

PA Vaccine Conversations and Misinformation on Twitter

Julia Alieva, Dawn Robertson, Dr. Kathleen M. Carley
Vaccine Hesitancy Project Update based on July 1 - July 7, 2021

The CMU centers for:
Informed DEMocracy And Social cyber-security
Computational Analysis of Social and Organizational Systems



Carnegie Mellon University



1/11/2022

1

1

- ❑ This report is an effort to summarize social media conversations around COVID-19 issues in Pennsylvania, focusing on vaccination. It contains an analysis of the general topics about the current pandemic, such as COVID-19 regulations, mandates, masks, pro-and anti-vaccination campaigns, as well as other topics related to COVID-19 misinformation, disinformation, conspiracy theories, and vaccine hesitancy messages.
- ❑ The material contained in this report is a summary of social media content and does not represent a judgment or characterization of any individual.

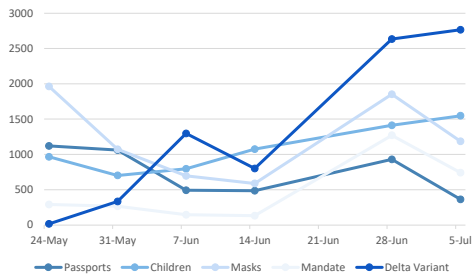
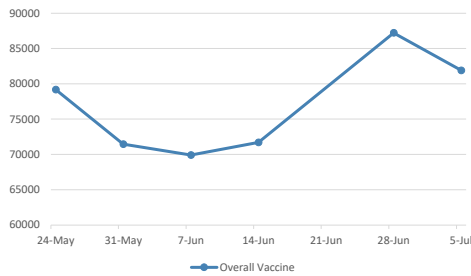
1/11/2022

2



2

Trends (tweets per week)



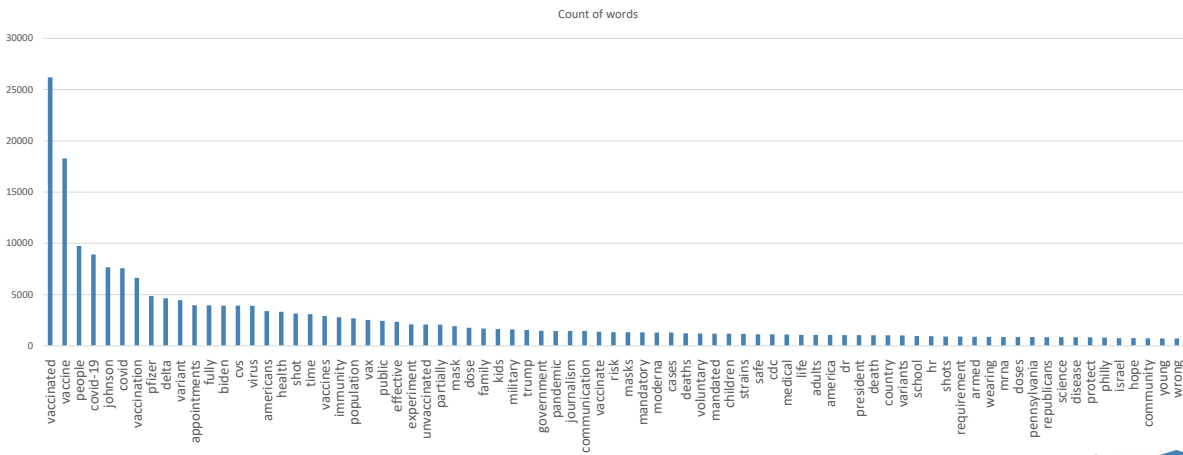
*These counts are from the entire PA-based conversation, which will include out-of-state tweets retweeted by in-state agents.

