

PA Vaccine Conversations on Twitter

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Vaccine Hesitancy Project Update based on December 10 – December 16, 2021

The CMU centers for:

Informed DEMocracy And Social cyber-security

Computational Analysis of Social and Organizational Systems



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PA Vaccine Conversation Project

- ❑ This report is an effort to summarize social media conversations around COVID-19 issues in Pennsylvania, with a focus on vaccination. It contains an analysis of the general topics related to COVID-19 vaccination. This includes discussions related to COVID-19 regulations, mandates, masks, pro-and anti-vaccination campaigns, science messages, 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.

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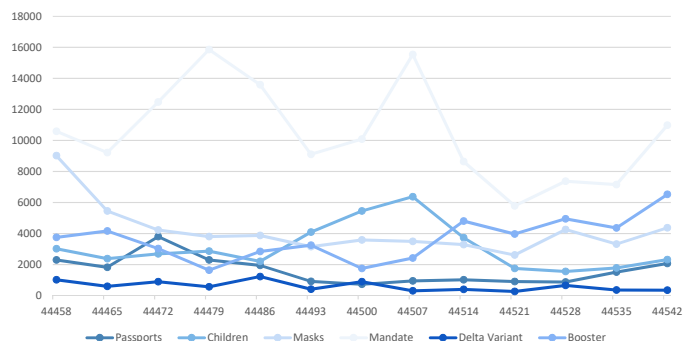
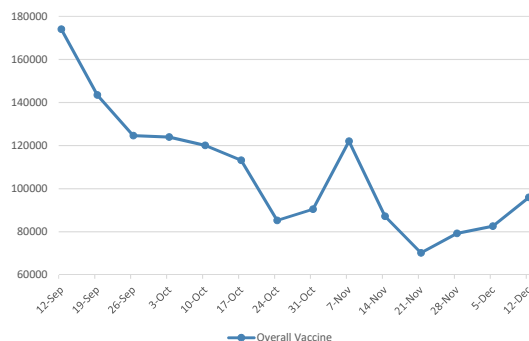
Report Overview December 10– December 16

- This week's trending stories cover new COVID-19 variant omicron, vaccination mandates, boosters, masks, and others;
- Trending stories: <https://www.foxnews.com/health/mixing-some-vaccines-produce-a-better-immune-system-response-against-covid-19-british-study-finds> Mixing Pfizer and Moderna vaccines gives a better immune system response against COVID-19, study finds; <https://bit.ly/3oBfA7Q> Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates; <http://hill.cm/RNF5fwZ> Pfizer CEO says fourth vaccine shot may eventually be needed; <https://mediaite.com/a/ewyqg> Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19; <https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/> Most reported U.S. Omicron cases have hit the fully vaccinated — CDC; <https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf> Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19–Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021; <https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf> Protection and waning of natural and hybrid COVID-19 immunity; <https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf> Protection and waning of natural and hybrid COVID-19 immunity;
- Anti-vax, disinformation, or vaccine hesitancy stories: <https://reclaimthenet.org/twitter-ban-vaccines-spread-virus/> Twitter will now ban users that repeatedly claim vaccinated people can spread Covid; <https://bit.ly/3rRVIEY> Fauci Suggests Families Should Enforce Vaccine Mandate in Homes During Holidays; <https://t.co/j4DXzMp3Bo> Anti-vax tweet: Dr. Fauci opens up the possibility that the COVID-19 vaccine could be making people more likely to be infected by the virus. "This would not be the first time, if it happened, that a vaccine that looked good in initial safety actually made people worse."

