#### **PA Vaccine Conversations on Twitter**

Dr. Iuliia Alieva, Dawn Robertson, Dr. Kathleen M. Carley Vaccine Hesitancy Project Update based on December 17 - December 30, 2021

The CMU centers for:

Informed DEmocracy And Social cyber-security

Computational Analysis of Social and Organizational Systems



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1

# **PA Vaccine Conversations 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.



1/11/2022

# **Report Overview December 17- December 30**

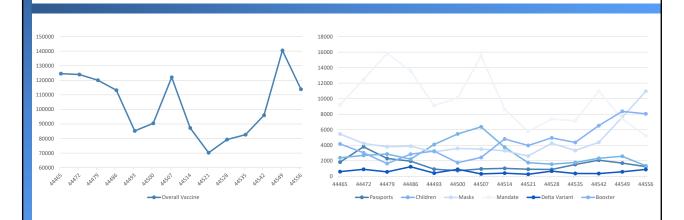
- ☐ This week's trending stories cover Sports, Breakthrough infections, Boosters, Omicron, Masks;
- □ Trending stories: <a href="https://www.essence.com/news/sixth-grader-saves-choking-student-woman-housefire/">https://www.defensene.com/news/sixth-grader-saves-choking-student-woman-housefire/</a> Sixth-Grader Saves Choking Classmate And Elderly Woman From House Fire In Same Day; <a href="https://www.defenseone.com/technology/2021/12/us-army-creates-single-vaccine-effective-against-all-covid-sars-variants/360089/">https://www.defenseone.com/technology/2021/12/us-army-creates-single-vaccine-effective-against-all-covid-sars-variants/360089/</a> US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say; <a href="https://www.mediaite.com/trump/trump-pushes-back-on-candace-owens-undermining-vaccine-people-arent-dying-when-they-take-the-vaccine/">https://www.mediaite.com/trump/trump-pushes-back-on-candace-owens-undermining-vaccine-people-arent-dying-when-they-take-the-vaccine/</a> Trump Pushes Back on Candace Owens Undermining Vaccine: 'People Aren't Dying When They Take the Vaccine; '<a href="https://www.frontiersin.org/articles/10.3389/fmed.2021.798095/full">https://www.frontiersin.org/articles/10.3389/fmed.2021.798095/full</a> Rapid Progression of Angioimmunoblastic T Cell Lymphoma Following BNT162b2 mRNA Vaccine Booster Shot: A Case Report; <a href="https://trib.al/ylAetdS">https://trib.al/ylAetdS</a> Harvard going remote again due to rise of Omicron variant;
- □ Anti-vax, disinformation, or vaccine hesitancy stories: <a href="https://alexberenson.substack.com/p/a-ny-times-editor-has-died-of-a-heart/comments">https://alexberenson.substack.com/p/a-ny-times-editor-has-died-of-a-heart/comments</a> NY Times editor has died of a heart attack at 49, one day after receiving a Moderna Covid "booster" shot; <a href="https://www.riotimesonline.com/brazil-news/modern-day-censorship/covid-19-pharmaceutical-giants-gates-fauci-uk-officials-accused-of-crimes-against-humanity-in-international-criminal-court-complaint/">https://alexberenson.substack.com/p/a-ny-times-editor-has-died-of-a-heart/comments</a> NY Times editor has died of a heart attack at 49, one day after receiving a Moderna Covid "booster" shot; <a href="https://www.riotimesonline.com/brazil-news/modern-day-censorship/covid-19-pharmaceutical-giants-gates-fauci-uk-officials-accused-of-crimes-against-humanity-in-international-criminal-court-complaint/">https://www.riotimesonline.com/brazil-news/modern-day-censorship/covid-19-pharmaceutical-giants-gates-fauci-uk-officials-accused-of-crimes-against-humanity-in-international-criminal-court-complaint/">https://alexberenson.substack.com/p/a-ny-times-editor-has-died-of-crimes-gates-fauci-uk-officials-accused-of-crimes-against-humanity-in-international-criminal-court-complaint/">https://alexberenson.substack.com/p/a-ny-times-editor-has-died-of-crimes-gates-fauci-uk-officials-accused-of-crimes-against-humanity-in-international-criminal-court-complaint/</a>.

