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RESEARCH ARTICLE

REVISED An exploratory study of social media users' engagement with COVID-19 vaccine-related content [version 3; peer review: 2 approved]

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Abstract

Background: Facebook, as the world's most popular social media platform, has been playing various important roles throughout the COVID-19 pandemic, allowing users to produce and share health-related information that both eases and complicates public health communication. However, the characteristics of vaccine-related Facebook content and users' reaction to the vaccine issue has been an unexplored area to date.

Methods: To fill the previous knowledge-gap, this exploratory study wants to understand the communication climate of Facebook on the COVID-19 vaccine issue, including the nature of dominant content and users' engagement patterns with them. Therefore, the study analyzes the 10,000 most popular Facebook posts with the highest interactions on the vaccine issue.

Results: The results show that Facebook users prioritize more vaccine-related news links (71.22%) over other content. The declining interactions on the issue suggests that interaction growth mainly depends on positive news on the vaccine. Finally, users' reaction to the vaccine issue is dominantly positive, though they may show a highly negative attitude toward vaccine misinformation.

Conclusions: A few limitations and strengths of this study are discussed along with values and implications. This study for the first time analyzes Bangla language-based Facebook content related to the COVID-19 vaccine issue, which is largely overlooked in global academic research.

Keywords

COVID-19 vaccine; Facebook; social media content; user engagement; medicine.

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report



report

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**version 1**

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report

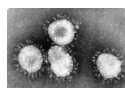
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REVISED Amendments from Version 2

Like the previous version, this version also includes some minor changes in the method section.

Any further responses from the reviewers can be found at the end of the article

Introduction

This exploratory study seeks to understand the characteristics of coronavirus disease 2019 (COVID-19) vaccine-related social media content and how users engage with them. COVID-19 has already claimed 1.76 million lives worldwide, making the public health condition critical. Meanwhile, lockdown and social distancing interrupt face-to-face human communication (Limaye *et al.*, 2020). Such a situation lets social media bridge the communication gap by delivering necessary information (Goel & Gupta, 2020; González-Padilla & Tortolero-Blanco, 2020). Researchers categorized COVID-19 online information into 11 types: valid information, comforting information, perplexing information, misinformation, disinformation, shocking information, contradictory information, doubtful information, progressive information, postponed information, and confidential information (Ashrafi-Rizi & Kazempour, 2020). Two broader categories may represent all of them: useful information that helps public health communication, and faulty information that interrupts public health communication. For example, social media was responsible for fake COVID-19 prescriptions and medications that claimed many human lives (Islam *et al.*, 2020). On the contrary, infographics containing COVID-19 health information delivered through Twitter and WeChat helped rapid COVID-19 knowledge dissemination (Chan *et al.*, 2020). Similarly, on the one hand, social media helps to run positive and effective virtual campaigns for the COVID-19 vaccine around the world, and, on the other hand, vaccine opposition and misinformation obstruct the vaccination process (Bonnevie *et al.*, 2021). A report says 31 million Facebook users follow anti-vaccine groups with 17 million YouTube users subscribing to similar accounts (Burki, 2020). Therefore, it is imperative to understand social media users' sentiments regarding the COVID-19 vaccine, and the nature of vaccine-related content that dominates social media platforms.

Previous studies from both the public health and communication domain dealt with different aspects of the COVID-19 vaccine, such as vaccine hesitancy (Bonnevie *et al.*, 2021; Jamison *et al.*, 2020; Puri *et al.*, 2020), vaccine misinformation (Jamison *et al.*, 2020; Loomba *et al.*, 2020), media, and the COVID-19 vaccine (Olijo, 2020). However, no attention has been paid to social media users' engagement with the COVID-19 vaccine issue. The present research attempts to fill this gap.

Methods

Study objectives

This research attempts to understand the communication climate of Facebook surrounding the COVID-19 vaccine

issue, the nature of dominant content and users' engagement patterns with them.

Data source & search strategy

Facebook is the most popular social media platform in Bangladesh (94.46%), compared to YouTube (3.31%) and Twitter (0.3%), so we selected it as the source of data for this study. We collected the data from Facebook pages using CrowdTangle, a public insights tool owned and operated by Facebook. It can access public pages and groups to collect various types of data. However, we excluded group data in this research because Facebook groups and pages are different in terms of users' interaction patterns, participation rates, and security issues. To collect the data from relevant Facebook posts, we conducted a keyword search. A large share of the users in Bangladesh use Facebook in the Bangla language. For that reason, we determined the following Bangla keywords in the Bangla alphabet: "corona vaccine," "coronar vaccine," "corona tika," "coronar tika," "corona oshudh," "coronar oshudh," "corona protishedhok," and "coronar protishedhok." All search terms can be translated as *corona vaccine* or *vaccine of the corona*.

