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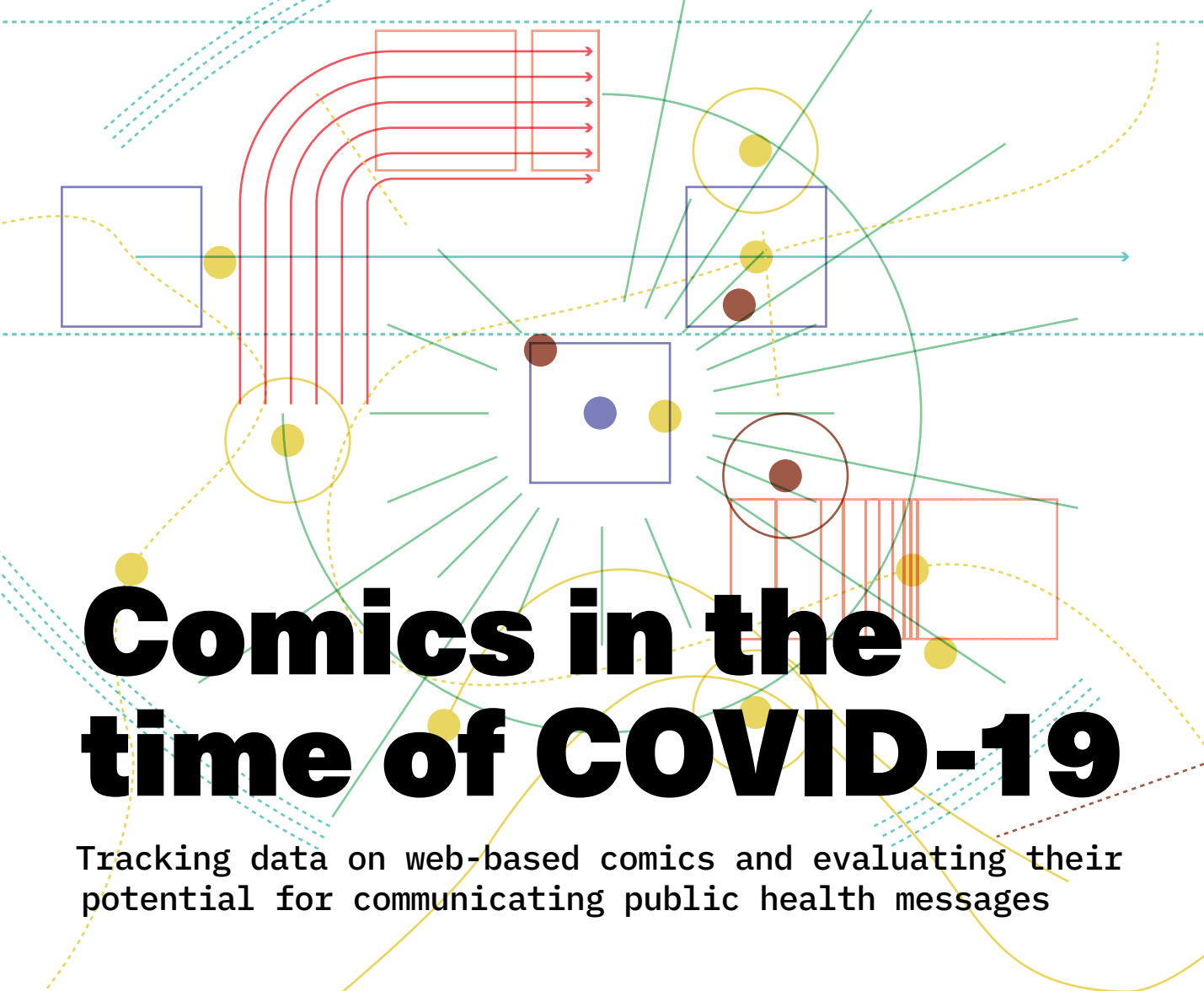

Comics in the time of COVID-19

Tracking data on web-based comics and evaluating their potential for communicating public health messages

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and evaluating their potential for
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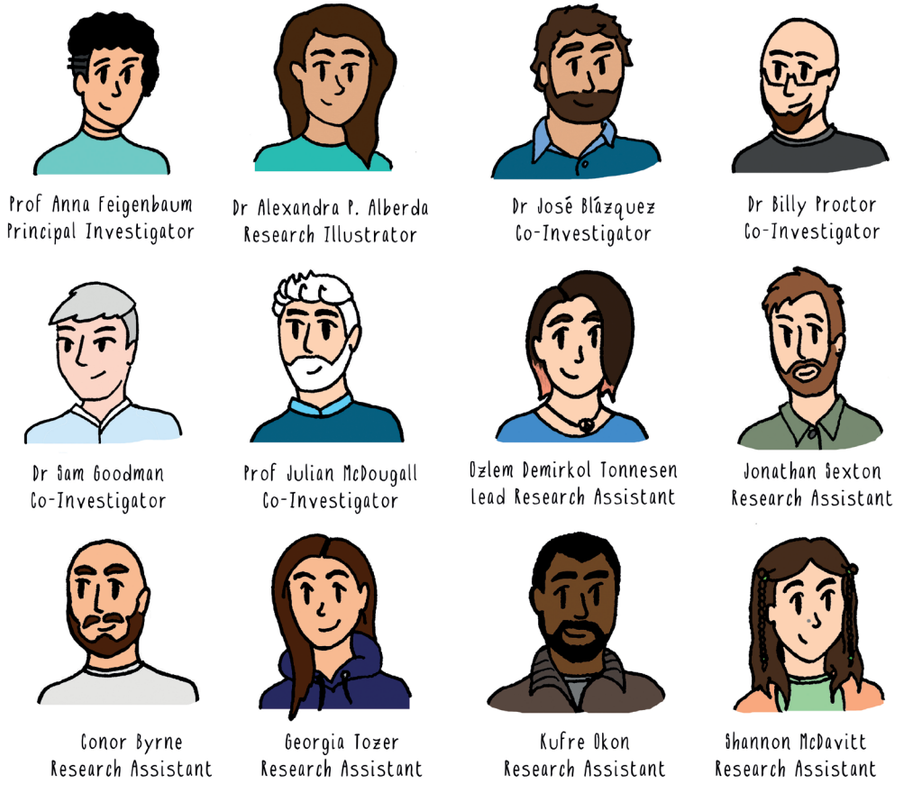


Contents

Project Overview

Executive Summary

Our pandemic lives are deeply entwined with visual, web-based public health messages, from instructional hand-washing pictograms to infographics about R numbers. Alongside these official public health communications, people have created thousands of web-based comics conveying public health messages. In 2021 Our Bournemouth University-based research team collected a sample of over 15,000 ‘COVID comics’ posted and shared over Instagram between January 2020 and March 2021. We then coded our sample of comics to explore how the medium was used to shape and share public health messages. Insights from our analysis reveal how comics can work to help governments and health professionals reach wider audiences, humanise public health messages and challenge infodemics online.

↳ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

Findings at a Glance

1. Comics can provide a platform to visualise and prioritise mental health, reaching people through emotional storytelling.

2. Comics can tackle issues of health equity and foster empathy by humanising illness and health experiences.

3. On social media, colour makes for more engagement and can be used to promote inclusivity and better target specific demographics.

4. Visual metaphors can help build health literacy - particularly around complex scientific concepts that are difficult to visualise.

5. Source referencing is key for improving evidence-based comics and creating verified 'influencer networks' of trusted social media health and science communicators.

6. Hashtags can widen and diversify audiences, allowing messages to better target communities prone to misinformation.

7. Digital optimisation can help drive engagement with public health messages on social media.

8. Artists are navigating algorithmic constraints as Instagram flags and supresses all COVID-19 material for misinformation.

9. Interactive web comics can foster participatory culture in online health messaging, promoting resource sharing and wellness.

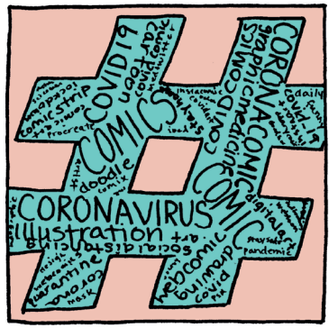
10. Communicating uncertainty in comics can help cultivate information literacy, wellbeing, and resilience.

Background Context

The Rise of COVID-19 Comics

During COVID-19 people's pandemic lives became deeply entwined with public health information, from instructional hand-washing infographics, to calls to 'flatten the curve.' Alongside authorial graphics produced by the world's biggest newspapers, the CDC, and the WHO, professional and amateur artists also created and shared public health messages online, tackling everything from understanding the importance of rising R numbers to everyday public health behaviours such as how to effectively wear a mask and socially distance. In addition, these comics covered a wide range of mental health and wellness topics, occasionally diving into broader issues of health equity and inequalities.

As these comics circulated, hashtags emerged to label and draw together people's social media creations: #covidcomics, #coronacomics, #lockdowncomics, and #quarintinecomix to name just a few. By the time we began collecting our sample in March 2021, thousands of these comics were already posted online, reaching millions of people around the world.



↳ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

The Benefits of Comics for Public Health Communications

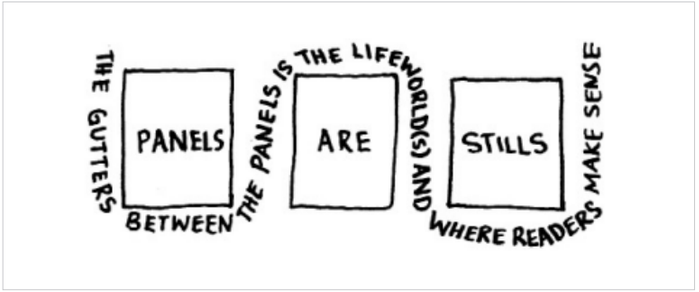
Across different fields, research has repeatedly shown that comics can help increase the effectiveness of communicating and comprehending health information (Hawley et al., 2008; Green and Meyers, 2010; Czerwiec et al., 2015; Ashwal and Thomas, 2018; Farinella, 2018; Noe and Levine, 2020). Comics can effectively communicate risk factors, as well as social issues surrounding an illness. Readers can relate to events and experiences, connecting them to their own and creating empathy (McAllister, 1992). Dr. Alexandra Alberda, summarises the reasons for why comics can work well around three key principles: comics are approachable, accessible, and relatable.