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Trends (tweets per week) December 10– December 16



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High Level View by City December 10 – December 16

	Total PA	Philadelphia		Pittsburgh		Erie		Allentown/Bethlehem		Other	
Conversation	Tweets	Tweets	%	Tweets	%	Tweets	%	Tweets	%	Tweets	%
Overall Vaccine	80534	48959	60.8%	16964	21.1%	710	0.9%	10638	13.2%	3263	4.1%
Vaccine Passports	2057	1344	2.7%	377	2.2%	13	1.8%	275	2.6%	48	1.5%
FDA Approval	178	130	0.3%	19	0.1%	2	0.3%	21	0.2%	6	0.2%
Boosters	5355	2937	6.0%	1189	7.0%	57	8.0%	853	8.0%	319	9.8%
Employees	749	457	0.9%	155	0.9%	5	0.7%	96	0.9%	36	1.1%
"Experimental"	173	85	0.2%	36	0.2%	4	0.6%	40	0.4%	8	0.2%
Children	1146	633	1.3%	261	1.5%	9	1.3%	189	1.8%	54	1.7%
Myocarditis	287	160	0.3%	72	0.4%	1	0.1%	42	0.4%	12	0.4%
Heart	858	428	0.9%	225	1.3%	8	1.1%	154	1.4%	43	1.3%
Masks	4318	2438	5.0%	822	4.8%	59	8.3%	617	5.8%	382	11.7%
Thrombosis/VITT	124	67	0.1%	26	0.2%			28	0.3%	3	0.1%
Mandates	10789	8133	16.6%	1019	6.0%	82	11.5%	1219	11.5%	336	10.3%
Natural Immunity	1148	822	1.7%	191	1.1%	2	0.3%	117	1.1%	16	0.5%
Efficacy	178	104	0.2%	44	0.3%	1	0.1%	26	0.2%	3	0.1%
Omicron	3262	1838	3.8%	564	3.3%	34	4.8%	641	6.0%	185	5.7%
Delta Variant	339	185	0.4%	74	0.4%	1	0.1%	47	0.4%	32	1.0%
Race	1464	834	1.7%	343	2.0%	21	3.0%	200	1.9%	66	2.0%
Ivermectin	220	110	0.2%	53	0.3%	1	0.1%	48	0.5%	8	0.2%
Military	463	252	0.5%	103	0.6%	2	0.3%	82	0.8%	24	0.7%
Breakthrough	241	147	0.3%	37	0.2%			48	0.5%	9	0.3%

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Trending conversations:

- Boosters
- Passports
- Masks
- Mandates



High Level View by County December 10 – December 16

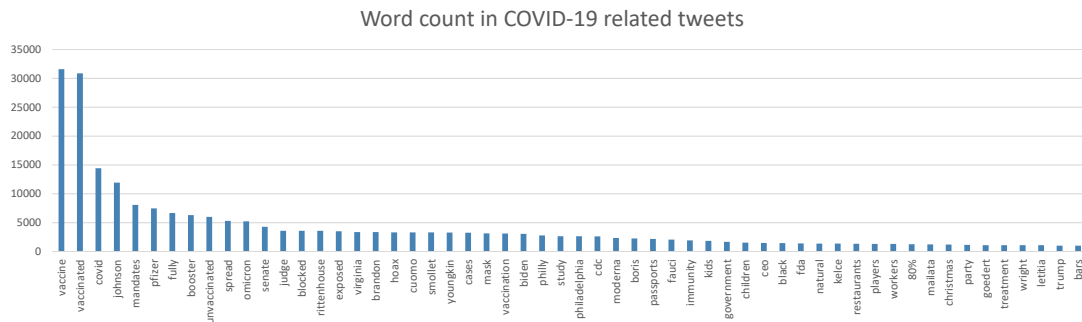
County	Allegheny	Beaver	Butler	Cambria	Fayette	Indiana	Somerset	Westmoreland
Overall Vaccine	17495	25	60	13	28	16	16	86
Vaccine Passports	386		1					6
FDA	20							
Boosters	1255	2	4	1	2	1	2	6
Employees	162							
"Experimental"	38							
Children	270		2	1				3
Myocarditis	74				1			
Heart	234		2		1	1		4
Masks	860	3	7	1	3	1	1	11
Thrombosis/VITT	26							
Mandates	1059	1	5		1	3	1	12
Natural Immunity	192		1					2
Efficacy	44		1		1			1
Omicron	596	1	2		1	1	2	5
Delta Variant	76							1
Race	354		1	1		1		1
Ivermectin	57							
Military	107				1			1
Breakthrough	38		1				1	1

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



Top Words Used per Week December 10– December 16



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Top Hashtags by County December 10– December 16