Data collection & analysis

We set the timeline from 8 March to 2 December 2020. The first case of coronavirus in Bangladesh was identified on 8 March 2020. As Facebook is an interactive platform, so we collected the data on 17 December 2020 (15 days after the end date of the data collection period) after stabilizing the threads. The search result produced 37,460 Facebook posts relevant to the topic. Of them, we selected the top 10,000 posts for the final analysis based on their total interactions, which was 26.70% of the total search results: These posts were from 1,087 different Facebook pages, on average 9.20 posts from each page. We categorized the content into six types: link, live video, native video, photo, status, and YouTube video. In Facebook, each of the mentioned content can usually have the following definitions and modes: a link and a photo can be shared with or without any text; live video can be completed or scheduled; native video is video that is uploaded directly to Facebook; a status is mainly text-based, often contains other elements, such as tags; YouTube videos are often embedded/shared on Facebook. We measured the users' engagement based on nine interaction parameters, including six Facebook reactions: comments (mean [M]=32.90, standard deviation [SD]=140.06), shares (M=145.17, SD=1345.86), like (M=1377.04, SD=4792.64), love (M=74.98, SD=788.35), wow (M=6.50, SD=40.33), haha (M=52.79, SD=408.28), sad (M=16, SD=372.76), angry (M=3.67, SD=55.05), and care (M=5.40, SD=51.67). In this study, we followed a bivariate statistical analysis and a simple time-series analysis with one-day intervals. The numbers and percentages are presented in tables, time-series data are presented in graphs.

Framing & interpreting Facebook reactions

In February 2016, Facebook introduced five basic reactions: love, sad, wow, haha, and angry, alongside like or thumbs-up. These reactions were influenced by the six universal reactions: fear, anger, joy, sadness, disgust, and surprise (Gu *et al.*, 2019), proposed by Ekman (1992) based on human facial expressions

(Keltner *et al.*, 2019). However, studies found that disgust and anger, and fear and surprise share similar characteristics, meaning the four following emotions should be considered as the actual basic emotions: anger, joy, sadness, and surprise (Jack *et al.*, 2014). Unlike basic emotions, Facebook reactions represent more varied and often contradictory expressions: *like* or *thumbs-up* usually expresses likeness, agreement, happiness, approval, and acceptance; *love* expresses positivity, affection, empathy, support, kindness, and liking something with feeling; *sad* expresses empathy, grief, tragedy, and support; *haha* expresses laughter, fun, mockery, and often rejection; *wow* expresses muted disdain, surprise, immediate shock, and skepticism; and *angry* expresses denial, aggressiveness, strong and overt disdain, and dislike (Al-Rawi, 2020).

In contrast to the idea of basic emotions, the circumplex model of affect proposes that human emotion is more complex and diverse than the basic emotion theory explains (Russell, 1980). At least 28 interconnected emotional states of humans can be defined with two variables: emotional valence or sentiment and emotional arousal or intensity (Citron *et al.*, 2014; Freeman *et al.*, 2020; Yang & Chen, 2012). This two-dimensional model of human emotions defines emotional valence as positive and negative and emotional arousal as high and low (Preoțiu-Pietro *et al.*, 2016). In this study, we tried to position Facebook reactions within this paradigm but with little modification. For valence, we defined like, love, wow, and care as positive, and angry, sad, and haha reactions as negative valence (Giuntini *et al.*, 2019). As the number of Facebook emotions is limited, unlike the circumplex model that has 28 distinct but relative emotions, we defined the seven reactions as follows: love, care, angry, and wow as high arousal, and like and sad as low arousal. That means positive high includes love, care, and haha; positive low includes like; negative high includes angry and wow; negative low includes sad. Although *like*, according to its defined meanings, belong to the lower

arousal dimension, its degree is moderate, which is closer to the high arousal dimension (see Russell, 1980). Again, Al-Rawi (2020) defined *wow* as positive, we defined it as negative based on the findings of Jack *et al.* (2014) (i.e., fear and surprise are the same, and *wow* expresses surprise or shock, which is negative). It is important to note that expressions through these reactions vary widely, and a reaction may express contradictory emotions: *haha* both expresses joy and refutation. It makes this reaction's position in the paradigm uncertain: it can be positive high and negative high. For such ambiguous nature, previous studies excluded *haha* from their interpretations (e.g., Al-Rawi, 2020).

