Characterization and Comparison of Public, Medical Professionals and Technical Communities Utilization of Facebook Groups to Facilitate Idea Sharing and Crowdsourcing During the COVID-19 Pandemic: A Cross-Sectional Observational Study

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Abstract

Background: Strict social distancing measures resulting from the COVID-19 pandemic have led people to rely more heavily on social media, such as Facebook Groups, as a means of communication and information sharing. Multiple Facebook Groups have been developed by medical professionals, lay people, and engineering or technical groups to discuss current issues and possible solutions to the medical crisis.

Objective: To characterize Facebook groups created by laypersons, medical professionals, and technical professionals, with specific focus on information dissemination and requests for crowdsourcing.

Methods: The Facebook social media platform was queried for user-created Groups with the keywords “COVID,” “Coronavirus,” and “SARS-CoV-2” at a single time point on March 31st, 2020. Characteristics for each group were collected, including language, privacy setting, security requirement to join group, and membership type. For each membership type, the group with the greatest number of members was selected, and in each of these groups, the Top 100 posts using Facebook’s algorithm were identified. Each post was categorized and characterized (evidence-based, crowd-sourced, and whether the poster self-identified). STATA Statistical Software and were used to perform statistical analysis.

Results: Our search yielded 257 COVID-19-related Facebook Groups Majority of the groups (89%, 229) were for laypersons, 10% (26) were for medical professionals, and only 1% (2) groups were for technical professionals. The number of members in medical groups (mean=21,215, SD=35,040) was significantly greater than those in laypersons groups (mean=7,623, SD=19,480), p<0.01. Medical groups were significantly more likely to require security checks to join the group (81% vs 43%, P<.001) and less likely to be public (3 vs 123, P<.001) compared to laypersons groups. Medical groups had the highest user engagement, averaging 502 ± 633 reactions (P<.01) and 224 ± 311 comments (P<.01) per post. Medical professionals were more likely to use the Facebook groups for education and information sharing, including academic posts (P<.001), idea sharing (P=.003), resource sharing (P=.02) and professional opinion (P<.001), and request for crowdsourcing (P=0.003). Laypersons groups were more likely to share news (P<.001), humor and motivation (P<.001), and layperson opinions (P<.001). There was no significant difference in the number of evidence-based posts between the groups

Conclusions: Medical professionals utilize Facebook groups as a forum to facilitate collective intelligence (CI) and are more likely to use the Facebook groups for education and information sharing, including academic posts, idea sharing, resource sharing, and professional opinion. This suggests the power of social media to facilitate CI across geographical distances. Laypersons groups were more likely to share news and humor and motivation, suggesting utilization of Facebook Groups to provide comedic relief as a coping mechanism. Further investigations are necessary to study Facebook groups’ roles in facilitating collective intelligence, crowdsourcing, education, and community building.

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Keywords: Social media; internet; cognitive intelligence; crowdsourcing; evidence based; communication

Introduction

The novel coronavirus, first discovered in Wuhan, China on December 31, 2019, has quickly spread to more than sixteen million cases world-wide by June 2020 [1], and has resulted in disruption to daily activities of human society [2], [3]. Social distancing has arisen as method of reducing transmission of COVID-19 and includes government recommended or mandated policies to "remain at home" or quarantine. Strict social distancing measures have led people to rely more heavily on social media as a means of communication and information sharing [4], including crowdsourcing (using many people to obtain a final goal). Forums that allow discussion and sharing of ideas, such as Facebook Groups, allows for the democratization of information and permits the development of quick collaborations to allow for allocation of

resources and advancement of science and technology. Social media has played a critical role in the COVID-19 pandemic, as multiple social media forums were developed by medical professionals, lay people, and engineering or technical groups to discuss current issues and possible solutions to the medical crisis.

However, despite the benefits of social media message sharing and crowdsourcing, studies have shown that social media can lead to propagation of misinformation [5]. With the rapid dissemination of information through unregulated forums, it is often difficult to distinguish evidence-based posts and forums from those that are not validated or come from a credible source. For example, during the COVID-19 outbreak, there has been great debate on whether social media platforms have bred unnecessary fear and spread of misinformation [6]. While social media is a powerful medium for communication, it can also result in conflicting information and negative societal impacts.