  Gates, Fauci, UK officials accused of crimes against humanity in International Criminal Court complaint

1/11/2022

3

## Trends (tweets per week) December 17- December 30



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# **High Level View by City December 17 - December 30**

	Total PA	Philade	elphia	Pittsb	urgh	Eri	ie	Allentown/	Bethlehem	Ot	ther
Conversation	Tweets	Tweets	%	Tweets	%	Tweets	%	Tweets	%	Tweets	%
Overall Vaccine	202592	115171	56.8%	52394	25.9%	1890	0.9%	24614	12.1%	8523	4.2%
Vaccine Passports	2767	1515	1.3%	705	1.3%	32	1.7%	448	1.8%	67	0.8%
FDA Approval	382	158	0.1%	97	0.2%	3	0.2%	104	0.4%	20	0.2%
Boosters	13298	7844	6.8%	2892	5.5%	124	6.6%	1753	7.1%	685	8.0%
Employees	1395	624	0.5%	389	0.7%	29	1.5%	277	1.1%	76	0.9%
"Experimental"	487	212	0.2%	151	0.3%	4	0.2%	103	0.4%	17	0.2%
Children	2452	1410	1.2%	497	0.9%	25	1.3%	421	1.7%	99	1.2%
Myocarditis	673	435	0.4%	121	0.2%	5	0.3%	94	0.4%	18	0.2%
Heart	1987	947	0.8%	589	1.1%	15	0.8%	356	1.4%	80	0.9%
Masks	13234	7627	6.6%	2760	5.3%	153	8.1%	1742	7.1%	952	11.2%
Thrombosis/VITT	145	76	0.1%	31	0.1%	3	0.2%	30	0.1%	5	0.1%
Mandates	11915	6339	5.5%	2483	4.7%	127	6.7%	2378	9.7%	588	6.9%
Natural Immunity	1766	995	0.9%	466	0.9%	9	0.5%	240	1.0%	56	0.7%
Efficacy	660	317	0.3%	178	0.3%	6	0.3%	136	0.6%	23	0.3%
Omicron	9027	5517	4.8%	1764	3.4%	80	4.2%	1176	4.8%	490	5.7%
Delta Variant	1313	770	0.7%	272	0.5%	2	0.1%	173	0.7%	96	1.1%
Race	2988	1561	1.4%	869	1.7%	48	2.5%	378	1.5%	132	1.5%
Ivermectin	480	176	0.2%	205	0.4%	9	0.5%	80	0.3%	10	0.1%
Military	791	404	0.4%	205	0.4%	12	0.6%	136	0.6%	34	0.4%
Breakthrough	1524	898	0.8%	323	0.6%	23	1.2%	217	0.9%	63	0.7%

- · Two weeks' data included
- Trending conversations:
  - Breakthrough infections
  - Boosters
  - Omicron
  - Masks



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5

#### High Level View by County December 17 - December 30

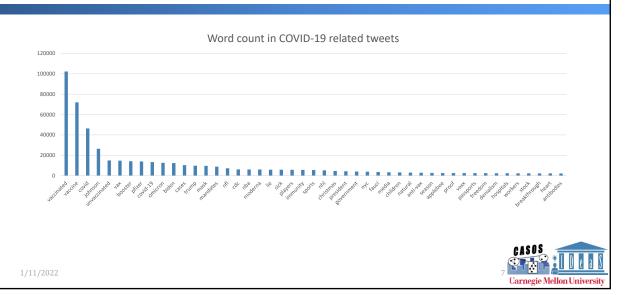
County	Allegheny	Beaver	Butler	Cambria	Fayette	Indiana	Somerset	Westmoreland
Overall Vaccine	53840	104	162	61	89	39	58	305
Vaccine Passports	713	1	5	1		1		3
FDA	103	1						
Boosters	3017	4	6	2	8	1	4	19
Employees	411	1			2			
"Experimental"	155							
Children	507	3	2		1			5
Myocarditis	124							1
Heart	596	4						3
Masks	2938	12	17	5	6	8	7	24
Thrombosis/VITT	31							
Mandates	2589	6	14		7	4	3	29
Natural Immunity	470		1					2
Efficacy	181							2
Omicron	1831	4	7	4	4	2	5	11
Delta Variant	286	1	5		1		1	2
Race	891	3	6	1	2		1	2
Ivermectin	206	1	1					
Military	208	1						
Breakthrough	333	1	3				1	4

