Safety and Health at Work 16 (2025) 27–35

Contents lists available at ScienceDirect

Safety and Health at Work

journal homepage: www.e-shaw.net

Original article

Anti-masking Posts on Instagram: Content Analysis During the COVID-19 Pandemic

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ARTICLE INFO

Article history:
Received 6 April 2023
Received in revised form
1 November 2024
Accepted 3 November 2024
Available online 14 November 2024

Keywords:
COVID-19
Infodemic
Masks
Misinformation
Social media

ABSTRACT

Background: The SARS-CoV-2 viral outbreak has been conflicts with the past-tense narrative elsewhere in the abstract.; the infodemic. Misinformation about the virus and disease it causes (COVID-19) has been linked with authority-questioning beliefs, co-branding with conspiracies, and other misinformation across social media. Distrust in simple occupational and public health tools we have at our disposal (like well-fitting face masks) has proliferated. Despite attempts to curb the spread of untrue or misleading information on COVID-19, this messaging persists on social media.

Methods: Using a clean and cleared account, the 300 top posts under the hashtag #masksdontwork were collected on Instagram for thematic analysis over three weeks in June 2022, with three separate data collection dates. Themes contained in the posts were independently assessed by two coders and discrepancies were resolved by consensus.

Results: The most dominant theme among posts was mistrust, including “government lies” and “media lies.” Anti-masking rhetoric was the second most frequent theme, where “freedom” and “disbelief in data” were common sub-themes.

Conclusion: Science denial and propaganda shared among Instagram users may represent an onramp to consumption of broader conspiracy theories and government distrust, in addition to having negative health effects and social consequences for workers regardless of whether they wear masks. Social media algorithms promote similar misinformation or authority-questioning beliefs to users who view related content. Addressing the spread of health-related misinformation can assist in deconstructing myths and increasing trust in public health authorities and prevent the spread of communicable diseases among workers and the public.

1. Introduction

SARS-CoV-2, commonly known as the virus that causes COVID-19, emerged as a global pandemic in early 2020 [1]. The spread of COVID-19 has been accompanied by a viral spread of misinformation on various social platforms, defined as an ‘infodemic’ by the World Health Organization [2]. The spread of both the virus and misinformation about it has resulted in a documented 6,859,093 deaths as of March 2, 2023, globally [3] (though the true total has been estimated as more than three times higher). Several

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2093-7911/$ – see front matter
https://doi.org/10.1016/j.shaw.2024.11.002

other impacts relate to delayed health care treatments, loss of resources, added stress, and broad misunderstanding of the virus and how it can be managed in the general and working populations [4].

Instagram, a popular social media platform, has a diverse, global base of over 1 billion users [5]. The platform allows the sharing of images, videos, hashtags, and captions, both publicly and privately. Listed as the fourth most active social media platform worldwide, nearly 20% of the global population uses Instagram [5]. Both male and female users who are age 13 or older spend 30 minutes on average a day interacting with the platform [6].

Posts on Instagram can be grouped by hashtags, algorithm suggestions, or accounts an individual follows. In an effort to curb the spread of misinformation [7], Instagram uses an algorithm to flag false information, enlisting the use of a third party for fact-checking efforts [8]. There is also a reporting feature where users can alert Instagram of potentially harmful content. Concerns surrounding the spread of misinformation on social media have been discussed widely since the beginning of the pandemic, and research efforts to investigate misinformation on social media have been conducted on several major health events [9,10]. An understanding of how misinformation spreads and investigating the patterns and content themes may serve to minimize the spread or correct myths with evidence.