1/11/2022



3

Top Words Used per Week July 1 – July 7



1/11/2022



4

High Level View by City July 1 – July 7

Conversation	Total PA		Philadelphia		Pittsburgh		Erie		Allentown/Bethlehem		Other	
	Tweets	%	Tweets	%	Tweets	%	Tweets	%	Tweets	%	Tweets	%
Overall Vaccine	46382*		26435	57.0%	9260	20.0%	374	0.8%	9583	20.7%	730	1.6%
Vaccine Passports	197		109	0.4%	52	0.6%	4	1.1%	29	0.3%	3	0.4%
Not FDA Approved	134		76	0.3%	38	0.4%			15	0.2%	5	0.7%
Boosters	94		56	0.2%	24	0.3%			12	0.1%	2	0.3%
Misinfo:												
Microchips	18		11	0.0%	3	0.0%			3	0.0%	1	0.1%
Misinfo: Magnets	39		12	0.0%	17	0.2%	2	0.5%	8	0.1%		
Misinfo: Shedding	14		7	0.0%	4	0.0%			2	0.0%	1	0.1%
"Experimental"	162		87	0.3%	40	0.4%	2	0.5%	29	0.3%	4	0.5%
Children	467		262	1.0%	103	1.1%	4	1.1%	89	0.9%	9	1.2%
Myocarditis	67		29	0.1%	23	0.2%	1	0.3%	13	0.1%	1	0.1%
Heart	316		133	0.5%	113	1.2%	2	0.5%	43	0.4%	25	3.4%
Masks	1935		1286	4.9%	358	3.9%	17	4.5%	236	2.5%	38	5.2%
Infertility	7		3	0.0%	2	0.0%			2	0.0%		
Mandates	490		362	1.4%	50	0.5%	4	1.1%	66	0.7%	8	1.1%
Natural Immunity	80		44	0.2%	27	0.3%			9	0.1%		
Efficacy	169		77	0.3%	34	0.4%	3	0.8%	52	0.5%	3	0.4%
Spike Proteins	25		10	0.0%	15	0.2%						
Delta Variant	1588		927	3.5%	338	3.7%	17	4.5%	269	2.8%	37	5.1%
Race*	426		252	1.0%	103	1.1%	4	1.1%	58	0.6%	9	1.2%

1/11/2022

- Tweets here counted only if there is a city location attached now
- Percentages across top are percentages of city out of entire state
- Percentages by city column are % of each topic out of the city's tweets
- Race: pulled by one of the vaccine keywords plus at least one other term in ("Black", "African American", "of color", "Latin", "Hispanic", "brown", "eugenic")



5

High Level View by County July 1 – July 7

County	Allegheny	Beaver	Butler	Cambria	Fayette	Indiana	Somerset	Westmoreland
Overall Vaccine	9363	6	23	13	13	4	1	12
Vaccine Passports	52		1		1			
Not FDA Approved	39							
Boosters	24							
Misinfo: Microchips	3							
Misinfo: Magnets	17							
Misinfo: Shedding	4							
"Experimental"	40							1
Children	104							
Myocarditis	23							
Heart	118			1		1		1
Masks	365		1	2				1
Infertility	2							
Mandates	50							
Natural Immunity	27							
Efficacy	34				1			
Spike Proteins	15							
Delta Variant	471		1					
Race*	103					1		

1/11/2022

- Tweets counted here if there is a county location attached now
- Race: pulled by one of the vaccine keywords plus at least one other term in ("Black", "African American", "of color", "Latin", "Hispanic", "brown", "eugenic")



6

Top Hashtags by City July 1 – July 7

❑ After removing hashtags that were part of our search criteria, the top 5 hashtags for each region related to COVID19/vaccines are as follows:

Philadelphia	Chester	Norristown	Pittsburgh	Erie	Allentown/ Bethlehem	Other
covid19 (569)	Covid19 (111)	covid19 (142)	covid19 (332)	covid19 (7)	covid19 (237)	saveourchildren (18)
deltavariant (353)	Deltavariant (105)	deltavariant (55)	deltavariant (143)	covidvaccine (5)	deltavariant (159)	Covidvaccine (6)
getvaccinated (182)	Mrna (52)	vaccineswork (28)	vaccine (74)	deltavariant (4)	getvaccinated (50)	covid19(4)
vaccine (129)	Kidney (45)	getvaccinated (18)	getvaccinated (57)	getvaccinated (4)	firefauci (28)	getvaccinated(3)
vaxupphilly (129)	Children (42)	genocide (16)	firefauci (42)	covidiot (3)	covidvaccine (25)	Johnsonandjohnson vaccine (3) Modernavaccine (3) pfizervaccine (3)