- ❑ We've checked hashtags in several counties such as Allegheny, Beaver, Butler, Cambria, Fayette, Indiana, Somerset, and West Moreland. 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	Beaver + Butler	Cambria	Fayette	West Moreland
covid19 (392)	coronavirus (1)	getvaccinated (2)	coronavirusvaccine (1)	covid19 (3)
steelers (308)	freedom (1)	staysafe (2)	eua (1)	herewego (2)
omicron (173)	tyranny (1)	thisisourshot (1)		omicron (1)
probowlvote (172)	bigpharmacartel (1)	trumpisalaughingstock (1)		smartnews (1)
vaccine (143)	booster (1)	vaccineswork (1)		

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Top Hashtags by City December 10– December 16

- ❑ 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 (598)	probowlvote (354)	covid19 (187)	covid19 (391)	demvoice1 (10)	covid19 (164)	vaccine (78)
eagles (519)	eagles (118)	omicron (110)	steelers (304)	browns (9)	omicron (145)	covid19 (53)
omicron (361)	omicron (110)	probowlvote (89)	probowlvote (172)	covid (8)	probowlvote (77)	probowlvote (44)
vaxupphilly (214)	covid19 (95)	eagles (71)	omicron (170)	steelers (7)	eagles (54)	eagles (32)
breaking (199)	covaxin (28)	covid (46)	vaccine (141)	omicron (6)	vaccine (42)	omicron (27)

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Top URLs by County December 10– December 16

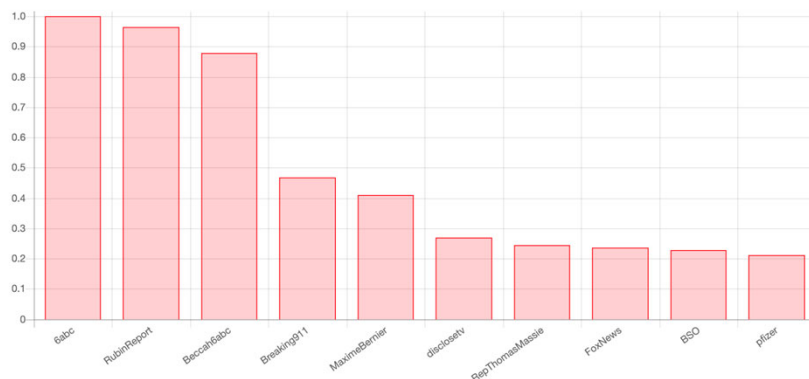
Allegheny	Butler + Beaver	Cambria	Indiana + Somerset	Fayette	West Moreland
https://www.foxnews.com/health/mixing-some-vaccines-produce-a-better-immune-system-response-against-covid-19-british-study-finds Mixing Pfizer and Moderna vaccines gives a better immune system response against COVID-19, study finds (363)	https://mediaite.com/a/ewyqg Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (2)	http://www.vaccines.gov (2)	http://www.votervoice.net/Shares/Bd3KKAgoACZBWA3RTRKZEBA Comments on Mandate to Elected Officials and public comment forum (1)	https://bit.ly/3oBfA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (2)	https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021 (2)
https://bit.ly/3oBfA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (240)	https://twitter.com/andrew_friedson/status/1469355126200619014 Great to be back this year in person for the #CFMBreakfast2021 with a huge turnout of Montgomery County's civic, business, nonprofit and government leaders. (2)	http://ow.ly/CTKtQ50H8IXF The Science Behind COVID-19 Vaccines: Parent FAQs (1)	https://bbc.in/3rVrlqm Omicron: Three vaccine doses key for protection against variant (1)	https://cnn.it/3yifowE Britain battles Omicron 'tidal wave,' as infections double every two to three days and first death from variant is recorded (1)	https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf Protection and waning of natural and hybrid COVID-19 immunity (2)
http://hill.cm/RNF5fwZ Pfizer CEO says fourth vaccine shot may eventually be needed (117)	https://bit.ly/3rRVIEY Fauci Suggests Families Should Enforce Vaccine Mandate in Homes During Holidays (1)		https://www.bloomberg.com/graphics/2021-covid-surge-shows-overwhelming-cost-of-being-unvaccinated-america Unvaccinated Covid Patients Push Hospital Systems Past the Brink (1)	https://www.businessinsider.com/lawmakers-bought-sold-covid-19-related-stocks-during-pandemic-2021-12 As the pandemic raged, at least 75 lawmakers bought and sold stock in companies that make COVID-19 vaccines, treatments, and tests (1)	https://hannity.com/media-room/mask-again-new-york-governor-brings-back-mask-mandate-for-indoor-spaces/ MASK AGAIN: New York Governor Brings Back Mask Mandate for Indoor Spaces (1)
https://mediaite.com/a/ewyqg Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (84)	https://www.washingtontimes.com/news/2021/dec/9/austria-to-impose-nationwide-vaccine-mandate-fine/ Austria to impose nationwide vaccine mandate, fine violators up to \$4,000 (1)		https://apnews.com/article/coronavirus-pandemic-health-pandemics-dcb943700b4a65fe1031a7f6ab40026d COVID cases spike even as US hits 200M vaccine milestone (1)	https://yougov.co.uk/topics/politics/articles-reports/2021/12/10/boris-johnsons-favourability-has-dropped-all-time-7utm_source=twitter&utm_medium=website&utm_campaign=favourability Boris Johnson's favourability has dropped to an all-time low (1)	https://thehill.com/opinion/white-house/585496-senate-vaccine-mandate-vote-shows-congressional-weakness-on-regulations Senate vaccine mandate vote shows congressional weakness on regulations (1)
https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (60)	https://trib.al/O3V1xe1 Omicron in Oakland: How a Wisconsin wedding with 'super responsible' vaccinated people led to outbreak (1)		https://on.msnbc.com/3Elv8fC Dr. Adalja on treating unvaccinated Covid patients: 'I'm far beyond burnt out' (1)		https://www.jpost.com/health-and-wellness/coronavirus/most-reported-us-omicron-cases-have-hit-the-fully-vaccinated-cdc-688433 Most reported US Omicron cases have hit the fully vaccinated -CDC (1)

