



Turbulence at Twitter with leadership change: implications for health research and science communication

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Abstract

Twitter has been an invaluable social media platform for scientists to share research and host discourse among academics and the public. The change of ownership at Twitter has changed how scientists interact with the platform and has led some to worry about its future. This article discusses the current changes at Twitter and what implications these may have for future health research and communication.

Keywords

Twitter, social media, science communication, mastodon, misinformation, leadership

The social media platform Twitter since its founding in 2006, has become a hub of scientific communication and a point of health research dissemination among academics to the benefit of lay audiences and the scientific community alike. In particular, the scientists involved in the biomedical field regularly share research and engage in discussion via Twitter. Indeed, “tweeterials” or “threads” have been used to unravel the findings of complex research papers and as such they are recognized as a valued method of scientific outreach [1, 2]. Scientists can also engage in discussion via public tweets or comments, or they can share private thoughts using the direct message function [3]. Twitter users include Noble Prize winners, science communicators, active scientists who engage with each other, members of the public, world leaders, and celebrities, in a community of over 350 million active users [4]. While the exact number of academics who use Twitter is unknown, previous reports published by *Nature* have estimated that 13% of researchers are regular users [5], although estimates appear to vary greatly [6].

Twitter has become a useful resource to conduct research and establish networks and collaborations for academics. There are multiple examples of studies using Twitter in the form of crowdsourcing [7–10], citizen science projects [11, 12], and the promotion of research communication in various formats [13, 14]. Twitter also gives a voice to researchers that may otherwise be excluded, and it can be the platform where



issues regarding academia can be discussed such as bullying, sexism, racism, and mental health. Twitter can also be a refuge for academics to express themselves among peers and reduce the feeling of isolation that often can affect academics [15]. Certainly, there are plenty of hashtags (#) available to follow such as #AcademicChatter, #AcademicTwitter, #ScienceTwitter, and #EarlyCareerReseachers, where academics can join conversations specifically regarding academic life.

However, Twitter can be a polarizing environment for some academics, scientists, and science communicators. This was never more evident than during the coronavirus disease 2019 (COVID-19) pandemic, where the healthcare community and world leaders effectively used Twitter to share public health information in real time [16], however, in almost equal measure, scientists countered disinformation regarding severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) health interventions [17–19]. Much of this misinformation and disinformation was directed by noteworthy individuals such as Donald Trump and his associates in an effort to direct the political narrative in his favor [20] at the expense of scientists in many cases [21]. Prior to the COVID-19 pandemic, Twitter was also an effective tool to communicate health information about vaccination during the H1N1 pandemic and it was used to track disease activity and public sentiments using infodemiology [22–24]. These types of activities and the ability to update the public in real time render Twitter an incredible resource to the scientific and public health community.

Some of Twitter's most turbulent times have occurred over the last year with the change of ownership of Twitter. In April 2022, Tesla and SpaceX CEO Elon Musk acquired a 9.2% stake in the company; later making an unsolicited offer to purchase the entire company for \$43 billion [25]. A saga ensued, whereby Musk was later forced to buy Twitter after initially attempting to back out of a deal for \$44 billion [26]. Considering Musk's history of acquiring or founding companies focused on scientific and engineering endeavors such as Neuralink, Tesla, and SpaceX one might think scientific communication would be supported and thrive on Twitter. However, under Elon Musk's leadership to date there has been increased antiscience rhetoric, increased misinformation, and increased hate speech on Twitter [27], some of it perpetuated by Musk himself [28]. Recently, Musk stated "My pronouns are prosecute/Fauci" in a tweet aimed at disparaging the transgender community and the Chief Medical Advisor to the President of the United States, Director of the National Institute of Allergy and Infectious Diseases (NIAID), Dr. Anthony Fauci [3, 29]. Musk has since tweeted inaccuracies multiple times regarding Dr. Fauci's career, his handling of the pandemic, and his family [30]. On the other hand, some of the increased misinformation and anti-scientific views on Twitter have been a direct consequence of the relaxed content moderation due to Musk's firing of staff and policy changes [31, 32], particularly regarding COVID-19 [33]. The increased negativity on Twitter and some of the tweets perpetuated by Musk were possibly the final straw for a lot of scientists and science communicators who appear to have left or threatened to leave Twitter [3].

Some scientists and science communicators have joined other social media platforms such as Mastodon, an open-source platform developed by Eugen Rochko. Over 100,000 new users signed up for Mastodon shortly after the sale of Twitter, which sent #TwitterMigration and #GoodbyeTwitter trending on Twitter amongst the scientific community [34]. By November 12th, 2022, Mastodon had gained over 1 million new users [6]. This migration of users was largely attributed to concerns about further misinformation and nastiness on Twitter due to Musk's rhetoric regarding "free speech", behavior towards scientists, lifting of bans on antiscience individuals, and removing Twitter's COVID-19 misinformation rules [32, 34]. These concerns appear to have been valid as there has been a notable increase in misinformation on Twitter since Musk's takeover and removal of the COVID-19 misinformation policy, and there has been an increase in racial slurs used on Twitter [33, 35]. While Musk is not the sole reason or only person responsible for these increases, his policy changes and actions while posting on Twitter enable others to engage in such activities. Other scientists and communicators decided to maintain both a Mastodon and a Twitter account, while others have decided to stay on Twitter to wait and see what happens for a variety of reasons. Some hope that the scientific discourse doesn't deteriorate further, and that the situation may improve. Other scientists have created a large following that has taken time to

cultivate that they do not want to lose so they have decided to stay. On the other hand, some have decided to reduce their activity on Twitter, but not necessarily migrate to other platforms [34].