Messaging about masking has varied throughout the pandemic, with an initial message that masking was not necessary, to masking is necessary for workers and the general public should not purchase them or it may limit supply for workers, to recommending cloth masks, to the suggestion that (K)N95s (and their equivalent) are the best, and only, option for the general public and workers [11]. Well-fitting, high-quality masks are a unique piece of personal protective equipment (PPE) in that they provide both source control when an infected person wears one, and protection to healthy wearers [12]. Preventive measures to protect against airborne viruses include maintaining clean indoor air, the use of high-quality masks, social distancing and strong vaccination programs, to decrease the risk of transmission [13–15]. Current evidence demonstrates that the universal wearing of well-fitting, respirator-type masks can reduce viral transmission by up to 95% [16]. Despite the scientific evidence, there has been individual and group objections to mask requirements or recommendations – with many citing personal freedom/rights or disbelief in their utility [17]. More recently, a Cochrane systematic review that, due to methodological issues, showed no clear benefit of masking was misused by the media and some authors to claim that masks definitively do not work; Cochrane issued an apology for the situation, but not before it had been shared extremely widely with unknown consequences to workers who would be likeliest to benefit from consistent and universal mask use [18]. Themes have emerged on social media and elsewhere suggesting that masking is a representation of government oppression and potential confirmation of conspiracy theories [19,20]. Statements made by political leaders (e.g., former president Donald Trump) can have a notable influence on the types of misinformation trending on social media [21]. The purpose of the present study was to qualitatively investigate and interrogate the popular hashtag #masksdontwork on Instagram via a media content analysis of the 300 top posts collected in the summer of 2022. For context, the summer of 2022 was a time of relatively minimal public health requirements in the US and Canada. In Canada at the time, masking was required only in healthcare settings, in airports and on planes and trains (notably, all places where workers are present). Masking during travel was made optional in April of 2022 in the US [22] and September of 2022 in Canada [23]. In other English-speaking countries like the United Kingdom, masking requirements ended in March of 2022 [24]. Spread of COVID-19 was higher in New Zealand and Australia at the time given they were in the winter season, and masks were still generally required during travel until September of 2022 in those countries [25,26]. Summer of 2022 was also a time of very minimal testing for COVID-19 so it is difficult to know the true burden of infection, but during the highest period of documented spread (mid-July 2022), the daily new confirmed cases per million population were 84 in Canada, 322 in the US, 407 in the UK, 1,483 in Australia, and 2,041 in New Zealand [27].

COVID-19 has been considered an occupational disease, particularly among those deemed essential workers, such as healthcare professionals, clerks, and cooks [28,29]. If frequently exposed to misinformation, workers may engage in behaviors increasing their risk of a COVID-19 infection, or if working in an environment with high contact with infected individuals and/or poor air quality. Medical professionals have been found to engage in sharing health misinformation online [30] and are at a higher risk of COVID-19 deaths [31]. Essential jobs, often include racialized, migrant, or low-wage workers, who are placed at a higher risk of infection [29,32]. These workers may also be at a higher risk of "moral injury" or poor mental health outcomes due to limited personal protective equipment (PPE), social perspectives on protective behavior, and workplace stress [32,33]. Exposure to misinformation can influence prevention behaviors, further increasing the risk of infection [34–36].

2. Methods

The methodology applied in our research was content analysis, which is a message-centred and a well-established research methodology approach used to study a broad range of content [37]. Content is grouped into categories to draw conclusions about trends based on thematic codes. These identified codes, which were grouped, tabulated, and assessed. Media content analysis is regularly used to understand patterns in content across various platforms on a wide variety of subjects [38,39].

The hashtag #masksdontwork was chosen due to its popularity (approximately $n = 29{,}200$, at the start of our data collection) and its relation to COVID-19 preventive measures. At the time of data collection, the hashtag was not blocked by algorithmic fact-checkers, unlike other relevant hashtags such as #covid19 or #pandemic.

One hundred of the top posts were collected on each of June 7, 14, and 21, 2022, at 9:00 am PDT using a blank account with cleared cache and cookies, that had not been used for any prior posts and use of the platform. The new account was used to limit bias introduced by personal account searches, accounts followed, and interaction with posts, because Instagram algorithms curate posts visible to the user [40]. In total we collected 300 posts for analysis, with 100 new posts being collected on each data collection date. On the second and third data collections, duplicate posts were skipped to avoid biased content analysis and ensure 300 unique posts were included. The 'top posts' section on Instagram refers to an algorithmic presentation based on a combination of popularity, engagement, and the speed at which engagement occurred after the post was made [40]. The number of posts was chosen based on prior literature demonstrating that it reasonably captures the content that most users are likely to engage with [4] and for adequate meaningful interpretation using content analysis [37].

The posts were screen captured and the content of the caption, image text, presence of a fact-checker warning, and image type were transcribed. On-screen text and audio were also transcribed, where applicable. This study utilized qualitative content analysis, aligned with that described in Schreier's book, "Qualitative Content Analysis in Practice" [41]. An initial subset of posts was coded, after which coders met to ensure they were consistent before

proceeding with the remaining posts. Posts were also coded for fact checker warnings. Hashtags from each post were collected and tallied, along with overall word counts. Posts were coded for post type based on the image(s) associated with the post. A codebook developed *a priori* was created based on previous study findings from our team and adjusted for current events and mask-related content, including findings from other social media content analysis (Table 1). For content that did not fit the *a priori* codes, codes were added or modified in the codebook including humor/mockery, fluoride, and Ukraine. Two coders (RD, EQ) separately coded all 300 posts for thematic content, including a broad theme category and a subtheme category (where present). The coders compared themes and any discrepancies were resolved by discussion; if consensus was not reached a third author resolved the conflict (CEP). Content analysis benefits from coder discussion for consensus rather than calculating inter-coder reliability, as discussed by O'Connor et al, 2020, and Kleinheksel et al, 2020. Thematic summaries were then analyzed for trends and patterns in content, as well as common language used throughout posts.