Approachable
Prevalent in popular culture
Created and read in many cultures
Accessible
Medium used in literacy training
Iconography represents local/regional/national identities
Effective visuals can get closer to meaning than text
Relatable
Tells the human-side of a health issue
Builds communities

Comics are Approachable

The familiarity of comics as a medium makes comics *approachable*. Comics are also *approachable* as the reader has control over how long they engage with the work. As opposed to videos or television, comics allow us to process the message at our own speed (Karp, 2011). Comics may make people feel “more focused and in control” and “less isolated and more hopeful” through this individual pacing (Green and Myers, 2010).

This structural aspect of comics also contributes to its potential for enhancing data-driven storytelling. Bach et al (2017) suggest that making use of panels can help break complex processes into less complicated units, helping guide the reader through transitions. For example, panels might be used to zoom out from specific detail to the broader context, or conversely as a way of drilling-down from broader picture to smaller detail.



→ Illustration by Alexandra Alberda

Comics are Accessible

Comics are likewise *accessible* in that they are usually presented in an easy-to-understand format. They often connect with readers by employing iconography that has a local, regional, or national identity, using recognisable images that can often get closer to meaning than text can alone. Because of their familiarity and ability to make information more comprehensible, comics have been found to be a useful medium for getting information out to the general public (McNicol, 2016, p. 25). As Farinella argues by combining metaphors and character-driven narratives, comics have the power to make scientific communications accessible to a wider audience (Farinella 2018).

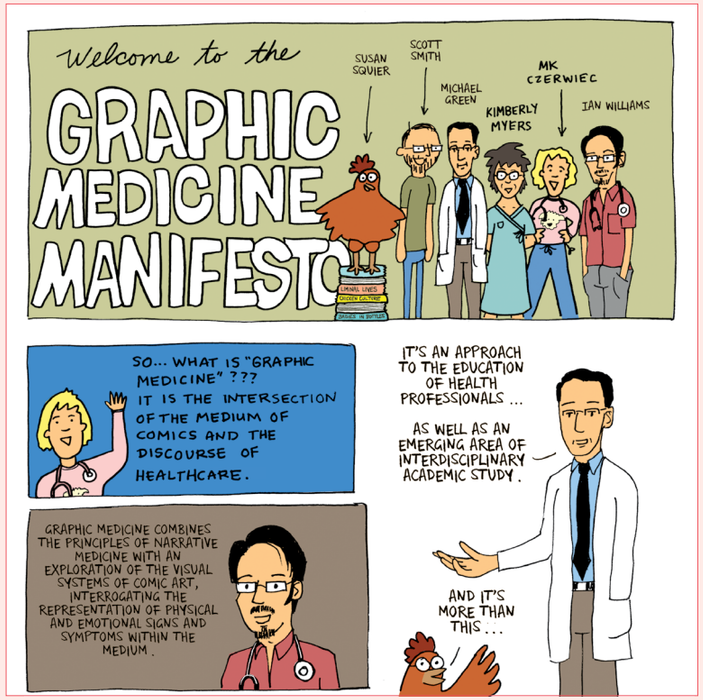
Comics are Relatable

The unique combination of text and images found in comics is also what can make the medium more *relatable* than other visual and text-based media. Not only is it important that health information is depicted accurately, but that patient and family experiences are also represented fairly (Green and Myers, 2010; McNicol, 2016). Through using emotive stories, people can forge stronger connections with health data, helping them to make sense of their own personal experiences with a particular issue or illness.

In Practice:
What is Graphic Medicine?

Many comics containing public health messages that emerged during the pandemic fall under the umbrella term 'graphic medicine', a concept that emerges from the intersection of the comics medium and healthcare. The term was coined by Dr Ian Williams, a GP, writer, and comics artist (Green and Myers 2010) and Graphic Medicine is now an organisation that works to further the practice and provide resources for artists, educators, and healthcare providers alike.

Graphic Medicine provides an umbrella term to bring together a growing number of comics that engage with healthcare, illness, disability, education, treatment and patient experiences, and practitioner experiences. Works classified as graphic medicine cross a variety of comic formats and genres, including webcomics, graphic pathographies, informational comics, comics strips, single panels, and video/audio installations.



↳ Excerpt from *Graphic Medicine Manifesto*, comic illustration by MK Czerwiec and Ian Williams

Comics and Mental Health

Gaining emotional intelligence over our own and others' feelings is connected to effective behaviour change in public health (Bhochhibhoya and Branscum, 2015). Research shows that the pandemic led to increased anxiety and reduced wellbeing. Uncertainty and the need to be hypervigilant in guarding our health and the health of others contributes to feelings of irritability, overwhelm, exhaustion, burn out and anxiety (Cullen et al, 2020; Hepburn, 2020; Pfefferbaum et al, 2020). Many people try to hide or to contain these feelings at home and at work, which can lead to further stress (Hamouche et al, 2020; Hepburn, 2020).

→ Emotional Intelligence was defined by Peter Salovey and John Mayer as "the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth."

Comics evidence great potential for public health communication around mental health. For example, comics can represent a conversation along with the hidden, unspoken meaning behind and beyond the words - something that is almost impossible to do with text alone. In this way, the reader simultaneously has access to the spoken words, as well as to the thoughts of the characters. This view of someone's inner world illustrates that what we say out loud is not always what we feel inside (Green and Myers, 2010). Sharing comics about mental health can offer support, help people feel less alone, and foster empathy towards what others' are experiencing that may not always be visible on the surface (McNicol, 2016; Farthing and Priego, 2016; Alamalhodaei et al, 2020; Sutherland et al, 2021).

→ Our inner worlds are made up of our thoughts, feelings, memories, values, beliefs, and desires. They are shaped by our personal experiences, social, economic and environmental forces. In contrast to our 'outer worlds', our inner worlds are hard for others to see.

Webcomics on social media and Instagram

As the pandemic quickly grew into an infodemic, social media researchers spoke out about the possibilities - and perils - of public health communication over social media platforms like Twitter, Facebook, and Instagram (Chan et al, 2020; King and Lazard, 2020). While social media presents opportunities for health actors and governments to enhance health literacy by engaging millions of social media users, most existing research focuses on monitoring and countering the flow of misinformation (Mendoza-Herrera, 2020; Johannsson and Selak, 2020).

Offering 'free' usage in exchange for access to your data, many artists who use Instagram to share their work do so with reservations. Yet, as the current leading platform for visual content sharing, along with its ease of use, Instagram remains a prominent choice for posting comics content and connecting with readers. The social media platform opens artists' work up to new audiences through hashtags and the explore function. It allows artists to test out works in progress, gain immediate feedback from fans, connect with other artists, and gain commissions.

→ According to the WHO an infodemic refers to "an over-abundance of information – some accurate and some not – that makes it hard for people to find trustworthy sources and reliable guidance when they need it.." https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf

In Practice:
Instagram as a Commodified Platform

Bought by Facebook (now Meta) in 2013, Instagram is a for-profit, heavily commercialised platform driven by advertising revenue and the collection and sale of users' data. Organised around the display and sharing of visual imagery, Instagram now has more than 1.3 billion users worldwide – accounting 22.6% of all people aged 13+ in the world. The platform has become an extremely popular mobile app, particularly among 18–34-year-olds, who make up 62.8% of its users (Kemp, 2021).

During lockdowns, the importance of the platform for social and international communication grew even more.

↳ Maaike Hartjes 2021, follow Maaike's comics on Instagram @maaike.hartjes

Sampling and Methodology

Our research method was designed to investigate the ways that public health messages are communicated and promoted in comics shared on Instagram. Our aim was to offer insight into the potential roles that web-based comics can play for enhancing wellbeing, encouraging behavioural change, and building resilience. By coding and archiving these ephemeral digital artworks into a database, our project set out to create a resource for public health communicators, educators, and artists looking to improve creative, evidence-based communication practices on social media.

Our method involved a three-step process. First, we engaged with practices of web-scrapping to retrieve social media data for analysis. Web-scraping is a popular method of data collection for researchers using social media content. To collect our sample we used Apify's Instagram scraper. The final dataset compiled 15,234 unique entries.

→ The sampling process was led by project Co-Investigator José Blàzquez with PI Anna Feigenbaum. You can find out more about Apify at https://apify.com/jaroslavhejlek/instagram-scraper

While most researchers that use web-scraping methods aim to produce academic findings, our aim was to re-curate social media data to make this data differently accessible for content creators, stakeholders, and the public. To do this, we developed a process we call 'coding as tagging'. Here we re-imagined traditional content analysis through the co-creation of 'stakeholder folksonomies' -categories relating to health and data literacy topics - that we then used, via coding, to 'tag' social media posts. This process transformed what would be a standard academic dataset into a searchable database that can become a publicly re-useable resource.

In the final step of our method, we directly contacted comics artists in our sample via an 'opt-in' participation process. This stage served to share project information and provided an opportunity for artists to self-represent by sharing biographical information and further links that we could include in our research dissemination. Together, these three steps offer an innovative, participatory approach to data-driven communications research.