1/11/2022



7

Top Hashtags by County July 1 – July 7

❑ We've checked hashtags in several counties such as Allegheny, Beaver, Bradford, Butler, Cambria, Crawford, Fayette, Indiana, Lackawanna, Luzerne, Lycoming, Monroe, Philadelphia, Pike, Potter, Somerset, West Moreland, York. After removing hashtags that were part of our search criteria, the top 5 hashtags for each county related to COVID19/vaccines are as follows*:

Allegheny	Butler	Luzerne	Philadelphia	York
covid19 (335)	covid19 (3)	covidvaccine (1)	covid19 (569)	getvaccinated (2)
deltavariant (144)	getvaccinated (1)	deltavariant (1)	deltavariant (353)	covidbullshit (1)
vaccine (74)	novaccinepassportsanywhere (1)		getvaccinated (182)	covidvaccination (1)
getvaccinated (57)	vaccine (1)		vaccine (129)	vaccineswork (1)
vaccineswork (50)			vaxupphilly (129)	

* If you do not see a county in the table, that means we couldn't find any hashtags related to COVID19 in this county.

1/11/2022



8

Top URLs by City July 1 – July 7

Philadelphia	Chester	Norristown	Pittsburgh	Erie	Allentown/ Bethlehem	Other
https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (679)	https://www.ema.europa.eu/en/documents/assessment-report/covid-19-vaccine-moderna-epar-public-assessment-report_en.pdf Assessment report COVID-19 Vaccine Moderna (46)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (67)	https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (664)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (9)	https://www.cvs.com/immunizations/covid-19-vaccine CVS page (3846)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (8)
https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (282)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (38)	https://rumble.com/vb8e1-massive-world-renowned-doctor-blows-lid-off-of-covid-vaccine.html MASSIVE: WORLD RENOWNED DOCTOR BLOWS LID OFF OF COVID VACCINE (34)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (298)	https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (7)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (114)	https://preprints.jmir.org/preprint/28568/accepted Physiologic Response to the Pfizer-BioTech COVID-19 Vaccine Measured Using Wearable Devices: A Prospective Observational Study (5)
https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (99)	https://twitter.com/RayArmat/status/1412042854663400373 Thread: Some Pharmacokinetics, Geno- & Reprotoxicity highlights, Moderna's report to EMA, mostly animal studies: "Low levels of mRNA could be detected in all examined tissues except the #kidney, this included heart, lung, testis & also... (30)	https://rumble.com/vsyy1-sen-ron-johnson-on-vaers-system-vaccine-deaths-and-youtubecensorship.html Sen. Ron Johnson on VAERS System, Vaccine Deaths and YouTube Censorship (32)	https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (77)	https://noqreport.com/2021/06/29/newest-covid-lie-fear-delta-variant-and-get-vaccinated/ Newest COVID Lie: Fear Delta Variant and Get Vaccinated (5)	https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (47)	https://www.nationalreview.com/news/trump-praises-xi-for-handling-of-coronavirus-outbreak-as-death-toll-passes-600/ Trump Praises Xi for Handling of Coronavirus Outbreak as Death Toll Passes 600 (4)
https://www.penncapitalstar.com/blog/wolf-vetoes-bill-banning-pa-primary-schools-colleges-from-requiring-covid-vaccines/ Wolf vetoes bill banning Pa. primary schools, colleges from requiring COVID vaccines (99)	https://twitter.com/RayArmat/status/1412042854663400373 Folks: Nobody cares more about your children's health than #McDonalds & Pfizer! Real #New/propaganda brought to you by ABC + JunkFood/Pharma industries (21)	https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (19)	https://mol.im/a/9734317 Doctors report first known case of rare blood clots in US patient who received the Moderna COVID-19 vaccine - and later died (59)	https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (4)	https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (39)	http://hill.com/bpr02P Va. governor says only a catastrophe will push unvaccinated Americans to get shot (3)
https://www.rawstory.com/alaska-house-rep-ron-sillham/ Alaska GOP lawmaker shares meme that promotes hanging of doctors who "force" him to get vaccinated (77)	https://www.cvs.com/immunizations/covid-19-vaccine CVS (19)	https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (33)	https://www.cnn.com/2021/07/06/politics/jim-justice-west-virginia-covid-vaccinations/index.html West Virginia GOP governor: "If you're not vaccinated, you're part of the problem" (52)	https://childrenshealthdefense.org/defender/covid-vaccine-spike-protein-travels-from-injection-site-organ-damage/ "We Made a Big Mistake" - COVID Vaccine Spike Protein Travels From Injection Site, Can Cause Organ Damage (3)	https://www.washingtontimes.com/news/2021/jun/30/dr-anthony-fauci-warns-its-going-to-be-two-americas/ Dr. Fauci warns "it's going to be two Americas" between vaccinated, unvaccinated (24)	http://bit.ly/CoronavirusPADQ COVID-19 in Pennsylvania (3)