Results

Analysis of content

Of the six content types, link ($n=8,614$; 86.14%) was dominant, followed by photos ($n=491$; 4.91%) and native videos ($n=466$; 4.66%); YouTube video ($n=52$; 0.52%) was on the bottom of the list (Table 1). During the time span, links were shared the most in July ($n=1,696$; 19.69%), followed by August ($n=1,331$; 15.45%); photos were shared the most in July ($n=147$; 29.94%) as well, followed by October ($n=72$; 14.66%). July (20.73%) had the highest percentage of content, followed by August (15.28%) and April (14.33%). Figure 1 shows that the percentage of the links content type was dropping gradually with a few fluctuations. On the other hand, the percentages of live video and status were slowly increasing with a few drops. However, except for the line of links, other lines do not show any significant changes.

Interaction analysis

All posts generated 17,144,403 interactions during the time span. The numbers of interactions were higher in the first half of the period, roughly from April to July 2020 (Figure 2). The interactions reached to the highest on 17 April 2020 ($n=201,834$), with a few more surges on 27 April ($n=135,941$),

Table 1. Content types and their percentages.

Months	Total contents (n, %)	Content types (n, %)					
		Link	Live Video	Native Video	Photo	Status	YouTube
Mar	639 (6.39)	564 (6.55)	0 (0.00)	24 (5.15)	19 (3.87)	29 (9.27)	3 (5.77)
Apr	1433 (14.33)	1304 (15.14)	4 (6.25)	44 (9.44)	36 (7.33)	42 (13.42)	3 (5.77)
May	1223 (12.23)	1130 (13.12)	1 (1.56)	44 (9.44)	22 (4.48)	25 (7.99)	1 (1.92)
Jun	1231 (12.31)	1135 (13.18)	5 (7.81)	27 (5.79)	26 (5.30)	30 (9.58)	8 (15.38)
Jul	2073 (20.73)	1696 (19.69)	22 (34.38)	109 (23.39)	147 (29.94)	77 (24.60)	22 (42.31)
Aug	1528 (15.28)	1331 (15.45)	9 (14.06)	63 (13.52)	87 (17.72)	33 (10.54)	5 (9.62)
Sep	719 (7.19)	573 (6.65)	7 (10.94)	62 (13.30)	41 (8.35)	31 (9.90)	5 (9.62)
Oct	497 (4.97)	369 (4.28)	2 (3.13)	28 (6.01)	72 (14.66)	24 (7.67)	2 (3.85)
Nov	622 (6.22)	488 (5.67)	12 (18.75)	64 (13.73)	36 (7.33)	19 (6.07)	3 (5.77)
Dec	35 (0.35)	24 (0.28)	2 (3.13)	1 (0.21)	5 (1.02)	3 (0.96)	0 (0.00)
Total	10000	8614 (86.14)	64 (0.64)	466 (4.66)	491 (4.91)	313 (3.13)	52 (0.52)