In Practice:
How We Collected Our Data

COVID-19 Hashtags	Pandemic Hashtags	Authors	International Community Hashtags
covidcomics covidcomic covid19comic covid19comics coronaviruscomic coronaviruscomics coronacomic coronacomics	lockdowncomic lockdowncomics pandemiccomc pandemiccomics viruscartoon viruscartoons quarantinecomic quarantimecomics	Pilot sample Instagram saves GraphicMedicine.org	graphicmedicine comicsforgood

This is an illustration of the hierarchic model used for our data collection. From the four groups of data sources, we gave priority to COVID-19 hashtags such as #covidcomics, #covid19comics or #coronavirus comics. Next, we considered pandemic hashtags, such as #lockdowncomics, #pandemiccomics and #viruscartoons. The third group consisted of the data collected from selected artists' Instagram profiles, selected due to their engagement with graphic medicine. Finally, the last group comprised of intentional community hashtags, which were not explicitly focusing on the pandemic yet were still oriented to the communication of public health messages via comics.

Artists profiles were also selected for data scraping based on previous identification of artists affiliated to the graphic medicine community, or featured in news reports, who we knew were creating comics with public health messages on Instagram. Graphic Medicine was consulted to identify some of these artists, as the organisation has previously showcased related social media content on their website (Graphicmedicine.org). Institutional accounts such as the NHS, WHO, NIH, and various governments were deemed out of scope.

Refining Our Sample

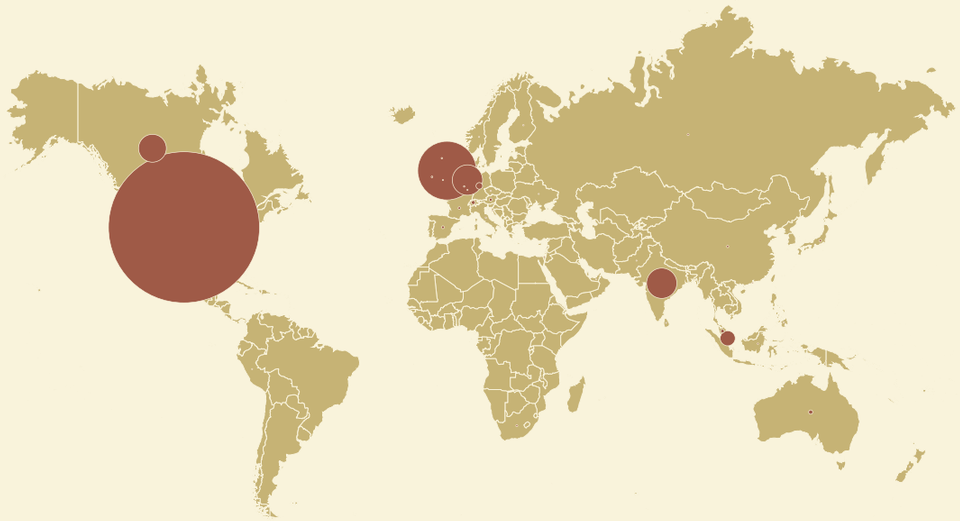
Nine project team members worked to refine the original 15,234 dataset of Instagram posts to those that were 'in scope.' This was defined as posts that were comics in English that contained explicit public health messages. The refinement process left us with a sample of 3,155 public health comics to code. These posts were then qualitatively coded by five project team members, after which we were left with 3,130 public health comics.

Comics came from all populated continents. Of the comics with a clearly identifiable country of origin (just under 60% of the sample), nearly half came from the United States, with the UK at 15%, and India representing the third largest contribution with 8%.

→ Datagraphic on next page

Comics were sourced from just over 1,000 unique users on Instagram; however, the distribution clearly resembled a long tail, with 20 artists contributing 25% of the total number of comics analysed. For data on literacy, visual and storytelling elements, we filtered out reposts, leaving a sample of 2,340 original comics.

Map of Comics by Country



Number of posts with clear country of origin:

US	552	China	6	Philippines	2
UK	213	Denmark	6	Scotland	2
India	109	Russia	5	Cambodia	1
Netherlands	104	South Africa	5	Dubai	1
Canada	100	Ireland	4	Luxembourg	1
Singapore	53	Belgium	3	Malawi	1
Germany	22	Hong Kong	3	Norway	1
Australia	13	Indonesia	3	Pakistan	1
Switzerland	12	Croatia	2	Peru	1
Malaysia	11	Czech Republic	2	Sri Lanka	1
Austria	9	Finland	2	Ukraine	1
Spain	8	Isreal	2	Wales	1
France	7	Italy	2		
Japan	7	New Zealand	2		

In Practice:
Generating ‘Stakeholder Folksonomies’ & Coding as Tagging

A folksonomy is a user-generated classification system that organises content online into different categories. A folksonomy allows users to categorise, annotate and search digital material using ‘tags’. Sometimes these tags are already part of the metadata (such as a time stamp or geolocation) and other times they might be words or phrases shared by a community. Different stakeholder groups generate and use different folksonomies.

Tagging became well known through popular photo sharing sites like Flickr and early social media platforms like Tumblr and Reddit. Today, tags are used in all kinds of digital systems, from file management to practices of ‘hashtagging’. Layering these web-based practices into our social media content analysis, we used codes that were generated from the language and taxonomies of our key stakeholders. This allowed us to not only label our data for analysis but also generate tags associated to each comic in our sample, thereby creating a digital resource for public use.

Tag Category	Description
Apify (web scraped data)	Metadata from Instagram including usernames, likes counts, time stamp of posting
Operational Codes	Process labels including if the post is in scope, whether it was a repost, when the coding was completed
Public Health Elements	Public health issues featured in the comic
Comic Artistry Elements	Technical comic features including panel count and layout, use of colour
Storytelling Elements	Narrative features regarding character, perspective, setting
Graphic Medicine Elements	More complex codes arising from existing graphic medicine scholarship relating to how comics about health use inner worlds, show embodiment of illness, scales of experience, and illness narratives
Data & Information Literacy	Code that evaluated comics in relation to best practices for building literacy, based on existing scholarship, concerning the inclusion of statistical information, references, and authorial sources.

Findings: Humanising Public Health

Comics Can Provide a Platform to Visualise and Prioritise Mental Health

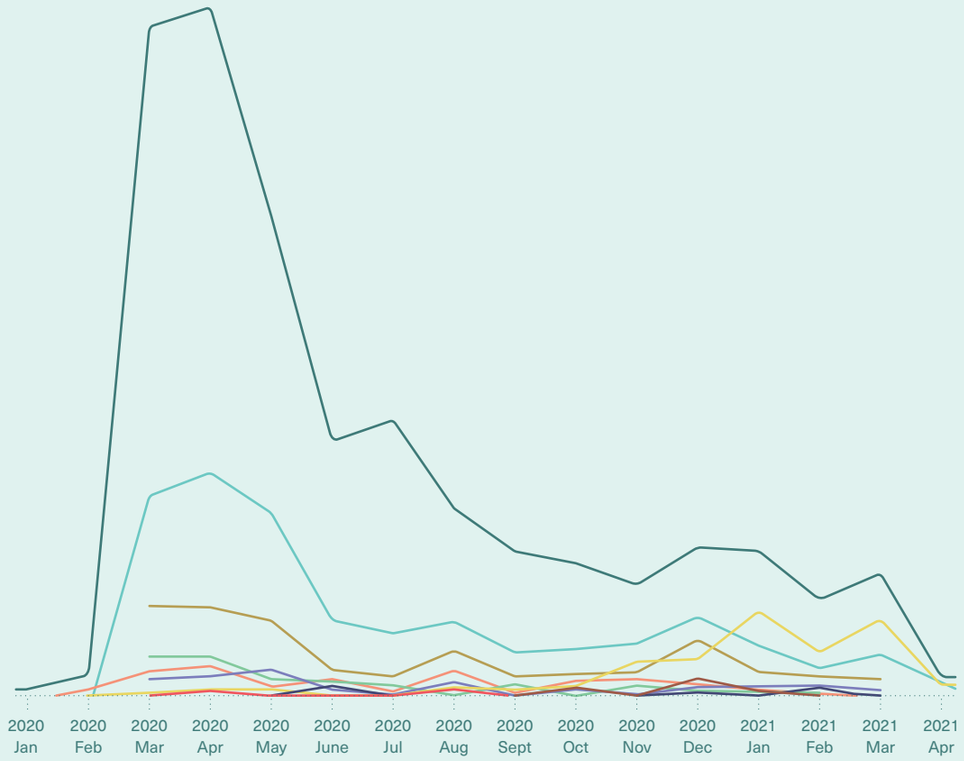
COVID-19 showed us that we need to have a public mental health focus when dealing with crises (Ahmad et al, 2020). In our sample, 'mental health' was the second most prominent COVID issue (19%), behind 'staying safe' (63%), an umbrella category referring to all preventative public health messages that included mask wearing, hand washing, and social distancing. These results show the extent to which mental health was a central concern for comic artists sharing public health messages during the pandemic.

It can be challenging to communicate the lived experience of depression, stress, anxiety, and other forms of psychological distress. Representing physical illness can often draw upon very clear symbolism such as a thermometer to represent a fever, or a bandage to represent a wound or broken bone. In contrast mental health has less clear. easily recognisable imagery to draw upon. Comics, through their use of visual and spatial metaphors to explore characters inner worlds, can create this imagery to help readers better understand how they - and others around them - are feeling.

→ In this section our findings look at how comics can help humanise public health messages, contributing to enhanced comprehension, engagement, and empathy.

→ Datagraphic on next page

Primary Covid Issue



- Staying Safe
- Mental Health
- Wellness
- Vaccination
- Bereavement
- Hospitalisation
- Care Work
- Mild Cases
- Long COVID
- Testing

In Practice:
Comics Can Improve Mental Health Communications

This post published by @flimsy_kitten uses a comic technique referred to as inner worlds, wherein the artist displays characters internal thoughts and feelings by using thought clouds. In addition to the use of inner worlds, creative choices such as showing the character in bed to suggest feelings of depression and a lack of motivation are also common in comics. Using the black cat figure to convey an internal dialogue of self-doubt is further able to express feelings of sadness and anxiety by giving them an accessible visual form.