3. Results

Of the 300 posts, only 24% (n = 73) contained a fact-checker warning about potentially untrue COVID-19 content. The most common shared hashtags among all posts were *#freedom, #republican, #trump, and #justsayno* (Fig. 1). Of the 73 posts flagged by fact-checkers, 70 were directly related to COVID-19, and 3 were coded as *opportunistic hash tagging*. Additionally, the top words using in posts, including captions, were *mask, people,* and *children* (Fig. 2). Post type varied overall; *image-with-text* posts (n = 81), followed by *text* (n = 58), *meme* (n = 47), *video* (n = 37), and *reposts* (n = 36). Less common types of posts were *gifs* (n = 1) and *selfies* (n = 11).

3.1. Thematic content

The most prevalent broad theme, *mistrust* (n = 204, 68% of posts), included several different dominant sub-themes (Fig. 3*). Most frequent was *government lies*, with 85 posts, 52 posts sharing *humour/mockery*, and 31 posts including content related to *media lies*. Additionally, less common sub-themes included *freedom marches or parades*, *anti-lockdown*, and posts objecting to *social distancing*. Meanwhile, *anti-mask rhetoric* (n = 134, 45% of posts) included *freedom/choice* content (n = 79), suggestions to *ignore the data* (n = 52), and *medical exceptions* to not abide by masking mandates (n = 3). The third most common dominant theme, *other* (n = 123, 41% of posts), contained mainly *child-specific content* (n = 63) and *opportunistic hash tagging* (n = 55). Other themes within, such as *neutral*, *pro-life*, and *immigration* were less present. The broad theme *anti-vaccination rhetoric* was less frequently coded (n = 70, 12%), followed by *conspiracies* (n = 32, 11% of posts), *anti-misinformation* (n = 2, <1% of posts), and *gun violence* (n = 1, <1% of posts).

*Broad category percentages are out of all post codes, noting that posts may have multiple thematic codes, while sub-category percentages of within their respective sub-node.

4. Discussion

The highest proportion of posts with the hashtag #masksdontwork were broadly themed as *mistrust*, *anti-mask rhetoric*, and *other*. These posts suggest a relationship between COVID-19 mask mandates and mistrust for government and media institutions. A study on conspiracy beliefs, mistrust and government compliance recently found that, although a substantial minority of the population endorses false ideas regarding the COVID-19 pandemic, the increasing popularity of fringe beliefs, misguided views, and contradictory conspiracy beliefs have created a public health information crisis [42]. A dominant theme that appeared with *anti-mask rhetoric* and *other* posts related to ignoring scientific research regarding the effectiveness of masks, and free choice for medical decisions, especially in school-aged children. *Child-specific content* often critiqued the inconsistency of mask enforcement among schools, public officials, and restaurants. Additionally, claims that children do not benefit from masking or that schools should not mandate classroom masking were common, despite known risks for both teachers and students. Previous research has demonstrated a higher level of trust in the government to be associated with an increase in preventive behaviours related to COVID-19, and vital to establishing adherence to public health policy [43]. The lack of trust in government and media-related health guidance was especially concerning within the context of emerging public health emergencies, such as the recent mpox outbreak in non-endemic countries [44]. Our findings demonstrate the impact Instagram has on effective dissemination of health information to the public (including workers) and its significance in the implementation of public and occupational health guidance for future pandemic mitigation strategies.

Our findings also suggest a connection between mask-related themes and cobranding to other political and conspiracy theory-related rhetoric. We define cobranding as the co-occurrence of public health interventions like masking with politically motivated themes that appears deliberate by post authors in order to reach readers interested in conspiracy theories (recognizing that this definition is somewhat subjective). American politics were most frequently observed among the cobranding posts, especially critiquing democratic leadership under President Joe Biden and support for former President Donald Trump. These findings are aligned with findings in Evanega et al, where in their sample, Trump was mentioned in nearly 40% of all posts collected within the 'infodemic' [45]. Many of the *opportunistic hash tagging* posts included conspiracy content related to false claims of Dr. Anthony Fauci's (Chief Medical Advisor to the President of United States) involvement in the spread of COVID-19 and the creation of a "New World Order" through lockdowns and mandates. Findings were consistent with other literature in North America, which have found links between COVID-19 misinformation and conspiracy narratives [46]. The cobranding of mask-related posts and political affiliation likely stems from two sources of mistrust: government and the media, which was reinforced by studies that have found a link between high levels of anxiety, mistrust and the openness for information of all sources, regardless of its legitimacy [47,48]. There was also a low level of scientific literacy in some communities within the public, and this might be especially true for the relatively niche scientific discipline of occupational/industrial hygiene, the science concerned with the recognition, evaluation, and, important for masking, control of health hazards. Confirmation bias was likely a major behavioral problem that drives the belief of misinformation through cobranding [49]. This has appeared under broad themed *conspiracy* posts, which included claims such as suggestions of government control through the implementation of fluoride in municipal water systems.