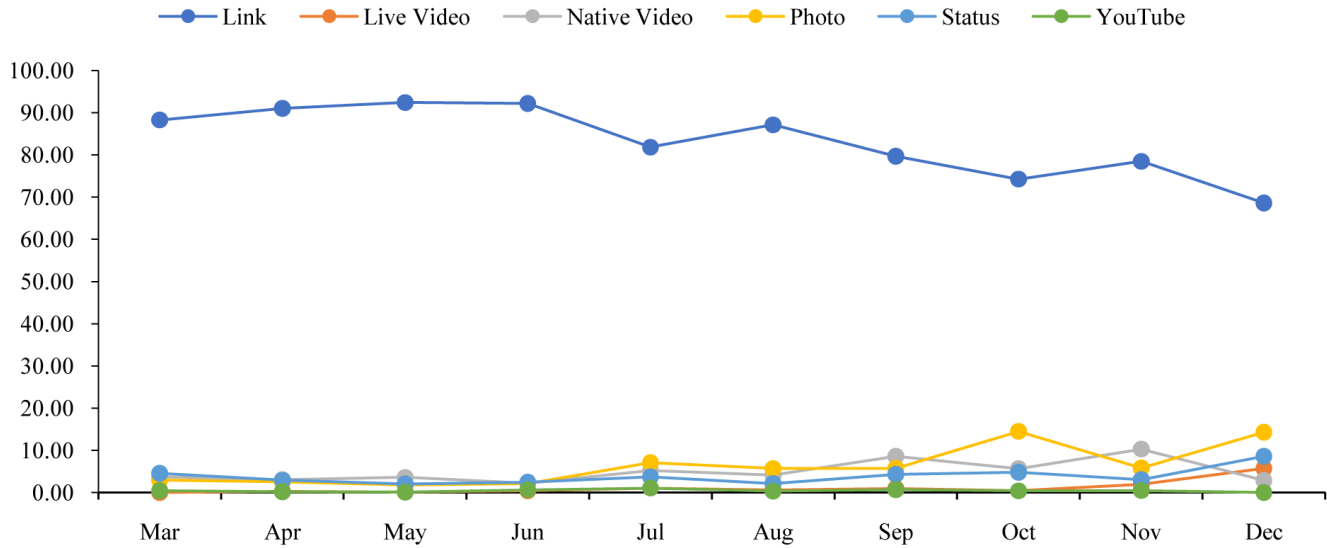


Figure 1. Content distributions during the time.

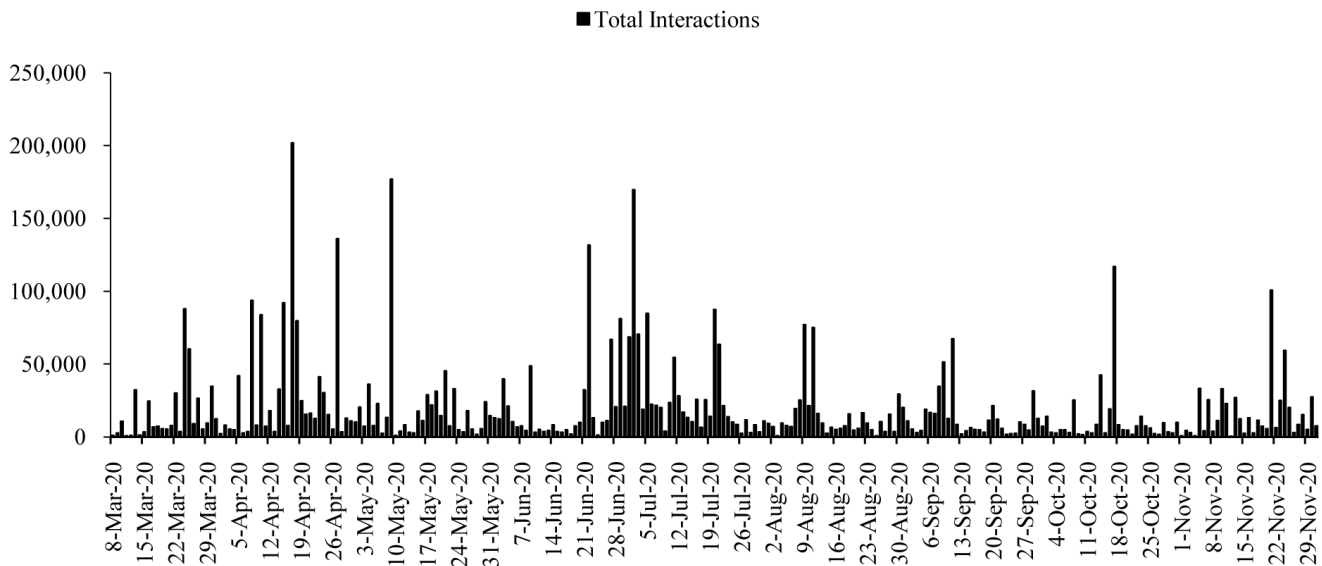


Figure 2. Interaction distributions during the time.

9 May ($n=176,936$), 22 June ($n=131,564$), and 2 July ($n=169,524$). The average interactions dropped in the following months, and again increased slightly in the mid-October 2020 and late-November 2020. However, except 17 October ($n=116,743$) and 21 November ($n=100,619$), the interactions were dropping gradually after July 2020 till December 2020.