In this comic's mini-narrative the central character struggles to carry on with everyday work during COVID-19, a theme that was relatable for many readers. This is evidenced in the comments section of the post where readers wrote, "This one helped me today. Being productive is really positive." and "It's tough at the moment. Here's hoping we all get through it." This method of communication can help those online feel less alone. Recent studies suggest that dialogue-based uses of social media, such as direct messaging and commenting on posts can be associated with improvements in wellbeing (Burke & Kraut, 2016; Escobar-Viera et al, 2018).

↳ Rachel Smith 2020, follow Rachel's comics on Instagram @flimsy_kitten

Comics can tackle issues of health equity and foster empathy

Comics can help communicate COVID-19 experiences from the perspective of vulnerable and marginalised people raising greater awareness for issues of health equity. As our sample shows, this can be done either by creating relatable characters in comics centred on conveying information (infocomics), or by telling character-driven stories that prompt the reader to reflect on how individual experiences might be systematic or play out on a broader, social level (slice of life, testimonial, political comics).

Fostering empathy and care for others' wellbeing is a key component of effective public health campaigns. Comics can also be a powerful medium for evoking emotions and empathy, which in turn can support prosocial behavioural change by shifting perspectives and attitudes (Pfattheicher et al, 2020; Petrocchi et al, 2021).

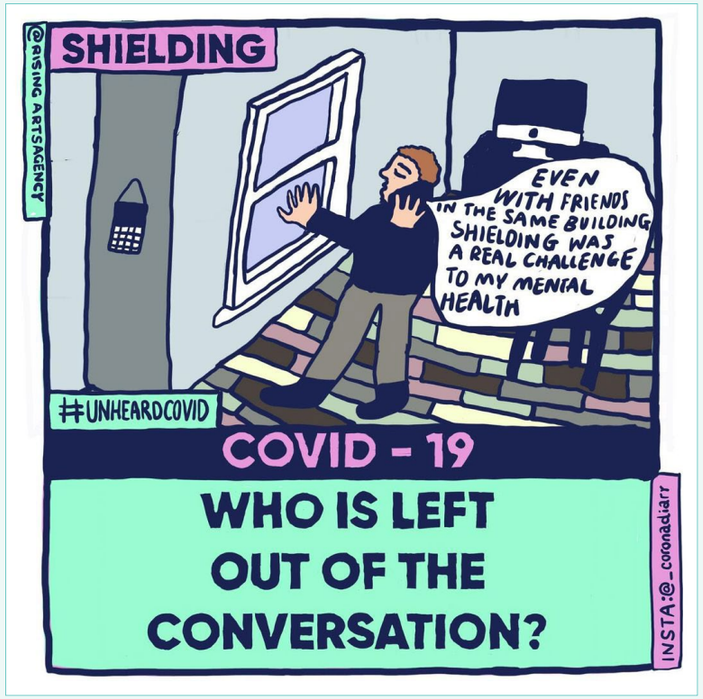
→ The WHO defines health equity as the influence that non-medical factors have on health outcomes. For example, this can include income, education levels, job insecurity, food, housing, social inclusion, access to affordable health services, as well as policy systems. https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

→ Excerpt from our *Humanising Public Health: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

In Practice: Comics Can Foster Empathy and Promote Health Equity

Originally posted by _coronadiary, the #unheardcovid series showed experiences of people who have been 'left out the conversation' during COVID-19. In this special collaborative series Jackson used composite characters to represent people that are often left out of public narratives around COVID-19. For this project she partnered with @risingartsagency. Together, they responded to the question: Who is left out of the conversation? "I asked followers for feedback and there was a lot!" Jackson explains on her Instagram account, "I picked 9 answers then spoke either directly to people who identified under these categories or alternatively found online quotes from those in response to the pandemic" (https://www.instagram.com/p/CG2rDpsFQNY/). The series includes a teacher, a pregnant person, a child, a homeless person, a medic, a disabled person, an evicted migrant, someone with long COVID, and someone shielding.

Jackson's illustrations bring these demographic categories to life through the creation of relatable characters. This practice can help foster empathy for those different from ourselves. This visually engaging, humanising approach to communicating marginalised experiences invites the audience to consider the pandemic from a perspective different to their own.



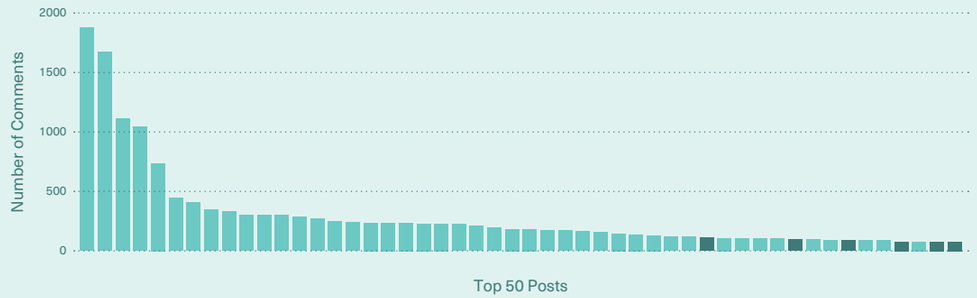
↳ Panels from the #unheardcovid series, follow Monique's work on instagram @_coronadiary

On Social Media, Colour Makes for More Engagement

Using visual media is especially important when utilising social media platforms to help spread evidence-based information, as visual content is 40 times more likely to get shared (PWC, 2017). Use of colour can shape the tone of a comic, highlight focal points, and create more inclusive representations of targeted demographics.

Within our sample, over 75% of all public health comics were in colour. Posts that used colour had both more comments and more likes. Of the top 25 most commented on posts, all were in colour, with only 6 of the top 50 most commented on comics appearing in black and white. Similarly, of the top 25 most liked posts all were in colour, with the same 6 posts in black and white among the top 50. This data strongly suggests that the inclusion of colour is beneficial for engaging audiences with public health messages on Instagram.

Use of Colour in Top 50 Most Commented on Posts



Use of colour:	Colour	Black & White

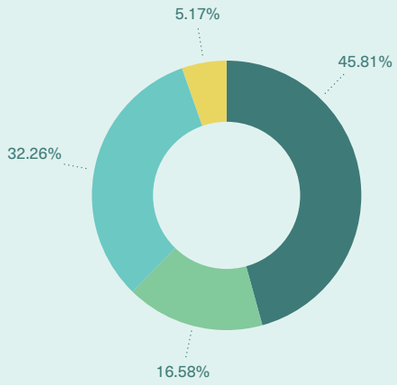
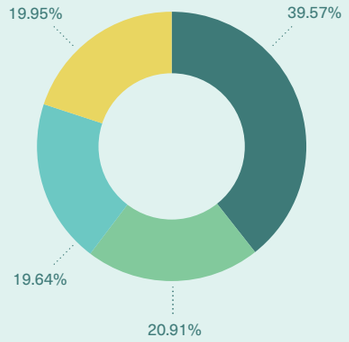
In Practice:
Good Use of Colour Can Help Drive Engagement

This comic, originally posted by @weimankow, was designed to disseminate COVID-19 safety information to a broad audience. In this example, Kow uses a soft colour palette with minimal writing to ensure the information is understandable by both adults and children. The symbols and textual messages used by the artist can be recognised in the same way on a global scale. The text has also been visually spread out with enlarged capital lettering to enhance readability.

A positive reception to this approach is shown in the comments section of the original post: “Gloves, time to buy a ton of gloves.” “Good graphics illustration and info” and “Thank you for helpful tips.” Such comments show how comics can help public health messages stick in the reader’s mind, increasing capacity for behavioural change.

↳ Comic by Weiman Kow. Follow Weiman’s work on instagram @weimankow

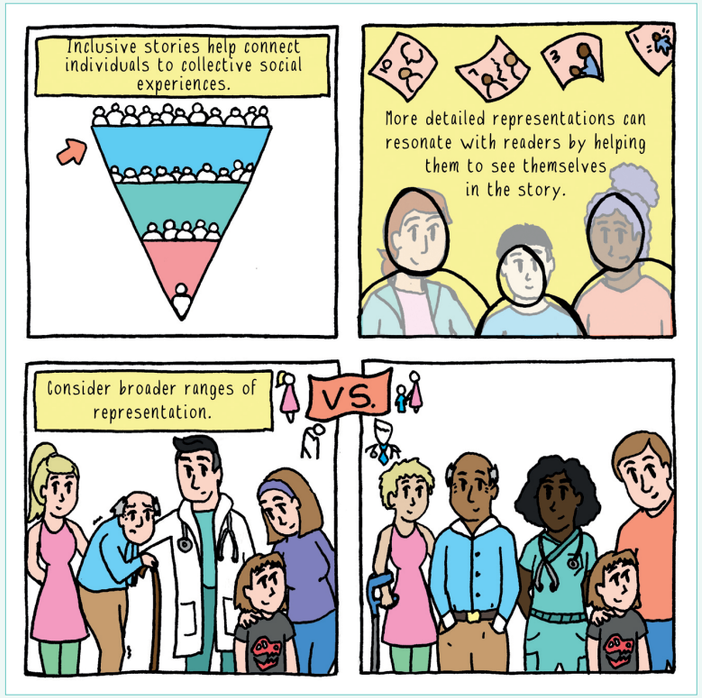
Our qualitative content analysis further showed that the use of colour helps to create more inclusive representations in relation to race and ethnicity. In comics, recent critical debate argues that the absence of colour tends to signify whiteness or colourblind frames that reinforce whiteness and icons as non-racial and universal, whether intentional or not (Hicks 2020; Smith 2019; Hunt 2018; Frankenberg 2001). When working in black and white, artists can use sensitive and thoughtful details to create non-white characters, but there needs to be a similar level of characterisation for all characters to avoid stereotypical representations (Campbell 2018). Inconsistency in racialising characters often marks non-white characters as 'other,' re-enforcing ideas that whiteness is the norm (Smith 2019; Frankenberg 2001). In contrast, when artists intentionally use colour to clearly illustrate pandemic experiences from multiple, diverse points of view, they create comics that can be useful for communicating public health messages across demographics, as well as for highlighting issues of health inequity and fostering empathy.