Top URLs by City December 3 – December 9

Philadelphia	Chester	Norristown	Pittsburgh	Erie	Allentown/ Bethlehem	Other
https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf Protection and waning of natural and hybrid COVID-19 immunity (414)	https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (45)	https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (26)	https://www.foxnews.com/health/mixing-some-vaccines-produce-a-better-immune-system-response-against-covid-19-british-study-finds Mixing Pfizer and Moderna vaccines gives a better immune system response against COVID-19, study finds (363)	https://cnb.cx/309TGtE Pfizer CEO says fourth Covid vaccine doses may be needed sooner than expected due to omicron (9)	https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (73)	https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (29)
https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021 (412)	https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (32)	https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf Protection and waning of natural and hybrid COVID-19 immunity (22)	https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (236)	http://erie.gov/vax (4)	https://mediaite.com/a/ewyag Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (52)	https://nbcnews.to/3yeEAnK CDC signs off on booster shot of Pfizer vaccine for older teens (14)
https://bit.ly/3oBFA7Q Letitia Wright Done With MCU And Black Panther: Wakanda Forever Because Of Vaccine Mandates (404)	https://ir.ocugen.com/news-releases/news-release-details/ocugen-inc-announces-submission-emergency-use-authorization Ocugen, Inc. Announces Submission of Emergency Use Authorization Request to the US FDA for Investigational COVID-19 Vaccine COVAXIN™ (BBV152) for Children Ages 2-18 Years (20)	https://trib.al/twZ1qUH Nets' Kyrie Irving might be swayed to take plant-based COVID vaccine in works (19)	http://hull.cm/RNF5hwZ Pfizer CEO says fourth vaccine shot may eventually be needed (117)	http://www.erie.gov/vax (4)	https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (50)	https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (14)
https://mediaite.com/a/ewyag Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (275)	https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021 (16)	https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021 (19)	https://mediaite.com/a/ewyag Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (84)	https://www.google.com/amp/s/www.nbcсандiego.com/news/coronavirus/1st-case-of-covid-omicron-variant-found-in-fully-vaccinated-and-boosted-sa-diegan/2808534/%3famp 1st Case of COVID Omicron Variant Found in Fully Vaccinated and Boosted San Diegan (4)	https://www.cdc.gov/mmwr/volumes/70/wr/pdfs/mm7044e1-H.pdf Laboratory-Confirmed COVID-19 Among Adults Hospitalized with COVID-19-Like Illness with Infection-Induced or mRNA Vaccine-Induced SARS-CoV-2 Immunity — Nine States, January–September 2021 (37)	https://nyti.ms/31P51Fn Covid News: States Enlist National Guard to Help Hospitals; Federal regulators clear Pfizer-BioNTech boosters for 16- and 17-year-olds. (12)
https://reclaimthenet.org/twitter-ban-vaccines-spread-virus/ Twitter will now ban users that repeatedly claim vaccinated people can spread Covid (200)	https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf Protection and waning of natural and hybrid COVID-19 immunity (16)	https://mediaite.com/a/ewyag Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (15)	https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (60)	https://www.reuters.com/world/us/most-reported-us-omicron-cases-have-hit-fully-vaccinated-cdc-2021-12-10/ Most reported U.S. Omicron cases have hit the fully vaccinated -CDC (4)	https://www.medrxiv.org/content/10.1101/2021.12.04.21267114v1.full.pdf Protection and waning of natural and hybrid COVID-19 immunity (37)	https://cnb.cx/3ILC6sD Pfizer CEO says fourth Covid vaccine doses may be needed sooner than expected due to omicron