Consequently, it is critical to understand how to social media can be used effectively, especially during unprecedented times such as during the COVID-19 pandemic. The CoV-IMPACT consortium has called for “the development of a real-time information sharing system drawing from data and analysis from a rank of social media platforms in multiple languages and across the global diaspora”[7]. Furthermore, we note that social media has been used by medical professionals and researchers to communicate and form virtual communities via groups. In this study, we aim to characterize Facebook groups created by laypersons, medical professionals, and technical professionals, with specific focus on information dissemination and requests for crowdsourcing.

Methods

Recruitment

The Facebook social media platform was queried for user-created Groups with the keywords “COVID,” “Coronavirus,” and “SARS-CoV-2” at a single time point on March 31st, 2020. Characteristics for each group were collected, including language (i.e. English or non-English), privacy setting (i.e. public or private), security requirement to join group, and membership type (i.e. laypersons, medical professionals, or technical professionals). For each membership type, the group with the greatest number of members was selected, and in each of these groups, the Top 100 posts using Facebook’s algorithm were identified. Each post was characterized by category and subcategory, whether it was evidence-based and/or crowd-sourced, and whether the poster self-identified. The coding scheme for category and subcategory was developed by three independent investigators (**Table 1**). Metrics were also collected for groups (number of members and posts, adjusted to time on Facebook) and for posts (number of comments and number of reactions). Posts with repeated content were discarded to avoid oversaturation of the sample.

Statistical Analysis

STATA Statistical Software (version 13 SE; Stata Corp) and Python (version 3.7.7; Python Software Foundation) were used to perform statistical analysis. Demographic data was tabulated and stratified by type of group (medical, layperson, technical). All hypothesis testing was conducted with an alpha level set at 0.05. To compare membership volume across Facebook groups, a Mann Whitney *U* Test for non-parametric data was used. A Kruskal-Wallis test was used to compare the volume of reactions and comments for the top 100 posts across various types of Facebook groups. Planned post-hypothesis testing was conducted using Dunn's testing. Lastly, chi-squared testing was conducted to compare evidence basis versus type of group for the top 100 posts.

Table 1. Predetermined Coding Framework for Post Categories

Categories	Subcategories	Example Posts
Education and Information Sharing	News	"Official statement from Dr. Peter Tsai, inventor of the electrostatic charging technology that makes the filter media of face masks including medical and N95."
	Academic	"I created these quick sheets (PDF and images) for non-ICU clinicians (medical or surgical) who may find themselves taking care of critically ill patients."
	Question	"Has anyone seen patients whose presenting symptom was only abdominal pain (no diarrhea)?"
	Personal experience	"We recently had a COVID patient with a cimino fistula with thrombosis of the fistula."
	Resource	"As you know, the CARES act passed a few days ago and it is 800 pages long. There are a lot of provisions in it that may help you, whether you run a small business or are an employee of a health care facility."
	Movement-based advocacy	"Stay Home Stay Safe."
Supply and Equipment	Idea sharing	"Here is a link to a google doc on how to make one yourself."
	Request for resources (demand)	"We need a way to make more. Can you help produce these?"
	Offer to provide resources (supply)	"I'm in Miami looking to donate some face shields locally does anyone here need?"
	Networking	"Anyone here been in touch with the NHS… Any contacts appreciated."
Opinion	Professional	"To summarize, treat your patients as individuals. If they have compliant lungs but are hypoxemic, use PEEP cautiously, and if they are not PEEP responsive, don't persist in trying to treat them for a disease they probably don't have."
	Layperson	"I have remained fairly calm since January when the news broke, but today I find myself sad and weeping for all that the world has suffered."
	Conspiracy theory	"Russia and anti-vaxxers are spreading disinformation about COVID-19 and 5G."

Humor and Motivation	Humor	"'What's parenting during lockdown like?"
	Support for healthcare workers	"We love you guys....thank you for saving life in this hard time"
	Inspiration	"Raise your hand if you know what it's like to lose everything and rebuild your life from scratch."
	Mental health visibility	"For all the health care providers and unsung heroes on the front lines: nothing can "fix" these feelings, but maybe naming them and noticing them can make them a little easier to bear."