One thing is for sure, any loss of expertise and engagement on social media platforms such as Twitter, is a loss to both the public and scientific communities who benefit from updates on cutting-edge developments and direct access to scientists, science communicators, public health authorities, etc. online who educate the public, instill trust in the scientific community, and increase scientific literacy online [36]. In particular, a shortage of expertise online opens the door to the rise of Twitter bots and trolls. These are accounts run anonymously that intend to spread false information or specific agendas, which have become commonplace on social media platforms [37]. Furthermore, new initiatives at Twitter led to confusion surrounding account credibility. Previously, accounts with a blue check mark beside the account name were denoted as “verified accounts” owned by well-known individuals or celebrities who were “authentic, notable, and active” [38]. Under new rules, for \$8 United State Dollar (USD) per month, anyone could get a verified account or make false accounts impersonating individuals by applying for “Twitter Blue” [39]. This policy was briefly ceased due to public and political concerns regarding numerous fake accounts that were established [40], but Twitter Blue is now again available. Verification of certain accounts can become a problem because it may appear to validate those accounts and their content, even if they happen to post misinformation [41]. Musk has tweeted that from April 15th, 2023, only Twitter Blue users may now vote in polls on Twitter. It is not clear whether this new policy was enacted, but any attempt to limit poll use will hinder the broader use of polls amongst scientists who conduct polls for research on Twitter [10, 42]. Furthermore, it was suggested that non-Twitter Blue accounts will not appear on the “For you” page, which is a Twitter page that suggests posts and accounts to view. Therefore, only paying accounts will benefit from the visibility offered by the “For you” page, hindering scientific communication and favoring the opinions of those who can afford the monthly costs. Previously, the vast majority of Twitter functions have been free to all users prior to Musk’s takeover [42].

Musk’s role at Twitter for the foreseeable future is unclear. In a poll conducted by Musk himself, 17.5 million Twitter users voted, and it was determined that Musk should step down as Twitter CEO with 57.5% in favor *versus* 42.5% against [43]. Musk had not appointed a new CEO by March 28th, 2023, when he claimed that his “new Twitter policy is to follow the science, which necessarily includes reasoned questioning of the science” [44]. However, on May 12th, 2023, Musk announced on Twitter that the new CEO Linda Yaccarino would step into the role in six weeks but that Musk would “focus on new product design & technology”, presumably within the company [45].

It is unclear what the new Twitter CEO can do to improve the platform at this point and what role Musk will play in the management of Twitter going forward. Only time will tell.

The question of what the current state of Twitter means for health research and scientific communication is at the tip of the thumbs of many academics. This perspective manuscript has only focused on a small fraction of controversies that have arisen since the takeover of Twitter but there are many other concerns surrounding data protection in light of the “Twitter files” saga (private files released by Twitter claiming to expose political wrongdoing at Twitter prior to Musk’s takeover) and in general the unpredictable direction of Twitter’s leadership. As Twitter reaches an inflection point with the appointment of Yaccarino as the new CEO, one thing is for certain, it is important to preserve and maintain a scientific presence on Twitter to prevent the rise of false narratives and misinformation. Certainly, initiatives such as the Digital Health and Patient Safety Platform hashtag (#DHPSP) campaign, which resulted in approximately 152 million impressions in just five weeks, have shown that Twitter campaigns led by academics and science communicators can achieve broad visibility [46]. Therefore, academics have the power to mobilize on large issues to spread scientific information. For scientists who decide to stay on Twitter, it is important to continue to engage in positive discussions regarding research and scientific communication with the public. As discussed, Twitter is also an invaluable data source to conduct research but not just for academics. Twitter is also used by human rights agencies during conflict [47]. Twitter has been used to send alerts during natural disasters and the data generated on Twitter can be used to monitor

the progression of such events like forest fires [48–50]. Twitter is used by researchers and law enforcement to predict and prevent crime and analyze human behavior [51, 52]. These broad examples point to Twitter’s many applications beyond simple social interaction and content generation. Therefore, it is important that academics engage and use Twitter while the platform is available. However, if Twitter should fail in the future, there is no doubt that academics will flock to other social media platforms to conduct the important work of communication and research. In the words of H. Jackson Brown Jr, “when you can’t change the direction of the wind—adjust your sails”.

Abbreviations

COVID-19: coronavirus disease 2019

Declarations

Author contributions

RL: Conceptualization, Investigation, Writing—original draft, Writing—review & editing. HPD: Writing—original draft, Writing—review & editing. All authors read and approved the submitted version.

Conflicts of interest

Author Hari Prasad Devkota is an Editorial Board member of *Exploration of Digital Health Technologies*, but he had no involvement in the peer-review of this article and had no access to information regarding its peer-review.

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