Racial Diversity in Black and White Posts	Racial Diversity in Colour Posts
	

Racial Diversity:	No	N/A	Unclear	Yes

In Practice:
Making Representational Choices for Diversity and Inclusivity

While representation alone is not enough to change structures of inequality, using more inclusive imagery helps challenge ingrained stereotypes by expanding our mental images of roles and relationships. Relatable uses of colour, along with space and detail, can also help connect with target demographics.



↳ Excerpt from our *Humanising Public Health: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

Visual metaphors can help foster health literacy

Existing research shows that using visual metaphors in comics can help facilitate the communication of complex health information and scientific concepts (Farinella, 2018; El Rafaie, 2019; Saji et al, 2021). Our study adds evidence to this argument, finding that visual metaphors were used in nearly one out of every four public health comics.

Comics using visual metaphors performed well in terms of audience engagement, as measured by like counts. Among the 10 most 'liked' infocomics within the sample, 8 used visual metaphors. This suggests there is a relationship between the use of visual metaphor and engagement with public health messages on social media. Further data analysis and audience reception research should be done to investigate visual metaphor as a tool for rapidly communicating complex public health information to non-specialist audiences.

In our sample, one third of comics using visual metaphor also used elements from the superhero genre to depict their public health message. Superhero genre comics that clearly featured human characters battling the virus depicted mixed gender groups 40% of the time and mixed age groups 20% of the time.

In Practice:
Visual Metaphors are key to good Science Communication

Visual metaphors are particularly useful when communicating health concepts that are otherwise invisible (Callender et al, 2020). For example, many artists in our sample drew COVID-19 as a monster or villain to visualise virus behaviour. This comic made by @elfylandstudios in collaboration with @lifeologyapp features COVID-19 personified as a monster to illustrate the virus' properties and behaviours for young audiences. Here, reimagining an abstract concept using familiar cartoon iconography helps to translate complex health information using a more recognisable visual language.

In the caption for this comic, artist Elfy Chiang writes, "This is a comic I made with @lifeologyapp and experts in virology. Created to help adults talk to little kids about the pandemic and help them make sense of the changes in our daily lives right now." In a recent study, Saji et al (2021) argue that such anthropomorphic metaphors "capture the existential experiences of the self and the bestial nature of the virus" (p.152). By depicting the virus as monster, comic stories can visually frame the 'battle' against COVID-19 as one that is collective and empowering, demanding society to fight the metaphorical beast.

↳ Comic by Elfy Chiang in collaboration with Lifeology. Follow Elfy on instagram @elfylandstudios.

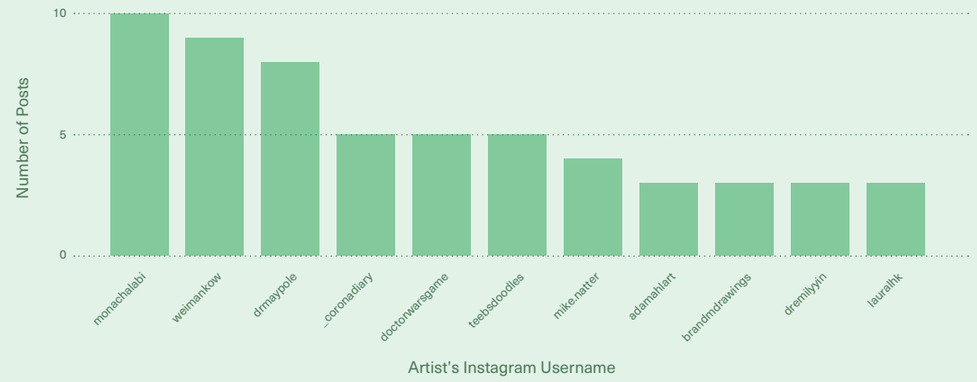
Findings: Evidence-based Comics vs Infodemics

Source referencing is key for improving evidence-based comics

The increasing popularity of comics and data comics can be leveraged to amplify the circulation of authentic health information. Creating a culture of good evidence-based communication practices among comics artists can help counter misinformation online and improve information literacy. As in mainstream reporting, crediting sources of comic data for health information and data in comics to expert sources like the CDC and the WHO have been found to be effective at correcting health misinformation on social media (Vraga and Bode, 2017). Moreover, by repeatedly referencing authorial sources in their public health messaging, and developing a reputation for offering verified information, comic artists can become science communication influencers whose messages can trigger adoption through positive social reinforcement (Zhou et al, 2015).

In our dataset of comics, sources were referenced in only 10% of comics, with only half these references citing authorial sources. Good referencing and authorial source citation practices were most common in infocomics. Promisingly, of the top 10 users with the most liked infocomics, the top 3 all engaged with authorial source referencing practices.

Authorial Source Referencing in Comics



The failure to reference does not rest with artists alone. Instagram has several platform constraints that makes it challenging for users to establish credibility for their posts. For example, Instagram has a 'no-clickable-link' policy in posts. The platform only allows for one link that users must put in their profile bios, making it challenging for this function to be used for referencing. While these policies are useful for preventing spam and countering online scams, it makes it challenging for artists to include links to authorial and evidence-based sources in their comics.

→ An aspect of the design of a particular social media platform that constrains or restricts a user from performing certain actions.

In response to this platform constraint, some artists put URLs in their images or captions to lead followers to health authorities as a way of establishing authentication and countering misinformation with their comics. Such effort is frustrated by the fact that the URLs do not appear as hyperlinks when posted, and often cannot be copied and pasted from Instagram's mobile app, making it difficult to follow the link to its source. While not ideal, sharing references visually and noting authorial sources through @ mentions are important for establishing chains of accountability and generating trust with both readers and public health professionals.

Our data highlights the need for further research into referencing practices as a potential force for countering misinformation on visually based social media. It also calls for more training and resources to be put into supporting communities of practice around evidence-based social media.

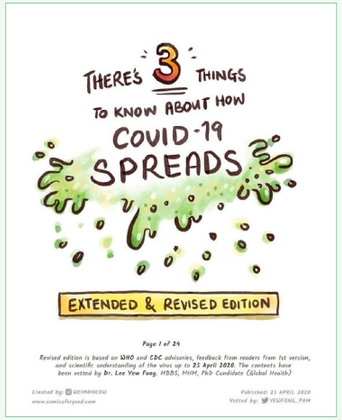
At the same time, our findings suggest that it should be the responsibility of social media platforms to enable and foster evidence-based communication online. Better practice in source verification can be embedded into platform design. For example, users could be prompted about referencing and fact-checking practices in the same way that platforms now inform users about third party data and personalised advertising through interface pop-ups or 'more information' buttons.

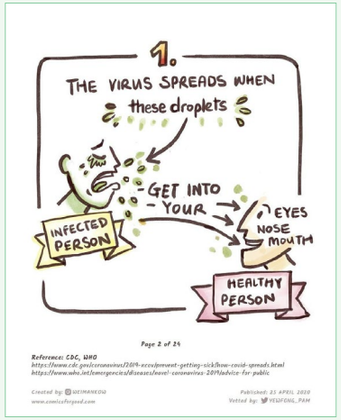
→ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

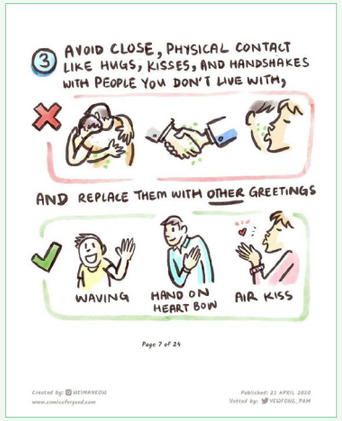
In Practice:
Artists Can Use Visual Referencing Strategies

In her comic on how COVID-19 spreads, artist @weimankow embeds references to the CDC and WHO in this comic panel and credits a medical expert who vetted the health message in the comic by using an @ mention in the caption box.

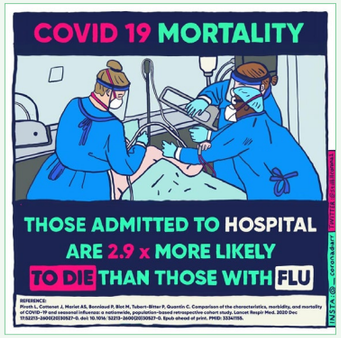
Another comic in our sample by Monique Jackson (@_coronadiary), draws attention to the lethal impact of COVID-19 to counter the myth that it is just another seasonal flu. Providing an evidence-base for her comic, Jackson visually references a scientific paper from *The Lancet* which compares data from COVID-19 and the seasonal flu.







↳ Comic by Weiman Kow. Follow Weiman's work on instagram @weimankow



↳ Art by Monique Jackson. Follow Monique's work on instagram @_coronadiary

Hashtags can widen and diversify audiences

The strategic use of hashtags, coupled with the visual elements of comics previously discussed, can increase social media attention to public health messages. Hashtags on social media platforms are used to make content searchable (Zappavigna, 2011). By segmenting content into specific topics, hashtags enable people who are interested in a subject to come together. As a content creator, they are one of the best tools to help ensure posts reach your target audience. For example, in the COVID-19 comics we analysed, we saw this in the use of hashtags such as "#quarantinelife" where the posts containing the hashtag aim to share relatable experiences for those who are in quarantine at the same time.