9

Top URLs by County July 1 – July 7

Allentown	Butler	Philadelphia	Lackawanna	Luzerne	York
http://hill.com/YGxqWpP Pfizer vaccine less effective against delta variant (665)	https://abcnews.go.com/Health/delta-variant-means-americans-summer/story?id=78577830 What the delta variant means for Americans this summer (1)	https://thehill.com/policy/healthcare/public-global-health/561627-pfizer-vaccine-less-effective-against-delta-variant Pfizer vaccine less effective against delta variant (679)	http://hill.com/lfarw/ Fauci: More than 99% of people who died from COVID-19 in June were not vaccinated (1)	https://fox56.com/news/local/east-stroudsburg-university-offers-vaccine-incentives-to-students East Stroudsburg University offers vaccine incentives to students (1)	https://beforeitsnews.com/politics/2021/06/15/official-fauci-the-fraud-finally-named-in-massive-lawsuit-filed-by-american-frontline-doctors-this-is-big-3238216.html It's Official! Fauci "The Fraud" Finally Named In Massive Vax Scam Lawsuit Filed By American Frontline Doctors! This Is Big! Must Video! (1)
https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (301)	https://alexberenson.substack.com/p/vaccines-reasons-for-concern-569?utm_campaign=post&utm_medium=web&utm_source=twitter Vaccines: Reasons for Concern (1)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (282)	http://hill.com/vc20cNS CDC director: Vaccinated people 'safe' from delta variant, do not need to wear masks (1)	https://fox56.com/news/local/gov-wolf-vetoes-anti-vaccination-legislation Gov. Wolf vetoes anti-vaccination legislation (1)	https://video.foxnews.com/v/6262464983001#sp=show-clips Dr. Marc Siegel says Dr. Anthony Fauci is sending the wrong message on masks (1)
https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (79)	https://www.governor.pa.gov/newsroom/gov-wolf-vetoes-anti-vaccination-legislation/ Gov. Wolf Vetoes Anti-Vaccination Legislation (1)	https://twitter.com/DailyCaller/status/1412490321770975237 Daily Caller BIDEN: "We need to go community-by-community, neighborhood-by-neighborhood, and oft times door-to-door, literally knocking on doors" to get people vaccinated. (99)	https://6abc.com/10869086?tex_cid=TA_WPVI_TW&raid=60e61d86fd7d30901f57cd1&utm_campaign=trueAnthem%24-Trending-Content&utm_medium=trueAnthem&utm_source=twitter Mayor of Chester concerned over city's low COVID-19 vaccination rates (1)	https://fox56.com/news/local/pa-dept-of-health-601-of-pennsylvanians-age-18-and-older-fully-vaccinated PA Dept. of Health: 60.1% of Pennsylvanians Age 18 and Older Fully Vaccinated (1)	https://www.penncapitalstar.com/blog/wolf-vetoes-bill-banning-pa-primary-schools-colleges-from-requiring-covid-vaccines/ Wolf vetoes bill banning Pa. primary schools, colleges from requiring COVID vaccines (99)
https://www.dailymail.co.uk/health/article-9734317/Doctors-report-known-case-rare-blood-clots-patient-received-Moderna-COVID-vaccine.html Doctors report first known case of rare blood clots in US patient who received the Moderna COVID-19 vaccine - and later died (59)	https://www.ipost.com/health-science/pfizer-covid-19-vaccine-linked-to-rare-blood-disease-israeli-study-671694 Pfizer COVID-19 vaccine linked to rare blood disease - Israeli study (1)	https://www.penncapitalstar.com/blog/wolf-vetoes-bill-banning-pa-primary-schools-colleges-from-requiring-covid-vaccines/ Wolf vetoes bill banning Pa. primary schools, colleges from requiring COVID vaccines (99)	https://cbsn.ws/2TxbTmU First nurse to receive COVID-19 vaccine will have her scrubs and vaccine card displayed in Smithsonian (1)	https://fox56.com/newsletter-daily/will-one-dose-or-a-two-dose-covid-19-vaccine-protect-me Will one dose of a two-dose COVID-19 vaccine protect me? (1)	
https://www.cnn.com/2021/07/06/politics/jim-justice-west-virginia-covid-vaccinations/index.html West Virginia GOP governor: "If you're not vaccinated, you're part of the problem" (53)	https://www.persuasioncommunity.org/what-we-got-wrong-and-right-about-what-we-got-wrong-about-covid-19/ What We Got Wrong (and Right) About COVID-19 (1)	https://www.rawstory.com/alaska-house-rep-ron-sillham/ Alaska GOP lawmaker shares meme that promotes hanging of doctors who "force" him to get vaccinated (77)	https://thehill.com/policy/healthcare/560871-cdc-director-vaccinated-people-safe-from-delta-variant-do-not-need-to-wear CDC director: Vaccinated people 'safe' from delta variant, do not need to wear masks (1)	https://twitter.com/armytimes/status/1410712841183809539 ArmyTimes - Prepare for mandatory COVID vaccines in September, Army says in EXORD (1)	