- · Two weeks' data included
- Race: pulled by one of the vaccine keywords plus at least one other term in ("Black", "African American", "of color", "Latin", "Hispanic", "brown", "eugenic")



1/11/2022

#### **Top Words Used per Week December 17 - December 30**



7

## **Top Hashtags by County December 17 - December 30**

■ 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 (873)	covidvaccine (3)	steelers (2)	covid19 (2)	steelers (10)
steelers (558)	omicron (3)	covid (1)	covidiots (2)	covid19 (3)
omicron (331)	pamaskmandate (3)	getvaccinated (1)	iammitchellbosch (2)	omicron (3)
herewego (248)	covid19 (2)	getvaccinatednow (1)	omicron (2)	getvaccinated (2)
holdtheline (216)	steelers (2)	healthcare (1)	antivax (1)	novaxpassports (2)

1/11/2022



# **Top Hashtags by City December 17 - December 30**

☐ 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 (1748)	probowlvote (194)	covid19 (238)	covid19 (858)	covid19 (40)	covid19 (347)	covid19 (177)
eagles (808)	covid19 (111)	omicron (119)	steelers (523)	vaccine (17)	omicron (195)	vaccine (143)
omicron (748)	demvoice1 (75)	eagles (53)	omicron (321)	browns (14)	vaccine (114)	eagles (79)
flyeaglesfly (671)	eagles (71)	vaccine (52)	herewego (246)	demvoice1 (12)	eagles (94)	covid_19 (77)
probowlvote (443)	omicron (63)	covid (49)	holdtheline (216)	omicron (12)	flyeaglesfly (77)	omicron (75)