Of all content types, links (71.22%) received the highest interactions, followed by native videos (16.52%), while YouTube videos (0.54%) received the lowest interactions. In all content types, *like* as a reaction had the highest percentages: in all except status, the second-highest was love; in status (11.16%), the second-highest was haha (Table 2). A comparison of interaction percentages among the content types shows that

YouTube video (4.16% and 1.35%) received relatively higher percentages of comments and care in its interaction types, followed by native videos (4.05%); native videos (19%) were shared more often, followed by live video (8.33%). Of the six reactions, links received relatively higher percentages of likes (84.14%); photos received higher percentages of love (16.80%); statuses received higher percentages of wow (0.65%), haha (11.16%), and sad (5.58%).

Of the total interactions during the period, 1.92% ($n=328,976$) were comments and 8.47% ($n=1,451,726$) were shares (Table 3). Of the six reactions, likes were the highest (80.32%), followed by love (4.37%) and haha (3.08%); angry (0.21%) had the lowest share. Within all interaction types, link had the

Table 2. Interaction numbers and their percentages within the content types.

Content types	Total interactions (n, %)	Interaction numbers and percentages within content types (n, %)								
		Comments	Shares	Likes	Love	Wow	Haha	Sad	Angry	Care
Link	12210941 (71.22)	233296 (1.91)	815980 (6.68)	10274354 (84.14)	358815 (2.94)	45967 (0.38)	349074 (2.86)	74221 (0.61)	31393 (0.26)	27841 (0.23)
Live Video	239176 (1.40)	9692 (4.05)	19929 (8.33)	189173 (79.09)	15924 (6.66)	786 (0.33)	1659 (0.69)	600 (0.25)	311 (0.13)	1102 (0.46)
Native Video	2831618 (16.52)	28472 (1.01)	538104 (19)	2067440 (73.01)	128542 (4.54)	9016 (0.32)	31606 (1.12)	14841 (0.52)	2350 (0.08)	11247 (0.40)
Photo	1117323 (6.52)	36936 (3.31)	53840 (4.82)	719088 (64.36)	187739 (16.80)	4671 (0.42)	69900 (6.26)	32649 (2.92)	1762 (0.16)	10738 (0.96)
Status	652504 (3.81)	16714 (2.56)	20681 (3.17)	451965 (69.27)	47026 (7.21)	4256 (0.65)	72842 (11.16)	36441 (5.58)	799 (0.12)	1780 (0.27)
YouTube	92841 (0.54)	3866 (4.16)	3192 (3.44)	68378 (73.65)	11760 (12.67)	261 (0.28)	2845 (3.06)	1223 (1.32)	65 (0.07)	1251 (1.35)

Table 3. Interaction numbers and their percentages within the interaction types.

Reactions	Total interactions (n, %)	Interaction percentages within interaction types					
		Link	Live Video	Native Video	Photo	Status	YouTube
Comments	328976 (1.92)	70.92	2.95	8.65	11.23	5.08	1.18
Shares	1451726 (8.47)	56.21	1.37	37.07	3.71	1.42	0.22
Likes	13770398 (80.32)	74.61	1.37	15.01	5.22	3.28	0.50
Love	749806 (4.37)	47.85	2.12	17.14	25.04	6.27	1.57
Wow	64957 (0.38)	70.77	1.21	13.88	7.19	6.55	0.40
Haha	527926 (3.08)	66.12	0.31	5.99	13.24	13.80	0.54
Sad	159975 (0.93)	46.40	0.38	9.28	20.41	22.78	0.76
Angry	36680 (0.21)	85.59	0.85	6.41	4.80	2.18	0.18
Care	53959 (0.31)	51.60	2.04	20.84	19.90	3.30	2.32

highest percentages: 70.92% comments, 56.21% shares, 74.61% like, 47.85% love, 70.77% wow, 66.12% haha, 46.40% sad, 85.59% angry, and 51.60% care (Table 3). Within comments (11.23%) and love (25.04%), photo had the second-highest percentages; within haha (13.80%) and sad (22.78%), status had the second-highest percentages; within shares (37.07%), likes (15.01%), wow (13.88%), angry (6.41%), and care (20.84%), native video had the second-highest percentages.

Discussion

Main objectives

This study for the first time attempts to explore the nature of content and public engagement in the COVID-19 vaccine issue on Facebook. To provide some novel insights, the top

10,000 most interactive and relevant Facebook posts have been analyzed following a combination of three communication research techniques: time series analysis, network analysis, and sentiment analysis.