Analysis of Tweeters - Super Spreaders

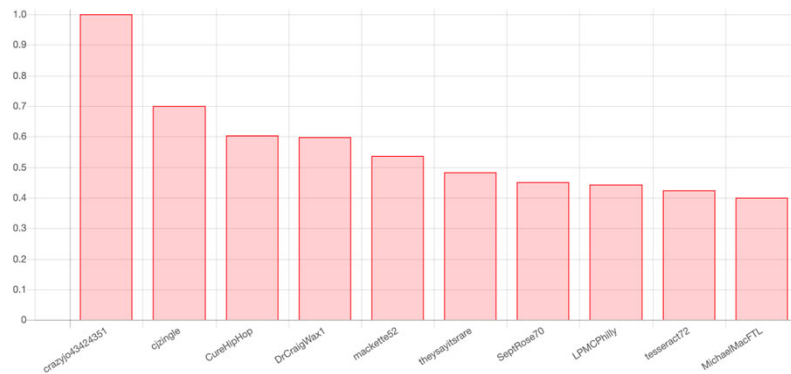
- ❑ Super Spreaders are users which generate content that is shared often, and hence spread information effectively.



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Analysis of Tweeters - Super Friends

- Super Friends are users that exhibit frequent two-way communication, facilitating large or strong communication networks.

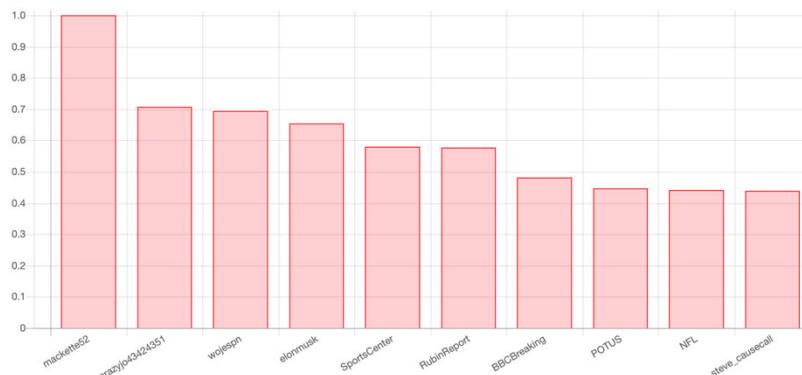


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Analysis of Tweeters - Other Influencers

- Other Influencers are users which have an active network presence, by tweeting often or mentioning users often, and operate in central parts of the conversation, such as by using important hashtags, or mentioning important users.



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Accounts Referenced by the Most Tweets

- ❑ This shows the tweeters that are most often referenced (e.g. mentioned) in PA tweets. Value is the number of tweets that reference the agent.