Social media platforms, such as Instagram, are a driving force for COVID-19 misinformation and require constant surveillance [50]. Although fact-checker warnings on Instagram exist as an initiative to combat it, our findings suggest the warnings on Instagram still lack the ability to correctly detect misinformation and are even used in factual posts from reputable organizations [51]. The risk for the spread of misinformation on the platform remains rampant as indicated by only 24% of the posts containing warnings for potentially untrue COVID-19 content. Although not found within our

Table 1
Thematic codebook defining themes and sub-themes for analysis

Broad thematic node	Sub-node	Definition
Anti-vaccination rhetoric		Posts associated negative connotations or opinions about vaccination, supported or unsupported by further information.
	Side-effects	The idea that negative side-effects are more likely to occur than the positive protective benefits.
	Next/another virus	The idea that the COVID-19 vaccinate infects individuals with a different strain or another virus (i.e., Monkeypox).
	Free will	Getting the vaccine violates one's "free will/freedom."
	Mind control/microchip	States that the government or another power is controlling people's minds through the administration of the vaccine (including implanting a microchip).
	Natural immunity	The notion that one's immune system will protect one from getting COVID-19. Religious protection (God) included in natural immunity.
	Immune boosting remedies	The idea of "immune boosting" products or natural remedies being more effective than vaccination.
	Vaccine passport	Against the implementation of the vaccine passport.
Anti-mask rhetoric		Posts generally associating masking with a negative connotation, including the belief that masking is not necessary.
	Medical exception	A so-called "medical exception as a reason for not wearing a mask.
	Ignore the data	All mask-supportive evidence has been fabricated and should be ignored.
	Freedom/choice	The idea that one should have the choice to not wear a mask in any or all locations.
Mistrust		General lack of trust in individuals or bodies of authority.
	Government lies	The idea that the government is covering up or fabricating information that is shared with the public including lies about the number of cases and/or the severity of the disease/ government lies about the vaccine – propaganda.
	Media lies	Implying that the media is lying about the number of cases and/or the severity of the disease. Media outlets are being controlled by the government to spread propaganda.
	Freedom march or parade	Sharing information about freedom parades or marches.
	Humur/mockery	General mistrust in authorities expressed in a humorous manner. Making fun of or mocking mandates, information, or individuals.
	Social distancing	Lack of belief in social distancing measures.
	Anti-lockdown	Opposed to the lockdown or return of lockdown circumstances. Belief that it does not work or is more harmful than beneficial.
Gun violence		Content in relation to gun, gun laws, or gun use.
	Pro-gun/AR-15 rhetoric	Suggestions that guns should be legal, paralleling COVID-19 freedom with gun freedom.
	Fake shooter	Posts suggesting the shooting massacres were planned to reduce the population, whether those were planned by secret groups or by the government.
	Anti-gun violence	Posts sharing beliefs about increasing gun restrictions to prevent further massacres.
Anti-misinformation		Pointing out misinformation or attempting to counter existing misinformation.
	Calling out misinformation	Pointing out COVID-19 misinformation and/or providing alternative information that is reliable.
	Misinformation prevention/factual clarification	Methods that are already in place to prevent the spread of COVID-19 misinformation, as well as suggestions to prevent further spread. This includes information about how to recognize misinformation.
	Pro-vaccination	Clarifying vaccination misinformation.
	Pro-masking	Clarifying masking misinformation.
Conspiracies		Co-branding of COVID-19 and a conspiracy, suggesting they are intertwined or caused by one-another.
	5G	Conspiracies that COVID-19 and 5G are related.
	Bill Gates	Conspiracies surrounding Bill Gates including implants, vaccines, and corporate corruption.
	Human experimentation	Suggestions that the vaccine is a human experiment.
	Dr Fauci	Mentions that the "information coming to light" via the Fauci emails are validating theories surrounding Dr. Fauci's involvement in COVID-19.
	Race war	The idea that a race war is occurring using a virus to wipe-out certain groups.
	New world order (NWO)	Posts that mention the presence of a new world order because of vaccination and/or COVID-19.
	Fluoride	The idea that fluoride is poison is meant to harm the public.
	Ukraine	Theories that relate the situation in Ukraine to other conspiracy ideas.
Other		Additional sub-categories including unrelated content.
	Opportunistic hash tagging	Unrelated content that used the trending hashtag to achieve a greater and/or wider audience, including advertising.
	Child-specific content	Content related to child health, child rights, parenting, etc.
	Neutral	Content is neutral to information provided.
	Pro-life	Posts sharing information about pro-life campaigns and anti-abortion rhetoric.
	Immigration	People moving into the country legally or illegally.