Key findings

This exploratory research has a few main findings. Vaccine-related links were the highest in percentage (86.14%) of all Facebook content during the period and the highest shared content (56.21%) as well, which counters the result of Baresch *et al.* (2011) that showed Facebook users' infrequently (49%) share news through links. Links shared in social media platforms are mostly news items primarily from different online news portals (Baresch *et al.*, 2011), which infers that Bangladeshi

Facebook users mostly consume news items related to the COVID-19 vaccine. However, the decline of links suggests that users are increasingly becoming less interested in vaccine-related news. Kleis Nielsen *et al.* (2020) also found a similar tendency that using Facebook for COVID-19 news and information is declining: from 10 April to 24 June 2020, the percentage declined from 24 to 12. Unlike the present study, however, the previous study considered all COVID-19 issues instead of *only* the vaccine issue and produced a similar result.

The interactions were higher during the first half of the period but decreased with time. Interactions surge mainly due to vaccine-related news irrespective of its valence (i.e. positive and negative). However, it seems positive news helps interactions to grow more than negative news. For example, two crucial vaccine-related positive news items from mainstream media influenced the interaction to reach its highest on 17 April: “The University of Oxford declared that the vaccine for COVID-19 would come in September,” and “The trial of COVID-19 vaccine would begin from the next week” (e.g. *Daily Jugantor*). The interaction reached its second-highest on 27 April due to a few more positive news events: “Corona vaccine production will start from May this year,” and “India’s Serum Institute will start producing COVID-19 vaccine soon” (e.g. *Bangla Tribune*, *DW*). Nevertheless, no significant positive follow-ups occurred in the consecutive months, so the interaction lines remained steady most of the time. Another surge on 17 October was for positive news articles: “Russia produced the first COVID-19 vaccine in the world,” and “Bangladesh’s Globe Biotech claimed the invention of COVID-19 vaccine” (e.g. *BBC News*, *Prothom Alo*).

Like and love are the two leading reactions, meaning the valence of users’ reaction to vaccine-related content is positive and, to some extent, highly intense. On the other hand, the lowest instances of the angry reaction indicate users’ minimal negative emotion toward the issue. Both tendencies indicate a positive valence with from moderate to high arousal, suggesting Facebook users’ optimistic attitude toward the COVID-19 vaccine. But note that users’ sentiments can be different for different content types: link has more positive valence, whereas status has comparatively more negative valence. However, news links often produce discontent among users, perhaps due to presenting unsatisfactory and undesired information, such as the cancellation and failure of vaccine, and demystified fake news. In practice, the COVID-19 vaccine produced uncertainties among the public around the world, often allowing many to produce vaccine-related misinformation and fake prescriptions (Limaye *et al.*, 2020). Also, during the pandemic period, COVID-19 misinformation is highly prevalent in social media platforms like Facebook (Al-Zaman *et al.*, 2020; Islam *et al.*, 2020).

Another finding shows that links about the vaccine generate more interactions than others. More specifically, links are shared more and generate more comments compared to the other content types. Previous studies revealed that the primary

reason for Facebook users’ news link-sharing behavior is to share important news with others that might be helpful (Baek *et al.*, 2011). It allows easier dissemination of news and sociality, the attachment to other users. In this regard, the present study expands on the previous knowledge, adding that users not only share links containing important information but also links allow more users to engage in discussion.

Conclusion: Limitations & strengths

This study has a few limitations. First, Facebook only introduced the care reaction in April 2020. It means interaction data before April could not include care responses, which may have impacts on the overall percentages. Second, Bangla is a complex language: diverse expressions and spellings of words can indicate the same thing. Therefore, though we searched for a single topic, our search terms were not likely to incorporate all posts. More search terms, such as “COVID-19 vaccine” and “COVID-19 medicine” could yield more search results that could have led to different findings. Third, although this study explored the content types, it failed to explain what these contents contain: vaccine news, instructions, or something else? Further research should explore what types of vaccine-related information Facebook users really consume. Fourth, previous studies found that, though links most likely contain additional text or status, they often contain photos as well (Baresch *et al.*, 2011), often making the three content types (i.e. link, photo, and status) difficult to categorize separately. The data for this study were automated and collected using CrowdTangle, which left room for doubt regarding this issue. Finally, sentiment analysis based on only Facebook reactions and excluding textual analysis may not be representative, and, to some extent, could produce unreliable results. For example, the like reaction could be a result of the absence of any particular emotion (Giuntini *et al.*, 2019).