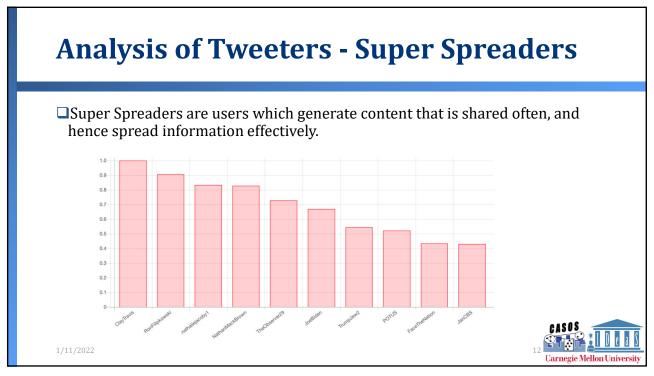
1/11/2022



9

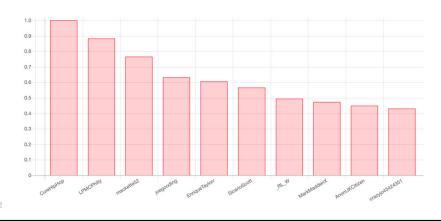
Top UR	Ls by Cou	nty Dece	mber 17	– Decemb	er 30
Allegheny	Butler + Beaver	Cambria	Indiana + Somerset	Fayette	West Moreland
http://vaccines.gov (227)	http://vaccines.gov (3)	https://www.theatlantic.com/i deas/archive/2021/12/our- emergency-rooms-arent-ready- for-omicron/621080/ Omicron Will Overwhelm America's Emergency Rooms (1)	https://www.washingtonpost.co m/opinions/2021/12/28/six- resolutions-that-america-must- keep-2022/7tid=ss_tw Opinion: Six resolutions that America must keep in 2022 (2)	https://trib.al/DodYBnV MAGIC JOHNSONWON'T WATCH HBO'S LAKERS SERIES 'I'm Not Looking Forward To It' (2)	http://vaccines.gov (2)
https://www.essence.com/news/six th-grader-saves-choking-student- woman-housefire/ Sixth-Grader Saves Choking Classmate And Elderly Woman From House Fire in Same Day (217)		https://bit.ly/3qkd45q States ranked by COVID-19 test positivity rates: Jan. 3 (1)		https://www.defenseone.com/technol ogy/2021/12/us-army-creates-single- vaccine-effective-against-all-covid-sars- variants/360089/ US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (2)	shares-reports-of-covid-fueled-burden-
https://www.defenseone.com/tech nology/2021/12/us-army-creates- single-vaccine-effective-against-all- covid-sars-variants/360089/US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (124)	student-woman-housefire/Sixth-	https://buff.ly/3srUICi US Army	https://www.vox.com/coronavir us-covid19/22839842/covid- omicron-variant-us-response- hospitalizations Omicron is coming and lockdowns aren't coming back. So what can we do? (1)	https://bit.ly/32sD32L Right-wing radio clown who promised to quit over employer's vax mandate is still on the job (1)	https://www.essence.com/news/sixth- grader-saves-choking-student-woman- housefire/ Sixth-Grader Saves Choking Classmate And Elderly Woman From House Fire In Same Day (2)
https://www.mediaite.com/trump/t rump-pushes-back-on-candace- owens-undermining-vaccine-people- arent-dying-when-they-take-the- vaccine/ Trump Pushes Back on Candace Owens Undermining Vaccine: "People Aren't Dying When They Take the Vaccine" (117)	http://hill.cm/IUVpv6L Jonas Brothers promote vaccines with Biden (1)		http://www.pharmaciststeve.co m/fda-the-wait-for-covid-pills-is- over-pfizer-claims-cuts-hospital- admits-deaths-by-90/f Pot- Wait for COVID Pills Is Over (1)	https://buff.ly/3srUICi US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (1)	http://hill.cm/QJCOMQ5 Trump pushes back on Candace Owens: 'People aren't dying when they take the vaccine' (1)
https://tnc.news/2021/12/17/new- brunswick-backtracks-on-vaccine- passports-for-grocery-stores/ New Brunswick backtracks on vaccine passports for grocery stores (110)	http://apne.ws/P9CD6ka Clip of Fauci discussing theoretical vaccine concern is from March 2020 (1)	https://wjactv.com/newsletter- daily/pennsylvania-asks-fema- for-help-with-covid-surge Pennsylvania asks FEMA for help with COVID surge (1)	https://www.foxnews.com/heal th/pfizer-covid-pill-approval- months-impressive-data Pfizer COVID-19 pill may not see approval for 'months' despite 'impressive' data (1)	https://nyti.ms/3EtsGZF As Omicron Spreads and Cases Soar, the Unvaccinated Remain Defiant (1)	https://alexberenson.substack.com/p/a- ny-times-editor-has-died-of-a- heart/comments NY Times editor-to- died of a heart attack at 49, one day afte receiving a Moderna Covid "booster" shot (1)