10

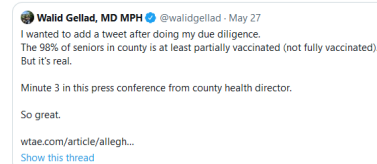
Topic: Homewood

- Pittsburgh neighborhood
- No “geo id” tag in Twitter data and users rarely share coordinates
- Keyword search in recent data: < 10 vaccine relate “Homewood” tweets



FYI this thanks in no small part to @AgeFriendlyPGH @livelypgh - rallying community partners for age-friendly clinics in Homewood, South Side, Sheraden, Clairton, Wilkinsburg, Whitehall (Bhutanese community), others run by Dr. Liz Miller & @UPMC @UPMCHHealthPlan

7 more in June



1/11/2022



11

Topic: Children

- Many URLs from Children’s Health Defense every week: <https://childrenshealthdefense.org/>
- Founded by Robert F. Kennedy Jr.
- Vaccine skeptical
- Media Bias/Fact Check site rates: high conspiracy level, high pseudo-science, low factual reporting

I was horrified yesterday to see supporters from RFK Jr.’s Children’s Health Defense distributing anti-vaxx propaganda disguised as “Medical Racism” flyers at the African Arts Festival in Brooklyn, one of the oldest and largest gathering of Black Brooklynites.

Deeply troubling. They are targeting Black and brown communities. I just was sent their pamphlet by a vaccine hesitant young(ish) man (in Philly) who felt vindicated about his hesitancy. There needs to be a concerted push back.

10:50 AM · Jul 5, 2021 · Twitter for iPhone

1/11/2022



12

For More Information

- ❑ Dr. Kathleen M. Carley - kathleen.carley@cs.cmu.edu
 - ❑ <http://www.casos.cs.cmu.edu/bios/carley/carley.html>
- ❑ IDeaS website - <https://www.cmu.edu/ideas-social-cybersecurity/>
- ❑ CASOS website - <http://www.casos.cs.cmu.edu/>

1/11/2022

Copyright © 2021 Kathleen M. Carley