Results

Group Characteristics

Our search on March 31st, 2020 yielded 257 COVID-19-related Facebook Groups (**Table 2**). Majority of the groups (89%, 229) were for laypersons, 10% (26) were for medical professionals, and only 1% (2) groups were for technical professionals. While the mean number of group members was 9,203, groups ranged widely in size from 1 to 185,340. A Mann-Whitney *U* test indicated that, overall, the number of members in medical groups (mean=21,215, SD=35,040) was significantly greater than those in laypersons groups (mean=7,623, SD=19,480), $P<0.01$ (**Figure 1A**). The mean number of group posts per day was 62 posts (range=0-625). Almost half of the groups were public (128, 50%); laypersons (123, 54%) groups were more likely to be public than medical groups (3, 12%, p = 0.0001). The majority of groups (218, 85%) predominantly operated in English, with no significant difference between laypersons, medical, and technical groups (**Figure 1B**).

Table 2. Characteristics of COVID-19-Related Facebook Groups

Number of Groups	257
Type of Group, n (%)	
Laypersons	229 (89)
Medical	26 (10)
Technical	2 (1)
Number of Members, mean (range)	9,203 (1-185,340)
Number of Posts per Day, mean (range)	62 (0 – 625)
Privacy Setting, n (%)	
Public	128 (50)
Private	129 (50)
Security Requirement to Join Group (%)	
Yes	121 (47)
Request	114 (44)
No	22 (9)
Language (%)	
English	218 (85)
Non-English	39 (15)

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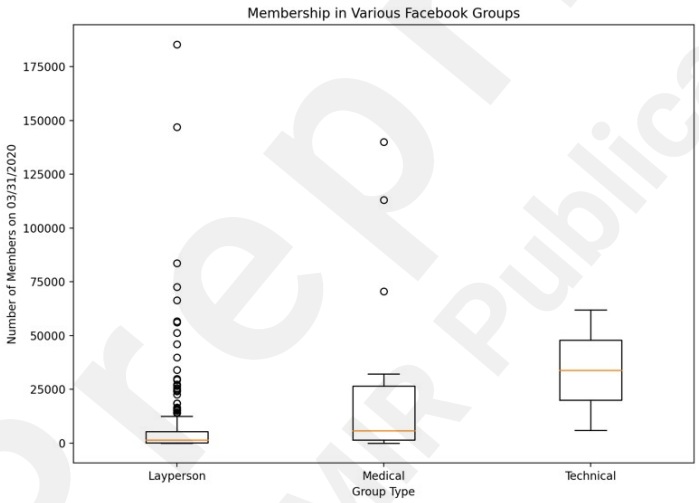


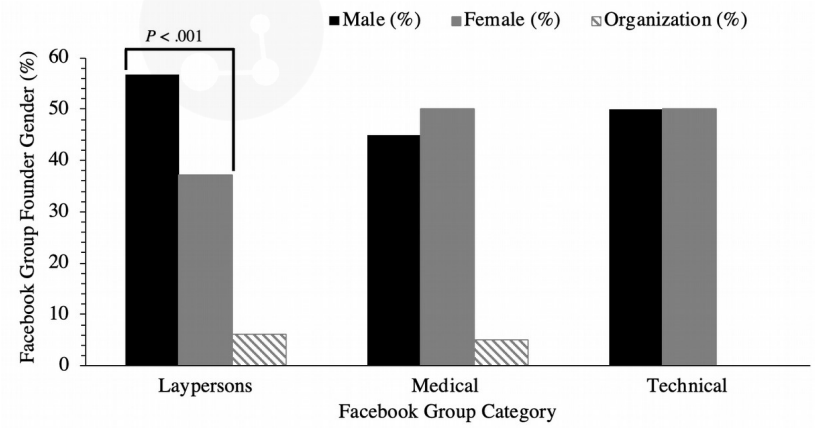
	Laypersons	Medical	Technical
Number of Members, mean (SD)	7,623 (19,480) *	21,215 (35,040) *	33,948 (39,578)
Public Privacy Setting, n (%)	123 (54) **	3 (12) **	2 (100)
Security Requirement to Join Group, n (%)			
Yes	98 (43) ***	21 (81) ***	2 (100)
Request	110 (48)	4 (15)	0
No	21 (9)	1 (4)	0
English Language, n (%)	193 (84)	20 (77)	2 (100)

* $P < .01$ between these two values
** $P < .001$ between these two values
*** $P < .001$ between these two values

Figure 1. Characteristics of COVID-19-related Facebook Groups, by group type.