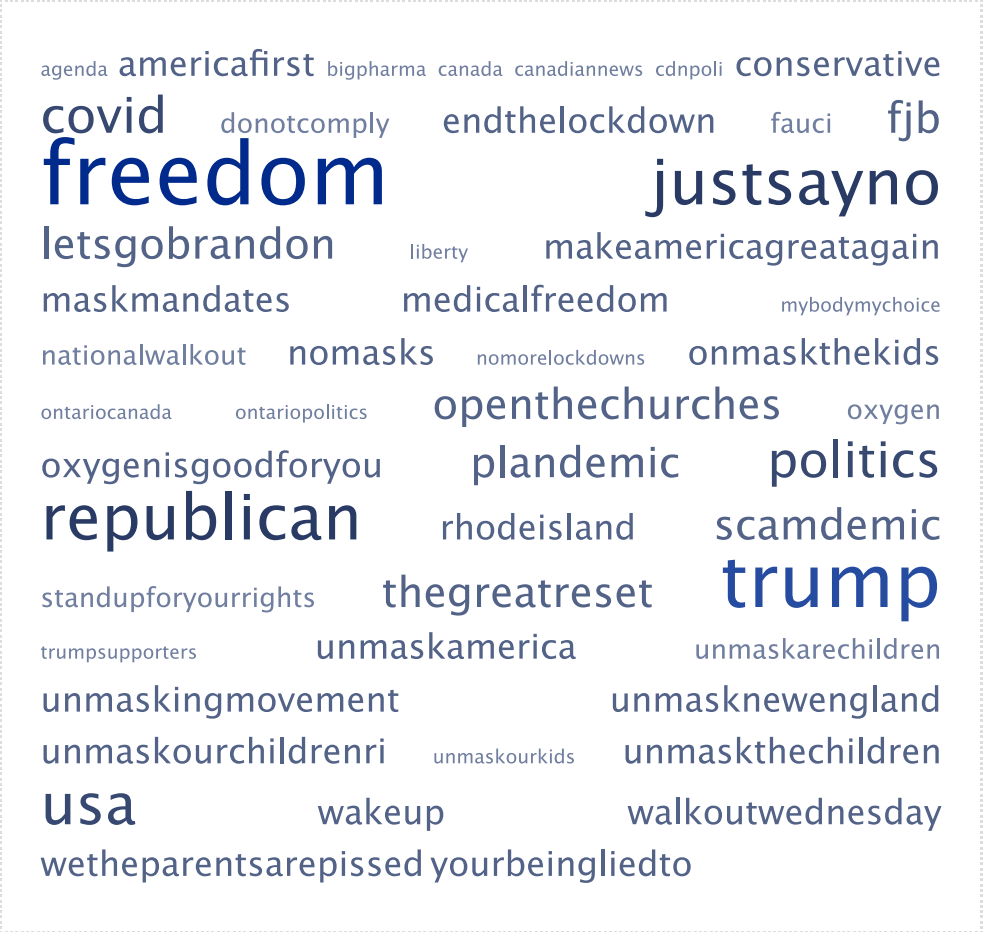

Fig. 1. Word cloud demonstrating the top 50 co-branding hashtags among all posts collected.