Agent Label	Value
RaheemKassam[+]	661
pfizer[+]	604
POTUS[+]	511
mtgreenee[+]	506
LaSleepy_	369
indyfromspace	365
TreezySosa	286
catturd2	282
NewBlueON	267
US_FDA[+]	253

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Trending Tweets December 10– December 16

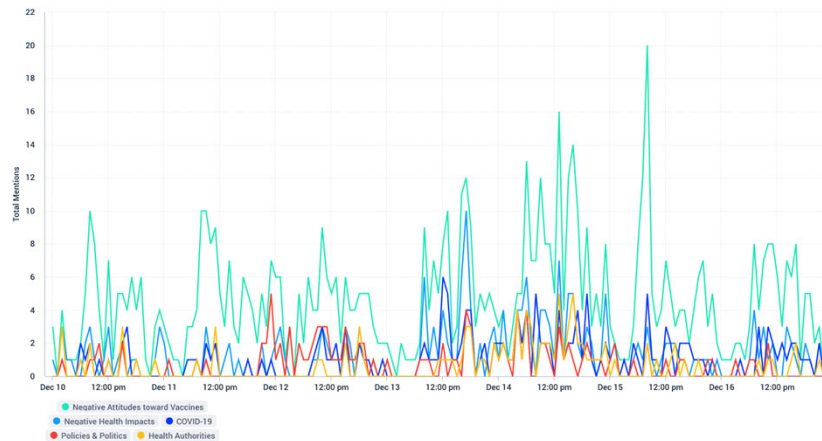
Tweets that are the most forwarded, either by retweet, reply, or quote:

- ❑ Youngkin won in Virginia. Kyle Rittenhouse was acquitted. Federal judge blocked vax manadates. Senate blocked vax mandates. Cuomo booted. Smollet hoax exposed. Things are turning. Keep pushing. Let's Go Brandon.
- ❑ Both the vaccinated and unvaccinated can spread the virus.
- ❑ CDC: 80% of Omicron cases found in the fully vaccinated, a third of them had received a booster dose Symptoms are mild in both the unvaccinated and vaccinated - Reuters
- ❑ Details on Letitia Wright Allegedly Done With MCU and Black Panther: Wakanda Forever Because of Vaccine Mandates (Video) <https://t.co/TLN8Pzh5h9> <https://t.co/RRW0Eq3fJA>
- ❑ UPDATE: 12/9/21 11:58 MST. My brother died this morning. We have now lost 2 of the 10 in our immediate family. We buried the other last Tuesday. My family & I are broken. For Gods sake I'm BEGGING you to get vaccinated. We have 8 others to care for now. Thx for your support.
- ❑ Israel study: the naturally immune had a 10.5 per 100,000 infection rate 4-6 mos. following recovery, vs a 69.2 per 100,000 rate among vaccinated.
- ❑ Mixing Pfizer and Moderna vaccines gives a better immune system response against COVID-19, study finds <https://t.co/tRvp3cYkoR>
- ❑ Dr. Fauci opens up the possibility that the COVID-19 vaccine could be making people more likely to be infected by the virus. "This would not be the first time, if it happened, that a vaccine that looked good in initial safety actually made people worse." <https://t.co/j4DXzMp3Bo>
- ❑ I'm fully vaccinated and I have had my booster. No, I don't know "what's in it". Neither this vaccine or the ones I had as a child. Nor do I know what's in the 11 secret herbs and spices at KFC.
- ❑ The #Eagles currently have no players slated to go to the Pro Bowl. We gotta help our guys out. #ProBowlVote Darius Slay #ProBowlVote Dallas Goedert #ProBowlVote Jason Kelce #ProBowlVote Lane Johnson #ProBowlVote Jordan Mailata #ProBowlVote Javon Hargrave 1 RT = 1 Vote