Apart from these limitations, this study has strengths in a few areas. First, Bangla language-based Facebook content is largely overlooked in academic research, perhaps due to the absence of research interest or research efficiency among researchers. The present study filled this gap a little. Second, how Facebook users react to the issue of the COVID-19 vaccine is still an unexplored but necessary area of research. In this regard, the novel findings of this macro study may help psychology and communication researchers to understand the diverse reactions and emotional positions of Bangladeshi Facebook users on the COVID-19 vaccine issue. Third, this study provides new perspectives to rethink social media users’ views toward the COVID-19 vaccine. While previous studies emphasized vaccine hesitancy, negatively portrayed social media users’ sentiments toward the COVID-19 vaccine, and found that vaccine opposition was rising among social media users, the present study showed that social media users are more positive toward the vaccine issue, which the past studies could barely identify (Bonnievie *et al.*, 2021; Puri *et al.*, 2020). Finally, this research dealt with a larger dataset than the previous studies on the COVID-19 vaccine (Jamison *et al.*, 2020; Rovetta & Bhagavathula, 2020), which makes the results more reliable. This is

an exploratory study that may not provide conclusive findings in some cases. Therefore, further research is required to provide more insights in this regard.

Data availability

Harvard Dataverse: An exploratory study of social media users' engagement with COVID-19 vaccine-related contents

<https://doi.org/10.7910/DVN/RCWH9D> (Al-Zaman, 2021)

This project contains the following underlying data:

- COVID_medicine_posts_data.xlsx

The data in this dataset were collected using the CrowdTangle platform. The Excel dataset includes six sheets. The first sheet titled "COVID-19 vaccine" contains the raw data with 31 different variables, such

as sources (e.g. FB pages) of data, date of the posts, content types, users' engagement indicators (e.g. number of reactions, comments, and shares), and link descriptions. The remaining five sheets contain the analyses of the data for this study. For example, Main Data includes only the twelve variables analysed in the present study. Similarly, each of Types & Interactions, Interactions & Time, and Types & Time include data of two variables, and often their cross-tabulations as well. We would like to recommend the researchers who are interested in this dataset utilize the first sheet (i.e. COVID-19 vaccine) for their study or other purposes.

Data are available under the terms of the [Creative Commons Zero "No rights reserved" data waiver](#) (CC0 1.0 Public domain dedication).

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Open Peer Review

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Version 3

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Arriel Benis 

Faculty of Industrial Engineering and Technology Management, Holon Institute of Technology, Holon, Israel

Thanks to the author for this interesting manuscript.

The focus on Bangla language and Bangladesh.

It can be good to add a discussion about the similarities and the differences between the results disclosed herein and other in other countries/areas around the globe. Moreover for the not social media users/specialist it will be good to shortly explain the difference between Facebook, Youtube, Twitter... before explaining why the author choose Facebook ("Data source & search strategy").

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Health Informatics; Digital Health; Social Media; Artificial Intelligence; Health Communication; Epidemiology;

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 30 June 2021

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Jayaseelan Rathinaswamy 

Department of Visual Communication, PSG College of Arts and Science, Coimbatore, Tamil Nadu, 641 014, India

The researchers have given necessary clarification.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: New Media Studies, Developmental Communication are my strong areas of research.

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to confirm that it is of an acceptable scientific standard.

Version 2

Reviewer Report 17 June 2021

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Jayaseelan Rathinaswamy 

Department of Visual Communication, PSG College of Arts and Science, Coimbatore, Tamil Nadu, 641 014, India

Facebook is [the most popular social media platform in Bangladesh](#) (94.46%), compared to YouTube (3.31%) and Twitter (0.3%), so we selected it as the source of data for this study. we collected the data from Facebook pages using [CrowdTangle](#):

- The researchers have mentioned in their study that Facebook is the most popular social medium in Bangladesh. I want to know how they measured it. Have they used any instrument to measure it or did they do any other research on Facebook usage? If they have referred any research paper, then it should be mentioned there.
- [CrowdTangle](#): should be explained clearly.

Most of the Facebook users in Bangladesh who write in the Bangla language use the Bangla alphabet

- The researchers should not use the term "most". It should clearly be stated what percentage or number of people are using the particular language in social media.

In this study, we followed a bivariate statistical analysis and a simple time-series analysis with one-day intervals. The numbers and percentages are presented in tables, time-series data are presented in graphs.