Top URLs b	y City De	ecember	17 - Dec	ember 30		
Philadelphia	Chester	Norristown	Pittsburgh	Erie	Allentown/ Bethlehem	Other
http://hill.cm//UVov6L Jonas Brothers promote vaccines with Biden (530)	https://mediaite.com/a/ewygg Twitter to Penalize Users Who Claim Vaccinated People Can Spread Covid-19 (28)	https://trib.al/ylAetdS Harvard going remote again due to rise of Omicron variant (66)	http://vaccines.gov (225)	https://www.nfldraftdiamonds.com/2 021/12/javlen-johnson/ 2022 NFL Draft Prospect Interview: Jaylen Johnson, DL, Lake Erie College (7)	http://vaccines.gov (70)	https://www.essence.com/i ws/sixth-grader-saves- choking-student-woman- housefire/ Sixth-Grader Sav Choking Classmate And Elde Woman From House Fire In Same Day (33)
https://www.essence.com/news/sixth-grader- saves-choking-student-woman-housefire/ Sixth-Grader Saves Choking Classmate And Elderly Woman From House Fire In Same Day (377)	https://www.cnbc.com/2021/12/2 6/omicron-drives-christmas- weekend-flight-cancellations- above- 1500.html?utm source=facebook <u>8utm medium-news tab</u> Omicron hits airline crews and sparks hundreds of holiday flight cancellations (26)	https://www.defenseone.com/t echnology/2021/12/us-army- creates-single-vaccine-effective- against-all-covid-sars- variants/360089/ US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (39)	https://www.essence.com/news/s xth-grader-saves-choking-student- woman-housefire/ Sixth-Grader Saves Choking Classmate And Elderly Woman From House Fire In Same Day (212)	http://publichealth.jhu.edu/headlines /subscribe Subscribe to receive updates about Johns Hopkins Bloomberg School of Public Health's work (5)	https://www.essence.com/news/ sixth-grader-saves-choking. student-woman-housefire/ Sixth- Grader Saves Choking Classmate And Elderry Woman From House Fire In Same Day (69)	sars-variants/360089/US
https://www.frontiersin.org/articles/10.3389/f med.2021.798095/full Rapid Progression of Angioimmunoblastic T Cell Lymphoma Following BNT162b2 mRNA Vaccine Booster Shot: A Case Report (355)	http://vaccines.gov (20)	https://nypost.com/2021/12/15 /nypd-officers-busted-for-fake- vax: cards/?utm campaign=iphone nyp&utm source=twitter app High-ranking NYPD cops busted for submitting fake COVID vax cards (38)	https://www.defenseone.com/tect nology/2021/12/us-army-creates- single-vaccine-effective-against-all- covid-sars-variants/360089/ US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (119)	http://www.vaccines.gov (5)	https://www.defenseone.com/tec hnology/2021/12/us-army. creates-single-vaccine-effective- against-all-covid-sars- variants/360089/US Army Creates Single Vaccine Against All COVID & SARS Variants, Researchers Say (51)	https://abcn.ws/3GYouCM Elizabeth Warren reveals sh tested positive for COVID-1 (23)
http://vaccines.gov (287)	https://www.frontiersin.org/articles/10.3389/fmed.2021.798095/ful Rapid Progression of Angioimmunoblastic T Cell Lymphoma Following BNT162b2 mRNA Vaccine Booster Shot: A Case Report (20)	http://vaccines.gov (36)	https://www.mediaite.com/trump, trump-pushes-back-on-candace- owens-undermining-vaccine- people-arent-dying-when-they- take-the-vaccine/ Trump Pushes Back on Candace Owens Undermining Vaccine: 'People Aren't Dying When They Take the Vaccine' (112)	https://www.essence.com/news/sixth -grader-saves-choking-student- woman-housefire/ Sixth-Toder Saves Choking Classmate And Elderly Woman From House Fire In Same Day (5)	1/12/26/ny-times-editor-49-dies- one-day-after-moderna-booster- shot/ NY Times Editor, 49, Dies	http://vaccines.gov (21)
https://www.riotimesonline.com/brazil- news/modem-day-censorship/cowid-19- pharmaceutical-jaants-gates-fau-u-ku-official- accused-of-crimes-against-humanity-in- international-criminal-court-complaint/ Covid- 19: Pharmaceutical giants, Gates, Fauc, UK officials accused of crimes against humanity in International-criminal Court complaint (212)	https://www.ncbi.nlm.nih.gov/lab s/pmc/articles/PMC8656165/ Rapid Progression of Angioimmunoblastic T Cell Lymphoma Following BNT162b2 mRNA Vaccine Booster Shot: A Case Report (15)	https://bit.ly/3ycz7ir Vaccine Dose Reminds Sedentary Man What Muscle Soreness Feels Like (36)	https://tnc.news/2021/12/17/new- brunswick-backtracks-on-vaccine- passports-for-grocery-stores/ New Brunswick backtracks on vaccine passports for grocery stores (110)	https://www.mediaite.com/trump/tr ump-pushes-back-on-candace-owens- undermining-vaccine-people-arent- dying-when-they-take-the-vaccine/ Trump Pushes Back on Candace Owens Undermining Vaccine: "People Aren't Dying When They Take the Vaccine" (5)	https://trib.al/ylAetdS Harvard going remote again due to rise of	http://publichealth.jhu.edu eadlines/subscribe Subscrib to receive updates about Johns Hopkins Bloomberg School of Public Health's wo (19)