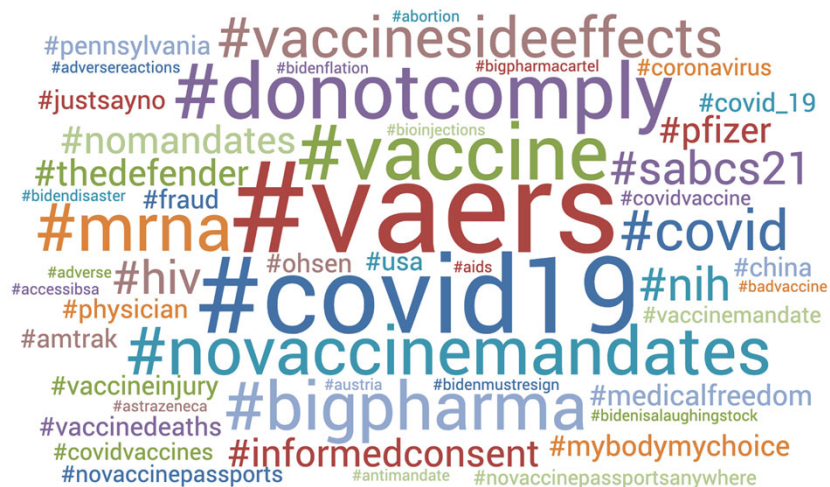
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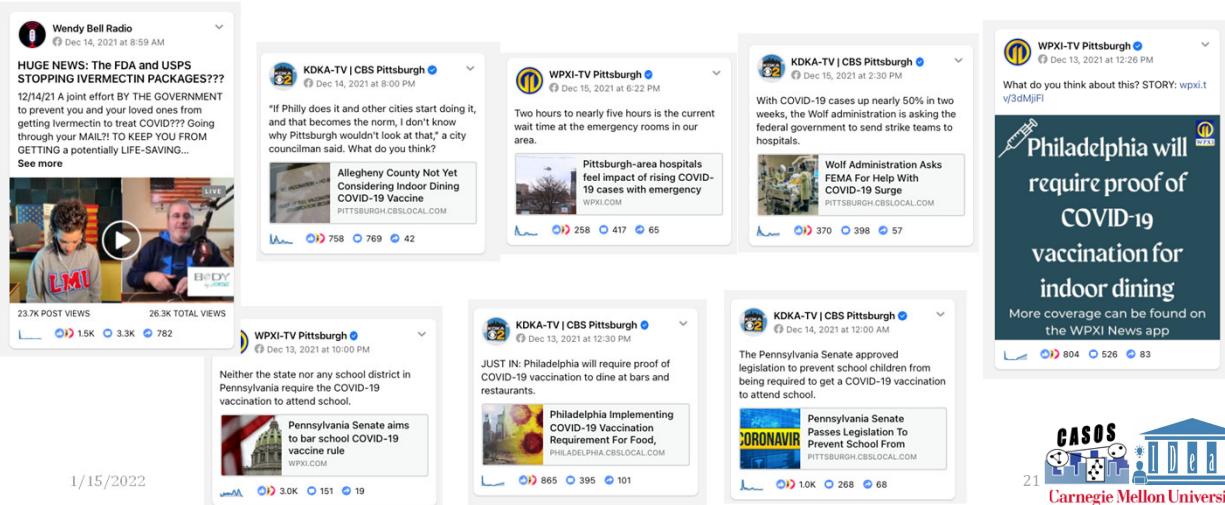
Negative Attitudes December 10– December 16