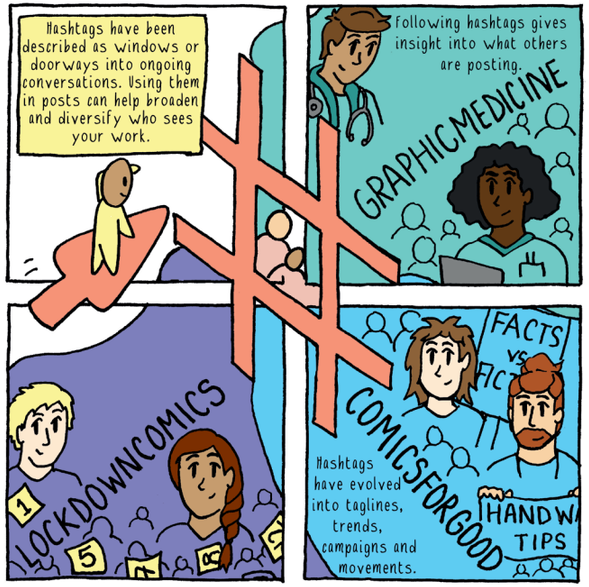
However, the use of hashtags varies heavily amongst Instagram users (McCosker and Gerrard, 2020). For instance, hashtags are often added to an image that further describes or amplifies its message but does not necessarily aim to open a space of discussion or reach specific target audiences (Highfield and Leaver, 2015). This can be seen in our sample through the use of trending COVID-19 hashtags, such as #wearamask, #staysafe, and #stayathome. While these public health directives may work to reinforce official messaging, they often only reach users who already share a similar point of view.

Recent research increasingly provides evidence that users can encounter opposing viewpoints in online spaces despite algorithmic curation and personalisation which was previously believed to trap users into homogenous filter bubbles (Messing and Westwood, 2014; Dubois and Blank, 2018). This suggests that online spaces do indeed create opportunities to reach those who are sceptical or unaware of public health messaging. For instance, research shows that during the pandemic over 60% of Instagram users surveyed were using the generic hashtag #coronavirus to share information about the pandemic (Rovetta and Bhagavathula, 2020). This is in line with what we observed in our dataset.

→ Algorithmic curation refers to the automated selection of what content is presented and how it is organised.

Drawing insight from this data, we would suggest that in order to further instigate behavioural change and raise awareness on Instagram, directive hashtags such as #wearamask should be used in combination with trending, generic hashtags that are more likely to circulate in communities beyond one's existing belief system. In addition, Rovetta and Bhagavathula (2020) point out that generic hashtags are frequently used by those spreading misinformation. This suggests that using such hashtags may help reach audiences that are more sceptical about public health information. Further research should be done to see how hashtag use in evidence-based visual media like comics can provide opportunities to interrupt and disrupt flows of misinformation on social media.

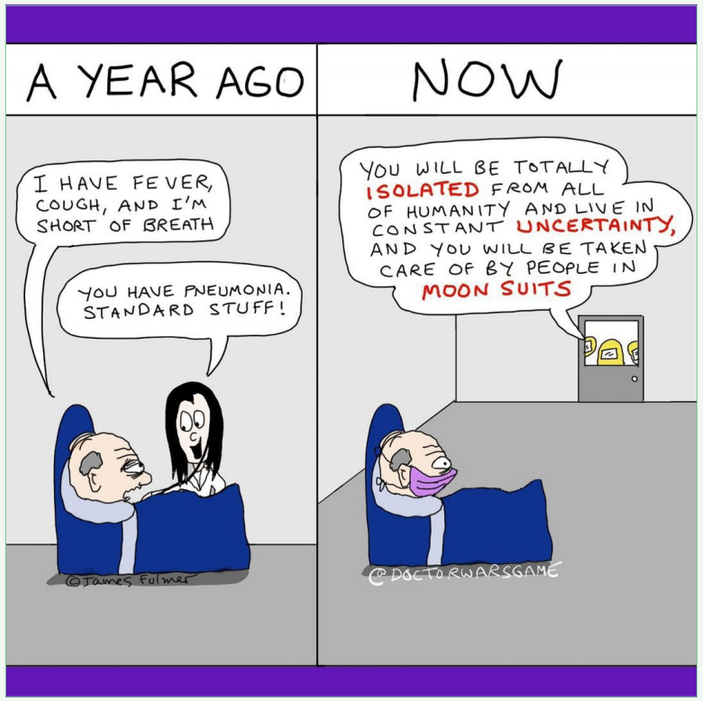
Another practice that can widen audiences is using location-specific or audience-specific hashtags. Several posts in our dataset utilised hashtags such as, #covidItaly, #coronavirusgermany, #covidmalaysia in order to signal the relevance of the message by country.



→ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

In Practice:
Good use of hashtags can foster community and fight infodemics

In this example, the artist, James Fulmer MD, uses both various hashtags relevant to certain countries, as well as hashtags such as #emergencynurse, #criticalcarenurse and #icunurse to signal specific occupational audiences that may find this content relevant. He also uses #graphicmedicine, linking his work into an existing community of health-based comics creators, scholars, and fans. Fulmer hashtags the post #facemasks rather than the directive #wearamask, as well as using a string of COVID-19 generic hashtags like #covid, #covid19, and #coronamemes, providing a good example of how to use a more generic hashtag list in efforts to reach a wider demographic. General social media advice for using hashtags on Instagram varies from 3-5 to up to 30.



↳ Comic by James Fulmer MD. Follow James' comics on instagram @doctorwarsgame

Digital optimisation can drive engagement

Digital optimisation refers to the practice of improving content production processes to increase digital visibility and engagement. All social media platforms have limitations on how content can be posted and shared. Learning how to navigate these parameters is essential for maximising the efficacy of public health messages on social media. In relation to optimising comics and related visual material for Instagram, there are two major areas that need attention – how to overcome aesthetic limitations, and how to overcome algorithmic limitations.

Aesthetic optimisation on Instagram involves considering how art will translate into Instagram's square single-image and 10-image slider formats. Abiding by the Instagram square is useful for content creators as it ensures that the image fits within the mobile app layout. Users often access Instagram on mobile phones, which means they view the content through smaller screens which can result in decreased readability if the comic does not fit within the optimum aspect ratio.

Instagram allows for a 4:5 aspect ratio for portrait images and 1.91:1 for landscape. However, the optimum size for the platform is 1:1, commonly called the Instagram square. Any image that is larger than these aspect ratios automatically gets cropped in order to be uploaded onto the app. Instagram also offers a slider function that allows for up to 10 images to be uploaded in a single post. In posts that use this function for multiple images, users are still limited to a fixed aspect ratio, where the aspect ratio used in the first image needs to be maintained across all images in the same post. Here, again, the 'Instagram square' format is best suited to the platform.

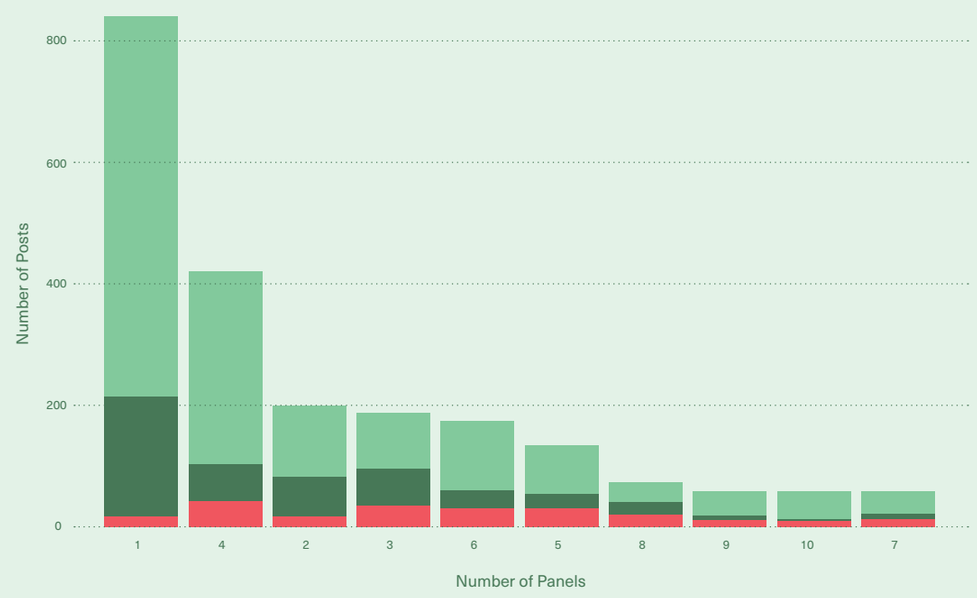
In Practice: Working with the Instagram Square

Social media platforms have restrictions on size and aspect ratio. 'Optimising for social media' means considering how the size and shape of a piece of work will effect how it looks on a social media platform including captions and text characters. While optimising can be great for making your work engaging online, be mindful that platforms change – we recommend people do what makes most sense for their art and the stories they want to share.

↳ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

Whilst still limited, the slider function on Instagram allows a maximum of 10 images in each post, providing opportunities for artists who wish to share content that does not fit within a single square image. The standard practice used by most Instagram-based comic artists is to post either a single image with no more than four comic panels, or to present each comic panel as a single square and use the slider function as a way for readers to follow the narrative progression. In comics that use the slider function, the swipe becomes akin to the gutter in a traditional comic panel layout.