# **Analysis of Tweeters - Super Friends**

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

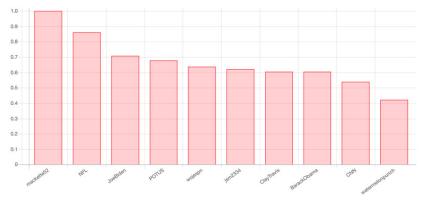




13

# **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.





14

1/11/2022

## **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
JoeBiden[+]	3,829
POTUS[+]	1,907
Timcast[+]	1,572
ClayTravis[+]	1,311
CNN[+][*]	1,025
wojespn[+]	995
catturd2	964
ramseyboltin	788
CDCgov[+]	696
mtgreenee[+]	680



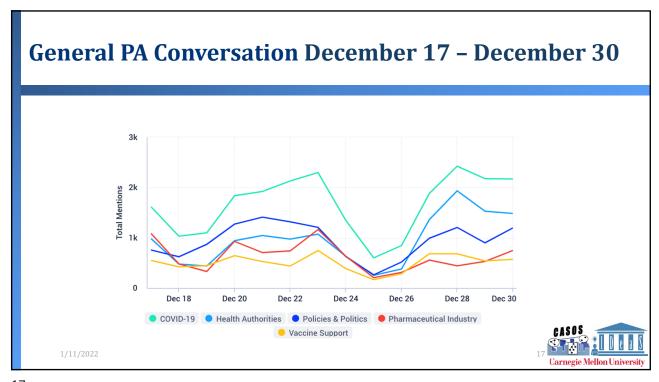
15

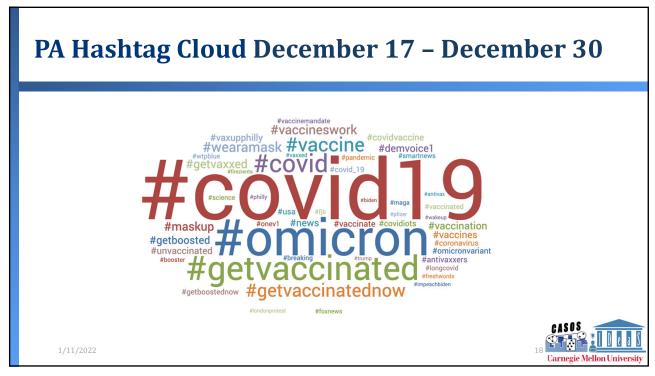
## **Trending Tweets December 17 - December 30**

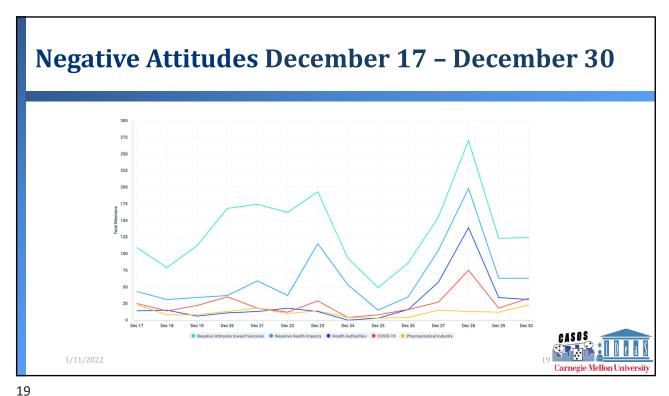
Tweets that are the most forwarded, either by retweet, reply, or quote:

- □ The NFL is 95% vaccinated, the NBA is 97% vaccinated, the NHL is nearly 100% vaccinated. All three leagues are still overwhelmed with covid cases & hitting new covid case highs. So how is @JoeBiden arguing vaccines will end covid? The pro sports leagues prove that's 100% a lie.
- Covid denialism includes vaccinated people not taking precautions
- ☐ Multiple people arrested in NYC for trying to eat in Applebee's without a vaccine pass https://t.co/CsKX7yauEC
- vaccinated or not pls stop making hot chocolate with water
- □ vaccinated or not please stop standing so close to me in line
- ☐ Man was arrested in Brooklyn, NY after trying to order food at Panera Bread without a vaccine pass https://t.co/KMwtPwHgII
- 75 members in the US Congress own stock in Pfizer Moderna and Johnson and Johnson. Just think about that...
- □ Kevin Durant just tested positive for covid. Pretty soon the only player the Nets are going to have eligible to play is Kyrie Irving, the guy who refused to get the covid vaccine and the media spent months telling all of us was a selfish, idiotic teammate.
- ☐ Vaccinated or not, stop fucking broke niggas
- ☐ They said the vaccine stopped transmission. Now they are lying and saying they didn't. Video proof here https://t.co/Ds632bHZzI
- □ Donald Trump: 'The Vaccine is one of the greatest achievements of mankind' 'All three vaccines (Pfizer, Moderna, J&I) are very good' 'The vaccines work If you take the vaccine you are protected' 'People aren't dying when they take the vaccine https://t.co/fU8q1sdMda