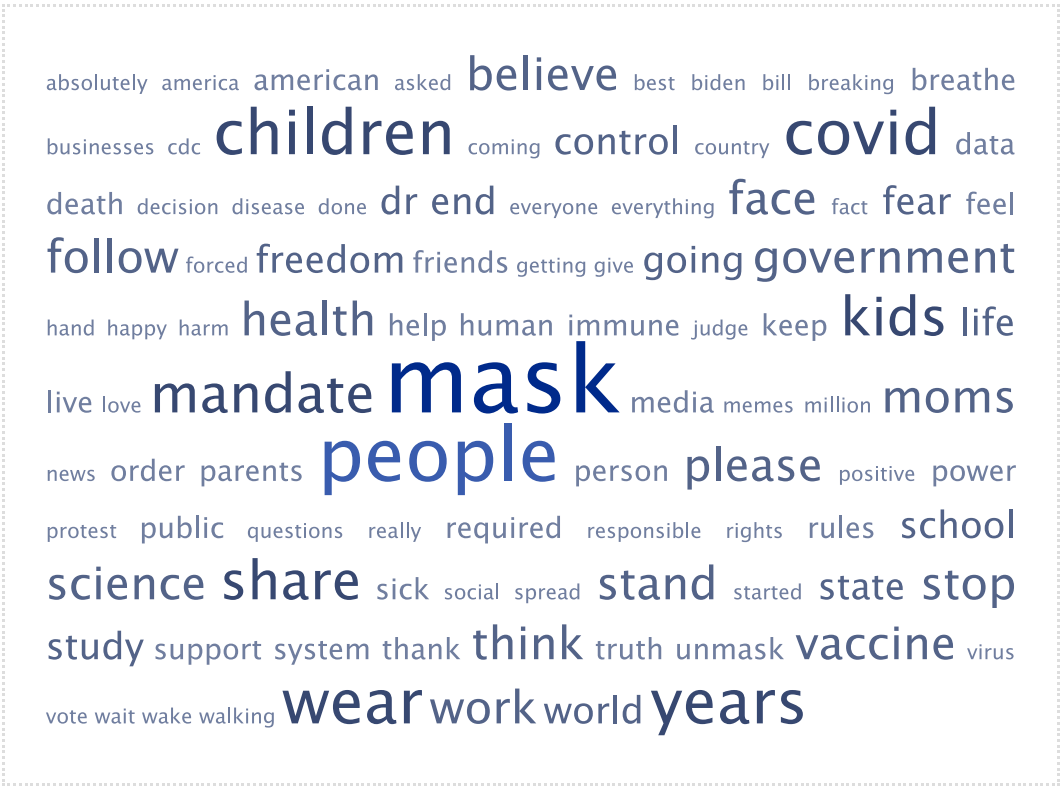

Fig. 2. Word cloud demonstraataing the top 50 words in post text and captions.

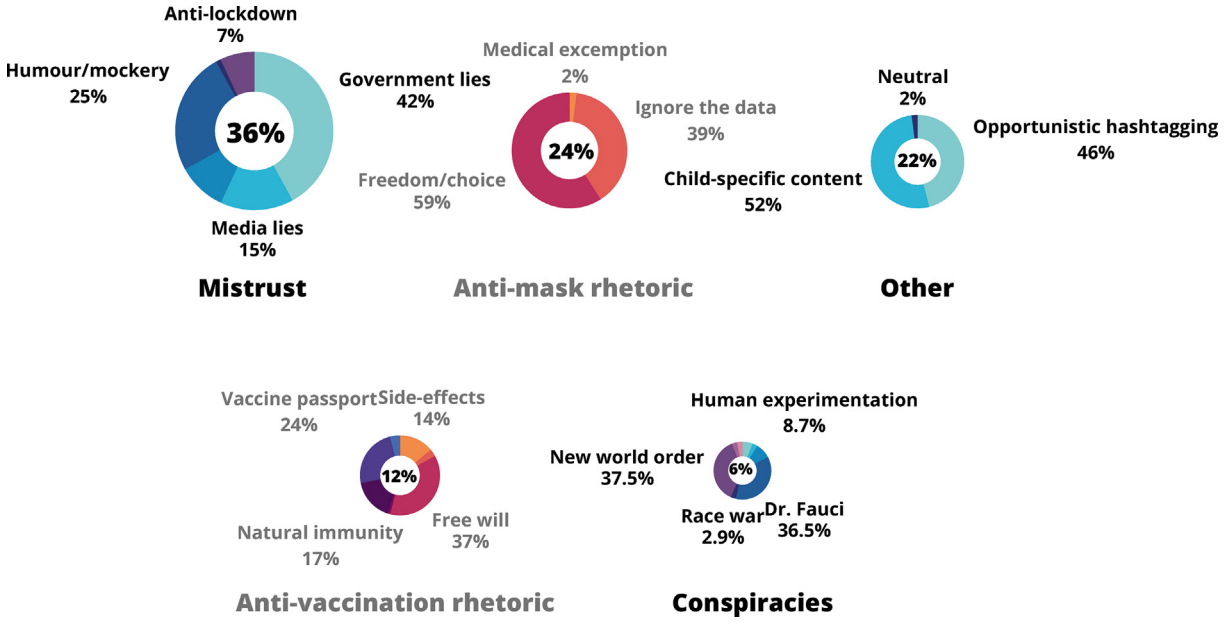

Fig. 3. Broad and sub-nodde Instagram post theme presence

sample, misinformation can include commercial posts encouraging the use of alternative products like supplements, which creates a potential revenue stream. A recent study found that despite the initiative to combat misinformation, the Instagram algorithm perpetually recommends COVID-19 misinformation to users that regularly consume politically far-right, extreme, or anti-vaccine content from verified users [52,53]. Additionally, more than 50% of the posts on Instagram's "Explore" page contained COVID misinformation at the time of collection. Cobranding with mask-related posts may have allowed anti-vaccine and anti-lockdown rhetoric to go undetected, exposing users to harmful conspiracy-related posts.