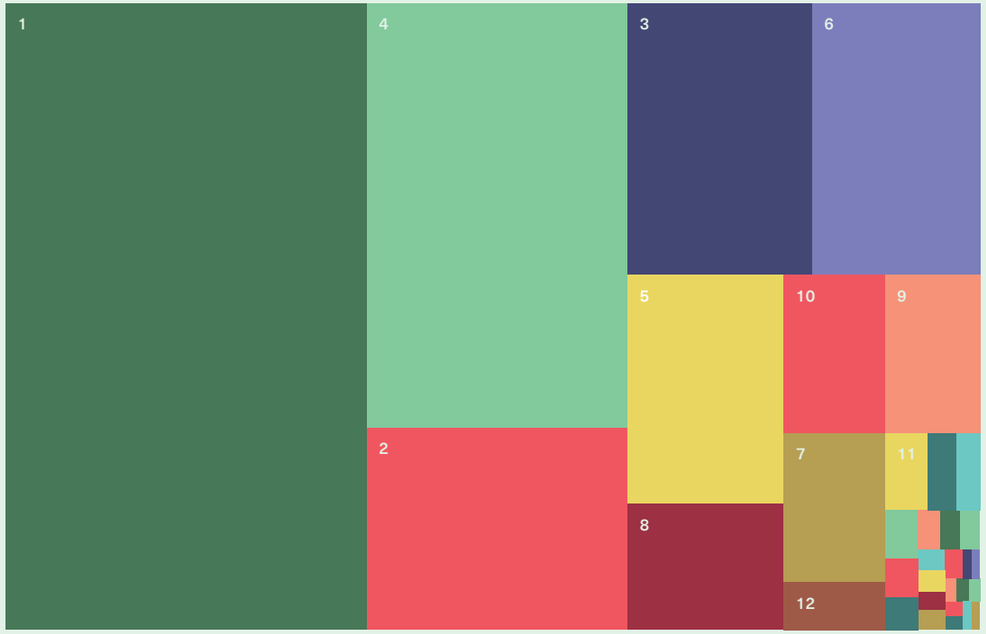
Artists' Use of Panels and Panel Layout



Panel Layout:	Square	Rectangle	Other

In our dataset, the majority of artists opted for square format and single image posts. We found that 53% of posts were a single image, with 67% of posts using a square panel format. The second most common format was a four-panel comic that either opted for a 4 squares within a square layout or a slider of 4 individual panels. Ranked by engagement data, the 10 most-liked and commented-on artists opted for square panel layouts over 90% of the time, with just under 50% of their posts being single images. The number of panels they used varied from 1 up to 19. Among the top 50 most liked and commented on posts, over 75% of posts included square panels, with 42% being single image posts. Again, the number of panels varied, here from 1-22.

Number of Panels Used in Comics



Insights from this data show that the Instagram square is key to visual optimisation and engagement with public health comics, as is scaling text and visual iconography in way that it remains legible for reading on mobile devices. Yet, while the scarcity of attention online and the need to grab audiences quickly should be considered, in our findings, reader engagement was not limited to single image, single-panel posts.

This suggests that various approaches to sequential storytelling can drive engagement, meaning creators have room to give some depth to characters, explain more complex data or breakdown information over the course of multiple panels and images. It also suggests that when comics can create an immersive, connective reader experience, it may be able to stand out in an over-saturated, visual information environment (Wolf, 2012). Further research into audience engagement, attention span, and the potential of evidence-based visual social media is needed.

In Practice:
Optimising for Share-ability

Another consideration regarding the aesthetic limitations of Instagram is that shareability is an essential part of gaining attention online. It is currently not possible to share, through reposting, more than a single image on Instagram. A good practice for shareability found in our sample was to upload individual panels as single images, and then put the full comic into a single, final image at the end of the post, a practice which encourages reposting.

However, as Instagram does not currently have a built-in reposting function, reposting practices often involve third-party apps or screenshots that do not automatically carry the username or caption when re-circulating. To ensure any references, sources, and artistic credit are preserved, this information can be included visually within the panels themselves.

For instance, this post by Mike Natter, M.D., uses a series of four single-image panels to tell a character-driven narrative about the lived experience of anxiety during the pandemic. The slider function allows the reader to pace themselves through the narrative progression sequentially, with the final image then bringing all four panels together. This makes it possible to re-post and share the full comic. The artist's signature can also be found in the lower corner of the panels themselves, allowing the artist credit to circulate with the post.

↳ Comic by Mike Natter MD. Follow Mike's comics on Instagram @mike.natter

Artists Are Navigating Algorithmic Constraints

Digital optimisation can also mean knowing how to navigate restrictions that are put in place by platform algorithms. How much visibility a post gets can be determined through engagement (i.e., the more comments and likes the content has, the more it is amplified), or through hashtags and mentions that notify the algorithms about who might be interested in seeing particular content. Algorithms are also used to find content and accounts that breach terms of service or copyright laws. Platforms may additionally choose to suppress certain content that they deem harmful by reducing its visibility and reach. This can include banning hashtags or accounts, which has become a popular method of fighting the proliferation of fake news and misinformation in recent years.

However, algorithmic interventions that aim to suppress mis/dis-information can result in the suppression of evidence-based informational posts on the same topics. In late 2020, in an attempt to curb misinformation, Instagram changed its rules around COVID-19-related content in order to suppress posts that were not shared by an authorial health institution. Users were directed to the WHO's Instagram account when they searched for hashtags about COVID-19 and posts that contained COVID-19 related information were marked with a banner that alerted the viewer to a local public health authorities' website based on their location.

In relation to our study, these attempts to curb misinformation meant that comic artists who were aiming to increase health literacy by explaining complex medical information were also being targeted by Instagram's algorithm. This resulted in the suppression of their posts. The content was sometimes flagged, left out of post feeds, and reached fewer users as a result.

In Practice:
Instagram's COVID-19 Algorithm Supresses Evidence-Based Information

In response to this algorithmic limitation, some artists started to mobilise their followers on Instagram, employing grassroots attempts to 'beat' the algorithm by urging their followers and viewers to like, comment, and save posts in order to amplify their reach. For example, in a post explaining the differences between COVID-19 variants and mutations, artist Maaike Hartjes explains how readers can help make artists' work on COVID-19 more visible. Here, Hartjes helps foster a community of practice around supporting artists on social media at the same time as she tries to build literacy, not only on COVID-19, but also on the ways that a platform algorithm works.

↳ Comic by Maaike Hartjes. Follow Maaike's comics on Instagram @maaike.hartjes

Interactive web comics can foster participatory culture in online health messaging

Interactivity on social media refers to messages that prompt the audience to share their experience or perspective in response to a post. In our sample, these interactivity prompts appeared within a comic panel and in the post caption box or in both. While interactivity was only used in 15% of the comics in our sample, 11 of the top 25 users with the most engagement used interactivity in their comics, their captions, or both.

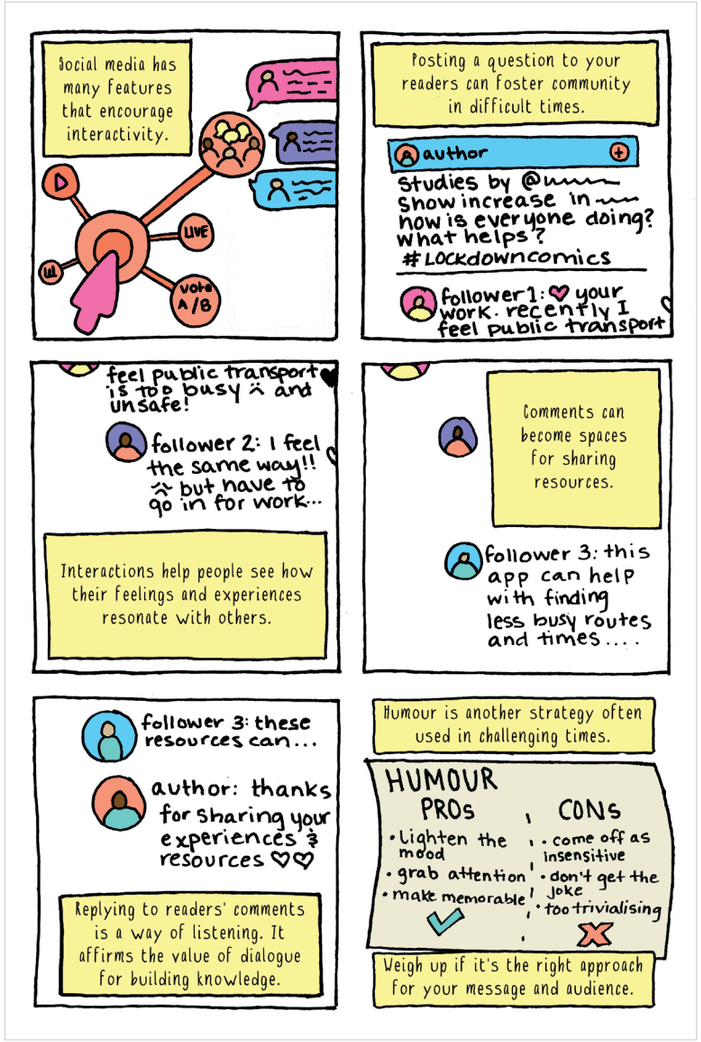
Analysing the comments on posts that included interactivity shows the potential that interactive social media engagement can have for building deeper understandings of public health issues. While the negative impacts of online comments are well documented, we found, in line with recent research, that the comments sections of public health comics can become deliberative spaces where people discuss experiences, discover new information and share resources (Andalibi et al, 2017).

In our sample, the comments sections of comics that included elements of health literacy, provided opportunities for readers to share opinions and ask questions. This can help increase comprehension through personal engagement and make health and scientific information more relatable, which contributes to information comprehension and retention (Martin and MacDonald, 2020). Comments are also useful spaces for artists to add further nuance to information shared in the comic and address reader questions.

