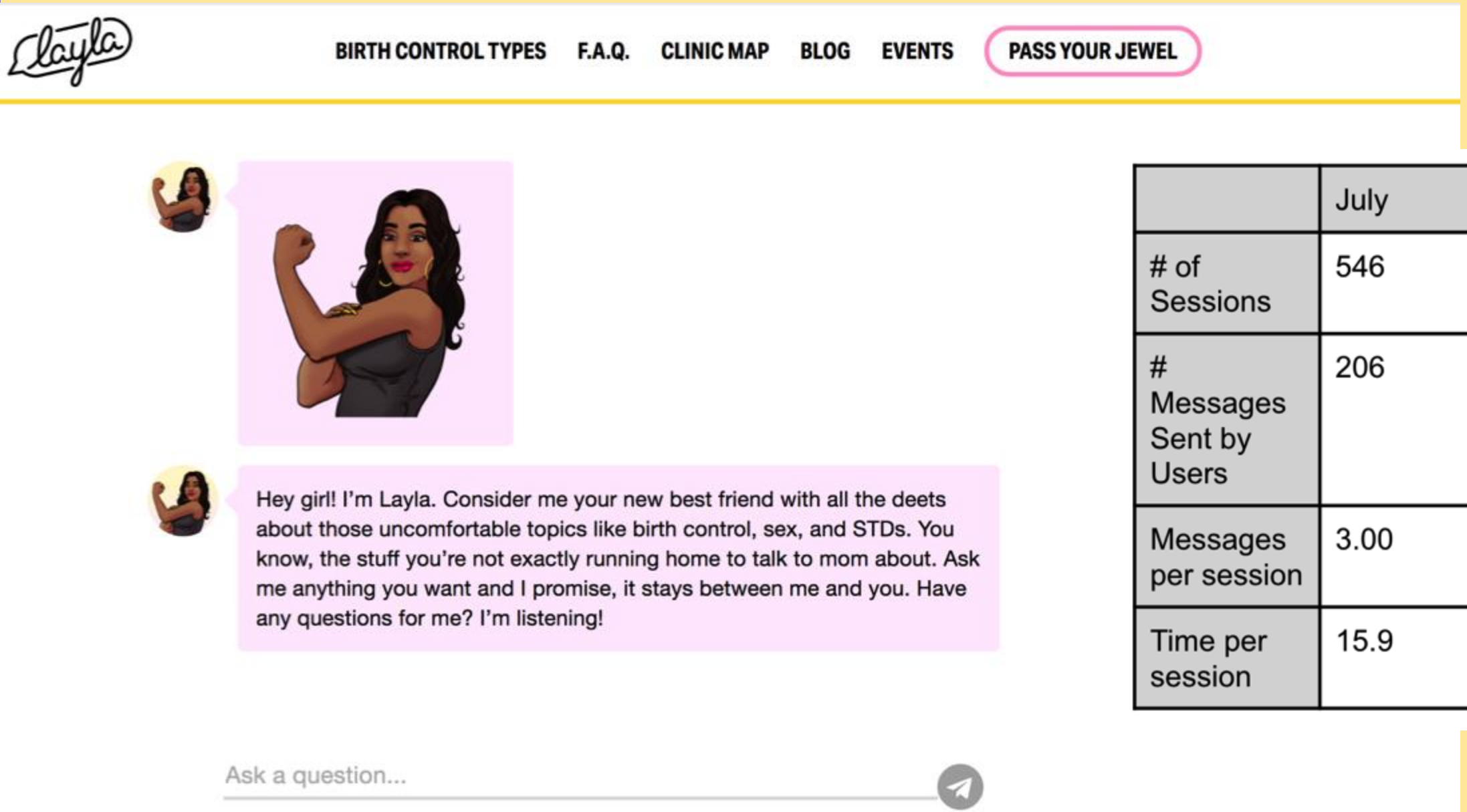
RT @QasimRashid: The Sackler family made over $4B off the opioid crisis & trasferred billions to offshore accounts t ... More
@takistewart - 17 days ago

OxyContin Maker #PurduePharma Files For Bankruptcy Major lawsuit alleges Purdue fueled US opioid crisis https://t.co/eVR ... More
@mlw975 - 17 days ago

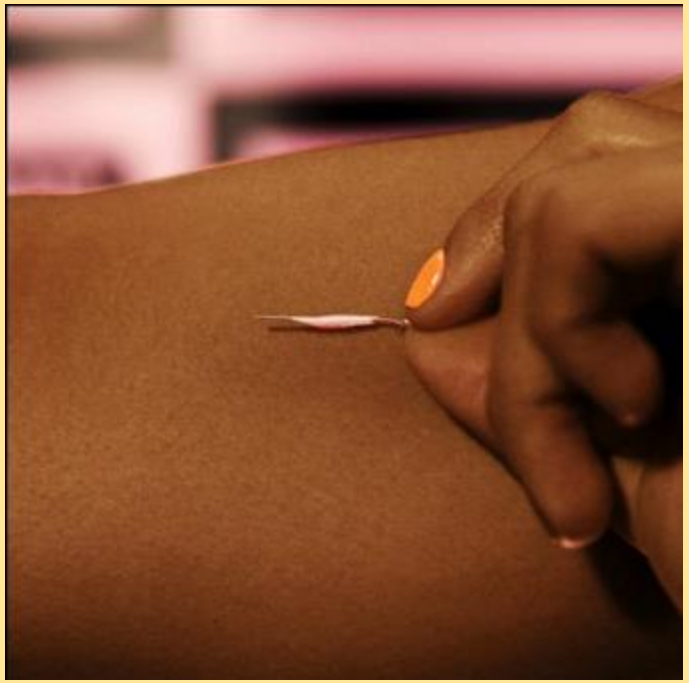
layla

Hey girl! I'm Layla. Consider me your new best friend with all the deets about those uncomfortable topics like birth control, sex, and STDs. You know, the stuff you're not exactly running home to talk to mom about. Ask me anything you want and I promise, it stays between me and you. Have any questions for me? I'm listening!

Ask a question...



	July	August
# of Sessions	546	642 (+18%)
# Messages Sent by Users	206	284 (+38%)
Messages per session	3.00	3.12 (+4%)
Time per session	15.9	16.97 (+6%)



THE SHOT

THE PATCH

THE RING

YOU ARE
100%
THAT QUEEN.

@peptik

HAVE BIG

DREAMS.

YOU'LL

GROW IN

TO THEM.

you are

enough

Elayla

good things are coming
good things are coming
good things are coming
good things are coming
good things are coming
good things are coming
good things are coming
good things are coming

ayla

Layla
@laylasgotyou

Let your strength shine. ✨ #blackgirlmagic #girlsarestrong

laylasgotyou • Follow

laylasgotyou Lean into Layla 'cause you know she's got you. #laylasgotyou #melaninpoppin

3w

Layla's Got You
Published by Taylor McDowell [?] · August 26 at 3:51 PM ·

Express yourself.

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THANK YOU!

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