With the frequency of *anti-mask rhetoric* found in our study, it is important to reiterate that masks are effective in reducing viral transmission. Several studies have found an association between mask use and a reduction in cases for COVID-19 [9,54]. Another study found a significant reduction in aerosolized SARS-COV-2 viral particles among samples taken from patients wearing face masks [55]. The Public Health Agency of Canada recommends the use of respirators or medical masks for better protection in the community [56]. More recently, and in light of the increasing awareness of the long-term implications of unmitigated COVID spread going forward, the Canadian Guidelines for Post-COVID Condition's (CanPCC) committee on prevention of PCC has recommended masking for caregivers, workers, and visitors in long-term care homes to reduce the risk of PCC in these settings during periods of high COVID-19 transmission. The prevention guidelines group of CanPCC has also released masking recommendations for staff, patients, and support persons in clinical settings, as well as community settings (during periods of high COVID-19 transmission) to reduce the risk of developing PCC after an infection [57]. Commercially available CA-N95, CA-N99, KN95, KF94, and FFP2 respirators approved by Health Canada are recommended; however, a mask with the right fit is a key factor in ensuring adequate protection. Despite demonstrated effectiveness of universal masking, the messaging from some public health officials on overall use and the best types of masks has been inconsistent throughout the pandemic, which at least partially reflected shifting understanding of transmission modes [58,59]. Even during more recent waves, some officials were still using or recommending cloth masks, rather than medical or respirator type masks that provide more protection [60]. Respirators, a purpose-built engineering intervention, have been certified by occupational hygienists (the authority on PPE) for use and recommended in the United States since the early 20th Century, and respiratory protection has remained key in reducing hazardous exposures for workers and the public [61]. Today, the lack of consistent, evidence-based messages given by some health professionals and other public health leaders likely contributed to confusion regarding the utility of masking as a preventive tool. Due to the very nature of work, masking among workers (especially when universal in a workplace) is of vital importance for people who are often spending 8 or more hours every day in an indoor setting, rather than members of the public who might only be in public buildings for a matter of minutes while running errands.

COVID-19 misinformation has been found to influence worker behaviours, including increased anxiety levels [62]. Since the COVID -19 pandemic began, the open literature presents plenty of discussions on how individuals have adapted to working from home (WFH). Nevertheless, there hasn't been much information on how individuals perceive WFH is affecting their daily work routine in the pandemic. By applying the stressors-strain-outcome (SSO) framework, the current study develops and tests a model that explains how misinformation and COVID-19 threat triggered the anxiety and social media fatigue of WFH employees and affected their work-related response. This study collected diary data for ten consecutive days from 56 WFH employees. Results widely supported the hypothesized model. Specifically, findings revealed that misinformation and COVID-19 threat increase anxiety and social media fatigue among these employees, resulting in a lower level of work engagement. This study also found that resilience as a coping mechanism reduces the adverse effects of anxiety on work engagement. The results have significant, timely implications for policy and research [62]. Coping mechanisms to overcome these anxieties may interfere with work ethic and productivity levels. A study assessing the relationship between misinformation and healthcare worker health behaviors found associations between being exposed to misinformation and poorer hand washing and mask wearing behaviors. Worker behaviors, particularly in the case

of healthcare workers, can result in the public being placed at greater risk of exposure. These studies, combined with the known presence of anti-masking misinformation on Instagram, suggest COVID-19 misinformation can influence everyone in daily life and their workplace.

In 2020, a study found that online mask guidelines were inconsistent across regions and nations [63]. Further, they appeared to be changing frequently, likely adding to frustration and confusion. A study in the United States found that 60% of adults reported being confused about health officials' recommendations [64]. Approximately half of respondents also reported thinking the officials were not handling the situation well. In the ever-evolving situation of the pandemic, officials were rushed to make decisions about recommendations and mandates. Among US Twitter users, negative responses were observed in response to changing masking and vaccination guidelines, regardless of whether they were mandates or removal of mandates. Decision-making processes that drove public health leadership to set or lift masking guidelines or mandates at different times were not clearly communicated to the public, which may have contributed to the sense that well-fitted respirator masks are not as effective as they are – in other words, "if masks work, why are they not required by leaders?"