By addressing people's scepticism, dialogue in the comments section of comic posts can offer a place to examine and accept scientific uncertainty. Fore example, in efforts to counter scaremongering in the comments, in one post artist Maaike Hartjes pointed her readers to preliminary scientific results. In the comments section of two of Hartjes' other posts featuring vaccination comics, several people declared that the comic led them to better understand how the vaccines worked and one person claimed that this artist's comics convinced them to take the vaccine. In another set of comics about restrictions, people from many different countries used the comments to discuss and make sense of their own country's way of dealing with the pandemic.

Artists' dialogues with readers shows us that when artists are willing to engage with fact-checking and respond to queries, they can build health literacy. While artists are not authorial sources themselves, these nascent findings point to the potential impact that collaborations between artists and health organisations could have. Combining the accessibility and relatability of comics with the interactivity afforded by social media could prove effective for challenging mis/disinformation.

Further, this combination of accessibility, relatability and interactivity works to support the four elements of digital literacy - access (to health information); awareness (of how public health is represented and the need for diversity); capability (to reflect on the impact of covid on the inner world) and consequences (more mindful engagement with data and sharing behaviours). Approaching digital literacy through this case study of comics lets us see how people can transform their existing digital literacies into the capability to make informed decisions about public health.



→ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

Communicating uncertainty in comics can help foster information literacy, wellbeing, and resilience

The COVID-19 pandemic has revealed health inequalities around the world and unearthed hidden or previously dismissed forms of systematic racism and discrimination, including ableism and ageism (Haynes, 2020; Marmot and Allen, 2020; Pirtle, 2020). On an individual level, the effects of COVID-19 have seeped into everybody's life, forcing all of us to view ourselves against the pandemic's health statistics, graphs, charts, and changing projections. We are called upon to continuously evaluate and re-evaluate our own health conditions and that of our loved ones during a time of extreme uncertainty.

In addition to the mental health and wellness impacts of the social and economic factors of the pandemic, this uncertainty itself has led to increased mental distress (Byrce et al, 2020; Koffman et al, 2020; Rutter, 2020). 'Stuck in fight or flight mode', cognitive psychology's language of trauma has entered popular vocabulary as people struggle to navigate life amid so much uncertainty. Whether this uncertainty is informational, economic, or emotional, it has become clear throughout the pandemic that we have a lack of language and resources for handling so much of it.

In our sample of comics, only 3% addressed issues of uncertainty, yet 3 of the top 5 most commented on artists addressed uncertainty in their work. In addition, the most prolific artist in our sample, @drmaypole, expressed uncertainty in 30% of his comics, which were often drawn from his experiences interacting with patients, and children, as a doctor during the pandemic. Comics addressing uncertainty were most prevalent in the infocomics genre where scientific uncertainty around safety protocols, testing, and vaccination was contextualised and explained, as well as in 'slice of life' comics where uncertainty was expressed in relation to mental health.

Humour was also used to navigate uncertainty, acknowledging both shared states of anxiety and shared frustrations in governmental guidance.

Sometimes the best thing that can be done in times of uncertainty is to acknowledge it. Recent research by Van Der Bles et al (2020) found that "a key challenge to maintaining public trust in science is for communicators to be honest and transparent about the limitations of our current state of knowledge." Our findings suggest that comics can serve as a medium to help health professionals and scientists communicate uncertainty in ways that are engaging and accessible to social media audiences. Further research is needed into effective strategies for communicating scientific uncertainty and utilising social media as a forum to build resilience in uncertain times.

In Practice:
Comics can help communicate uncertainty

In September 2020, cartoonist and hospital administrator Katy Doughty created a web-comic called 'We Might Not Ever Know the True Toll of COVID-19' (https://thenib.com/the-true-toll-of-covid-19/). As part of her hospital job, Doughty was responsible for updating her hospital's online COVID-19 guide. Her web-comic illustrates her reflections on the messiness of COVID-19 data and its collection.

For example, in one stark panel the bars of a bar graph tumble and fall over each other like the planks of a broken fence. Some of them fall into a blood red mound at the bottom of the graph, paired with the caption "The truth is COVID-19 statistics are a mess." Doughty's sombre text relates the struggle of keeping up to date with the death count.

Doughty's sequential artwork on the statistical chaos of COVID-19 uses a stripped back colour scheme, resonant iconography, and layers of text to convey the contrast between what we see on the 'data surface' versus the realities behind the scenes. Doughty's comic legitimates the human experience of chaos, while making visible data that is absent, uncounted, or hidden. Most importantly, it does this in a way that spotlights—rather than shies away from—the systematic failures and vulnerabilities revealed by all that what we cannot yet count.

↳ Panel excerpts from Katy Doughty's comic We Might Not Ever Know the True Toll of COVID-19 published on The Nib. Follow Katy's comics on instagram @katydoughtydraws

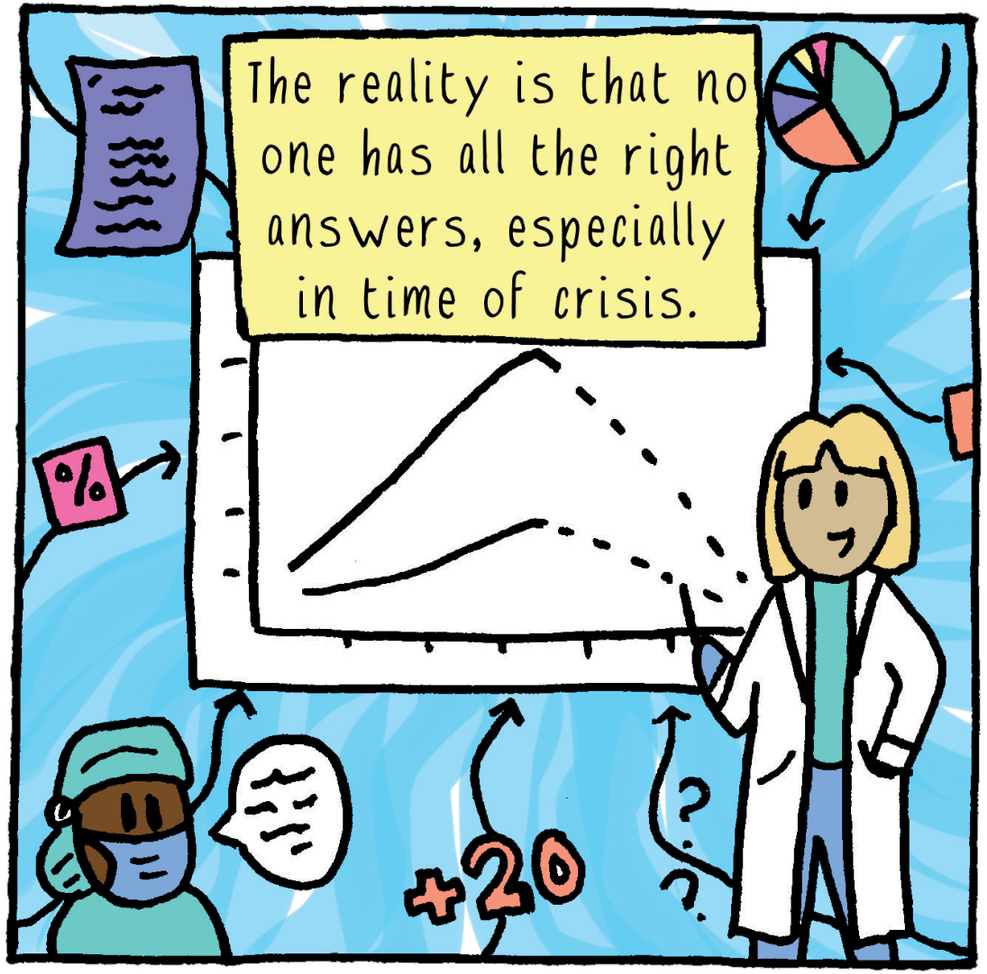
Further Research

Based on our findings we would recommend, as a priority, the following further research:

- There were 5,726 comics excluded from the public health sample that addressed issues associated with living through the pandemic, as well as 1,396 comics in our sample excluded from analysis because they were not in English. Further research could extend analysis to include looking at these “COVID life” comics, as well as looking across multiple languages to give a better global perspective on this topic.

- This study focused only on Instagram, further research could look across social media to include Twitter and Facebook, as well as online webcomics platforms like webtoons and publications like The Nib.

- Data from this research could be triangulated with data from audience reception surveys or focus groups in order to develop a deeper understanding of how people respond to public health messages on social media and how these responses translate offline.



↳ Excerpt from our *Infocomics vs. Infodemics: A Comic Guide to Best Practice*, research illustration by Alexandra Alberda

Recommendations

Based on the findings arising from our research, we put forward the following recommendations.

1. Best practice in public health messaging should combine visual storytelling and referencing techniques that acknowledge the existing literacy practices of their audiences.

2. Communities of practice should be further developed to enhance creative, evidence-based communications on social media. This includes bringing visual metaphor and internal emotional worlds into the visual communication of scientific and statistical reporting, as well as training in data referencing and social media optimisation skills.

3. Public Health bodies should work with comics artists on the creation and distribution of public health messaging campaigns. These collaborations are often most successful when artists can tap into their existing reader networks and retain ownership over their creative work.

4. Social Media platform regulation should focus not only on supressing and flagging dis/misinformation, but also on helping to tag and amplify evidence-based posts. For example, a “green tick”, similar to the “blue tick” already used for verified public figures, could be used to verify the credibility of science communicators.

5. Platform regulation should be combined with strategies to strengthen people’s resilience to health misinformation through digital literacy, taking the transferable principles from how comics combine accessibility, relatability and interactivity to support the conversion of existing digital literacies into information capabilities.

6. More work at policy level needs to be done to achieve free access to social media data for researchers. Corporations like Facebook (now Meta) intentionally limit our ability to study social phenomena and preserve digital cultural heritage.

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