- The researchers have mentioned about the analysis method but it should be clearer.
- They have mentioned in the paper that the percentage are presented in the table, but have not mentioned in which table. The table number should be mentioned clearly.
- There are no research questions or hypothesis mentioned in the study. It is very important for a research work.
- Reviews of Literature are very less. More reviews can be added.
- The researchers have used 1st person in some places as 'I' and it should be changed to 3rd person eg: "the researcher/ researchers". (Researchers have not changed this even after mentioning it in the previous report)

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: New Media Studies, Developmental Communication are my strong areas of research.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 19 Jun 2021

Md. Sayeed Al-Zaman, Jahangirnagar University, Bangladesh

Thanks to the reviewer for further comments on our manuscript. Followings are our responses:

1. We did not measure the popularity levels of the social media platforms. Rather, we provided a source from where we borrowed the statistics. Please see the link attached to "[the most popular social media platform in Bangladesh](#)" in the manuscript. As per the policy of F1000 Research, all web citations should be included as links.
2. For "CrowdTangle", see point 1. Also, we defined CrowdTangle as "a public insights tool owned and operated by Facebook" in the manuscript, which is an ideal and referred description of this tool. For more, see <https://help.crowdtangle.com/en/articles/3192685-citing-crowdtangle-data>.
3. We excluded the word "most". However, a specific percentage is absent regarding the statement, and measurement of the entire Facebook users is not possible as well. For that reason, we had to rely on our general observations.

4. Regarding the analysis, we do not think the method needs further clarification because it clearly mentions the two techniques we devised in this study. Bivariate analysis is simply the cross-tabulation between two variables and time series analysis is the distribution of a variable throughout a specific period. Detailing such a primary-level explanation would make the section verbose.
5. Since all tables are cross-tabulations produced by bivariate analysis, it would not require mentioning the table number in the method section. Rather, we clearly mention the number in the result section while interpreting our data.
6. F1000 Research is a medicine-related journal, and such journals unlike the social sciences and humanities journals emphasize results over literature review. Research papers in similar journals should be as succinct as possible, though we provide the reviews of necessary studies for both the background and conceptual framework. Also, the guideline of the journal clearly states that the four required sections should be: Introduction, Methods, Result, Conclusions/Discussion. Therefore, we decided not to include a dedicated Literature Review section for a detailed literature review. Lastly, since this is an exploratory study, it is obvious that not many studies have not been conducted in this area so far.
7. One "I" was remained in the manuscript mistakenly and we have replaced it with "we." Thanks for the suggestion. As mentioned in our previous response to the reviewer's comments, using "we" in scholarly manuscripts is standard practice.

We have now addressed the reviewer's concerns properly and make the necessary changes (see Track Change) in the manuscript.

Competing Interests: No competing interests were disclosed.

Version 1

Reviewer Report 09 June 2021

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Jayaseelan Rathinaswamy 

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The results of the study should be more focused towards implications, which is missing. The conclusion gives positive and negative aspects of Facebook on COVID-19 and but doesn't give a strong conclusion.

The Researcher/s have used time frame analysis but not mentioned which type of approach they have adopted.

The researcher used 1st person in some places as 'I' and it should be changed as 3rd person eg: "the researcher/ researchers".

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: New Media Studies, Developmental Communication are my strong areas of research.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Author Response 10 Jun 2021

Md. Sayeed Al-Zaman, Jahangirnagar University, Bangladesh

Many thanks to the reviewer for such valuable comments on this manuscript. The following changes have been made using Track Change according to the suggestions:

1. Thanks for pointing out the apparent limitation regarding the result interpretation. However, a glimpse of the intellectual implication of the results has already been included at the end of the conclusion (please, see from "*Apart from these limitations, this study has strengths in a few areas...*" to "*Finally, this research dealt with a larger dataset than the previous studies on the COVID-19 vaccine...*"). Also, the last sentence would inform the readers that this is an exploratory study, and such studies might have limitations from different aspects (e.g., reaching some certain and concrete conclusions), but it can guide future studies in this area. From this perspective, the

inability to forecast very concise practical and policy-related significance could be difficult for this study.

2. A one-sentence clarification regarding the data analysis has now been added to the methodology.
3. The use of "I" is now replaced with "we", which is an ideal practice in the scholarly arena.

Competing Interests: No competing interests were disclosed.

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