Our findings that anti-mask rhetoric was closely linked with anti-government sentiments is particularly interesting given that it was not uncommon for government and public health officials to frame masking as negative. For example, the US Center for Disease Control's director stated in the spring of 2022 that masks were the "scarlet letter" of the COVID-19 pandemic, giving them a very clear negative connotation [65]. It is perhaps not surprising that this would create confusion or mistrust about the utility of masks for infection prevention and control if masking is framed as a punishment by public health and political leaders. Indeed, President Biden also framed masking as a burden when he declared that those who had been fully vaccinated against COVID-19 would no longer need to mask in May of 2021, a move that arguably contributed to the mass spread of the Delta variant of SARS-CoV-2 a few short months later [66]. These observations are in contrast to the population-wide normalcy surrounding wearing masks for a variety of reasons in many Asian countries (especially Japan, China, and Taiwan) that has existed for decades, and demonstrates that cultural norms could theoretically be altered to normalize masks in English-speaking countries as well [67,68].

The impacts of COVID-19 have caused impacts on society worldwide, including among frontline workers [28]. The health implications of COVID-19 on the global workforce are complex, and behavior changes can be influenced by true or false information. Wang et al, 2021, found that some healthcare workers, for example, do not always adhere to mask-wearing guidelines, leaving them at higher risk of infection [69]. A survey assessing healthcare workers about COVID-19 found a common source of information was social media, and a significant proportion have poor knowledge of its transmission and symptoms [70]. Protecting essential workers in from high-risk communicable diseases, particularly in occupational settings, remains a priority in the context of COVID-19 and future pandemics.

Mask mandates were common in many parts of Canada from 2020 to 2021, with jurisdictions periodically removing mandates during times of slower spread, while others kept them in place. Inconsistencies in masking requirements within and between jurisdictions or workplaces opens the door to mistrust in leadership and theories related to efficacy [12,61], although it can be useful to mount a regional approach to infection control based on current conditions in the local settings. The inconsistency was likely to be noticed in a digital age and could undermine trust in the public health tools available to us, which includes masking. Solutions are likely to be focused around clear and honest public health communications on how risks were being assessed over time and across space in different regions.

5. Limitations

A few limitations to our approach should be mentioned. The sampling strategy in this study was limited to 300 posts in the English language, which is not representative of all social media posts more broadly. Posts containing anti-masking sentiment may exist beyond the hashtag #masksdontwork and would have been missed in our data collection. User type of each post was not examined, and the impact the post could have on a group of users was not taken into consideration. While the content related to #masksdontwork may be prevalent on other social media platforms and users can cross-post content, this study focused solely on the content on Instagram. Post interaction was not tracked, although following posts to determine the number of likes, comments, and reposts would assist future studies in understanding which types of posts generate the most engagement. This type of research would value from follow up studies in order to evaluate misinformation content trends and engagement changes over time. Some of the findings may be similar to other platforms, but conclusions may not be directly applicable to social media more broadly.

In conclusion, our study demonstrated that Instagram users are being consistently exposed to authority- and media-questioning content regarding a known public health tool in the curbing of COVID-19 spread (masking). Building trust with the public through social media is vital in ensuring adherence to health guidance for current and future pandemic responses. Further analysis into the effects COVID-19 misinformation on other social media platforms has on mask adherence is recommended. Additionally, knowledge of the trends and spread of misinformation can assist in steering the public towards reliable information and myth busting health misinformation before it leads to poor outcomes. Implications of such findings would value from the integration of social dynamics to better understand how and why misinformation is interacted with on Instagram, and other social media platforms [71].

CRediT authorship contribution statement

Emma K. Quinn: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Robert T. Duffy:** Conceptualization, Data curation, Formal analysis, Writing – original draft. **Kristian Larsen:** Data curation, Formal analysis, Methodology, Writing – review & editing. **Maria Dalton:** Formal analysis, Writing – review & editing. **Cheryl E. Peters:** Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – review & editing.

Funding

This study was supported by the Canadian 2019 Novel Coronavirus (COVID-19) Rapid Research Funding Opportunity. Specific funders include Canadian Institutes for Health Research, Alberta Innovates, the Ministry of Economic Development, Trade and Tourism, and the Government of Alberta.

Conflicts of interest

There are no conflicts of interest to declare.

Acknowledgments

No acknowledgements to be noted.

Ethical Approval Statement

Ethical approval was not applicable or required for the study.

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