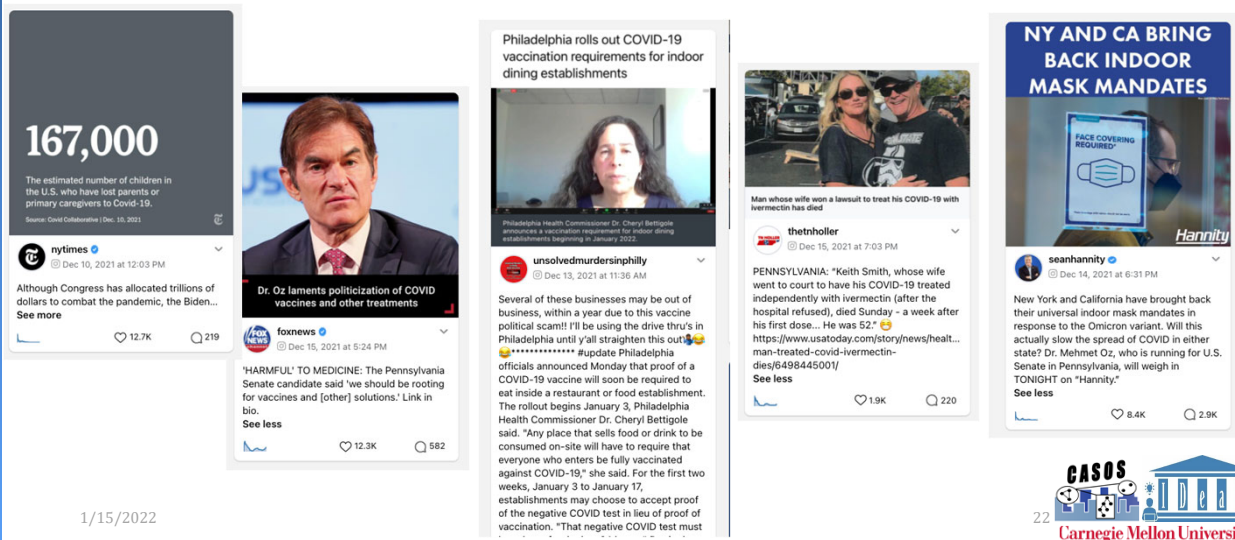
Negative Hashtag Cloud December 10– December 16



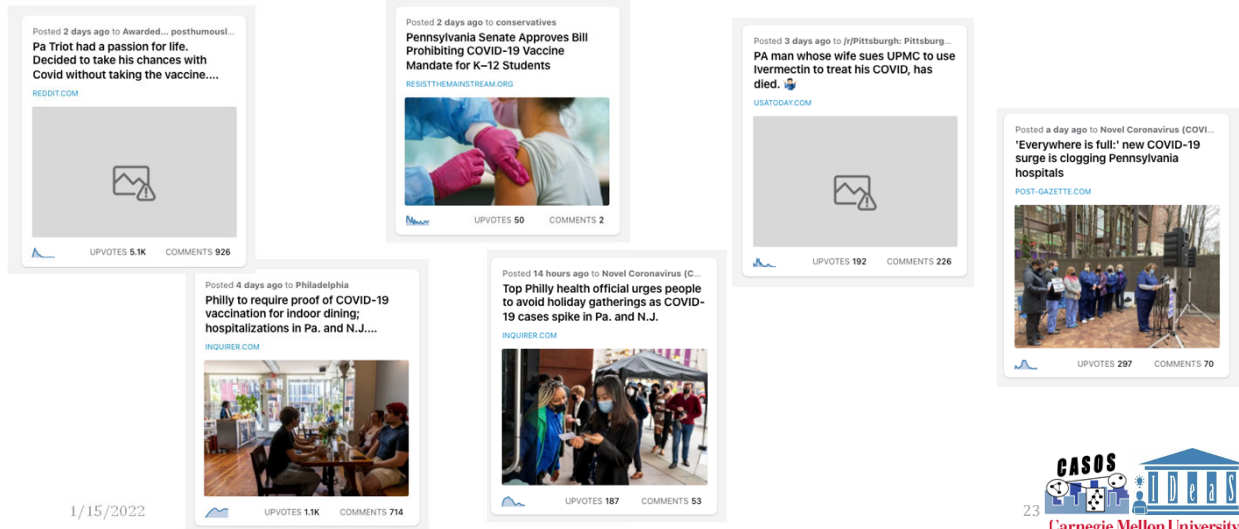
Trending Posts on Facebook December 10– December 16



Trending Posts on Instagram December 10– December 16



Trending Posts on Reddit December 10– December 16



For More Information

- ❑ Director 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/>
- ❑ Social Cybersecurity Working Group - <http://social-cybersecurity.org>
- ❑ Facebook: [@IDEasCMU](https://www.facebook.com/IDEasCMU)
- ❑ Twitter: [@IDeaSCMU](https://twitter.com/IDeaSCMU)
- ❑ YouTube: [IDeaS Center](https://www.youtube.com/IDeaS_Center)
- ❑ Ask to be on our Email-Distro Lists

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