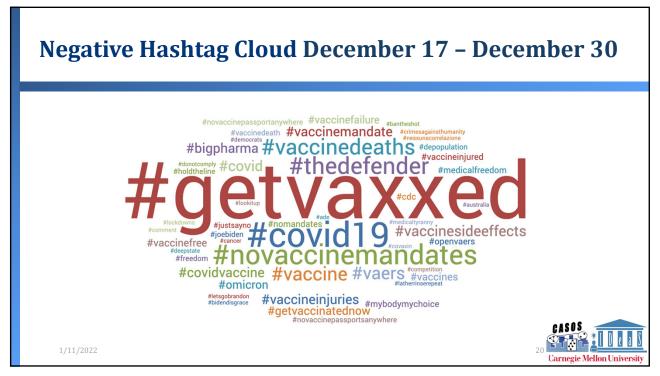
1/11/2022



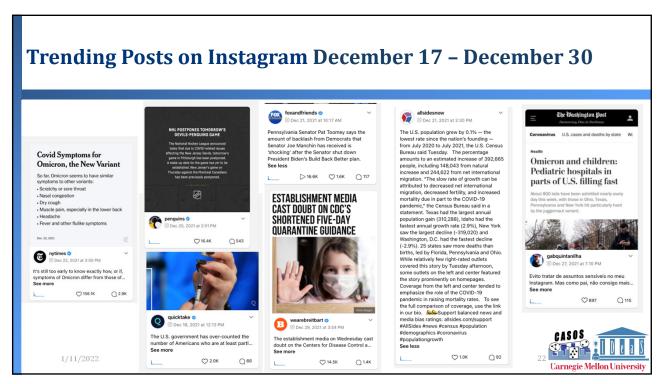




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#### **Trending Posts on Reddit December 17 - December 30** Allegheny County has detected omicron in wastewater, indicating a COVID-19 surge is on the way Pennsylvania man embraced religion and disinformation causing him to fear vaccines, Halloween, and... Pennsylvania man thought closing the border would protect him from Covid. Should've tried the vaccine instead UPVOTES 108 COMMENTS 64 UPVOTES 325 COMMENTS 196 UPVOTES 1.5K COMMENTS 309 UPVOTES 2.3K UPVOTES 862 COMMENTS 269 Federal strike team will soon arrive at PA Firefighter/Medic + Veteran loved visiting Disney World but hated vaccine mandates, comparing them... William Ames, Lebanon Pa, County Commissioner dies of Covid. No one City Of Pittsburgh Will Not Enforce COVID-19 Vaccine Mandate This The Amish community in Lancaster. PA achieved herd immunity from COVID without vaccines. They did it... shocked ... Week Amid Union Grievance UPVOTES 230 COMMENTS 176

## **For More Information**

- □ Director Kathleen M. Carley <u>kathleen.carley@cs.cmu.edu</u>
  - http://www.casos.cs.cmu.edu/bios/carley/carley.html
- ☐ IDeaS website <a href="https://www.cmu.edu/ideas-social-cybersecurity/">https://www.cmu.edu/ideas-social-cybersecurity/</a>
- ☐ CASOS website <a href="http://www.casos.cs.cmu.edu/">http://www.casos.cs.cmu.edu/</a>
- ☐ Social Cybersecurity Working Group <a href="http://social-cybersecurity.org">http://social-cybersecurity.org</a>
- ☐ Facebook: @IDeasCMU
- ☐ Twitter: @IDeaSCMU
- ☐ YouTube: <u>IDeaS Center</u>
- ☐ Ask to be on our Email-Distro Lists

1/11/2022

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24