Nearly all groups required prospective members to submit a request and/or answer security questions to join (235, 91%) (**Figure 1)**. Medical groups were significantly more likely to require security checks to join the group (i.e. providing practice number, identification, verification of physician, agreement to terms), compared to layperson groups (81% vs 43%, *P*<.001). Among medical groups, the majority were private groups (23, 88%) that enforced security settings, with 4 groups (15%) that required requests, and only 1 group (4%) that had no security settings. Similarly, both technical groups required security requirements to join the group (2, 100%). In contrast, 98 (43%) of the layperson groups had security requirements, 110 (48%) had requests to join, and 21 (9%) had no security requirements.

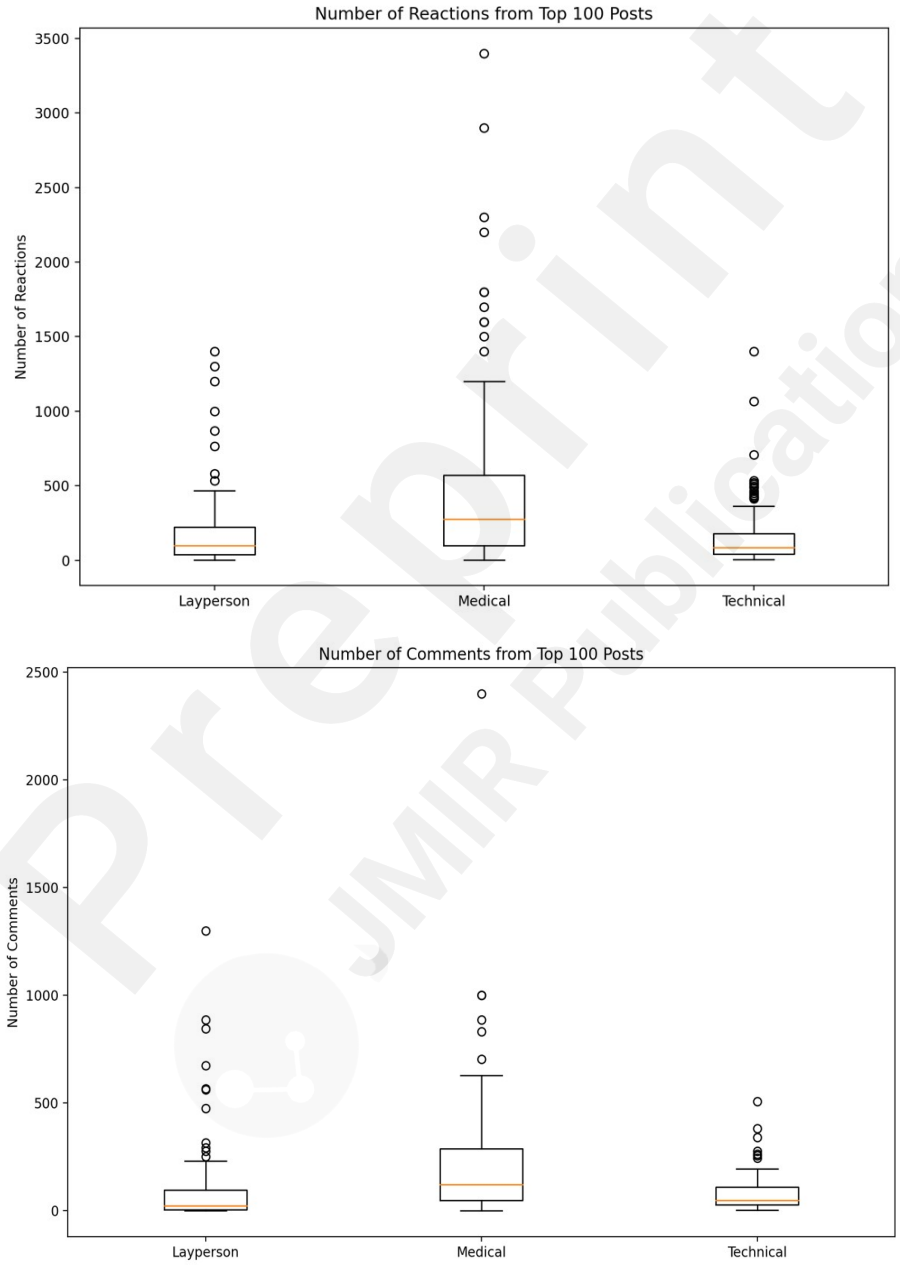
When analyzing gender of the Facebook group creator (male, female, or organization, **Figure 2**), laypersons groups were more likely to be created by a male (131, 56.7%) than a female (86, 37.2%, *P*<.001). Male creators were more common in non-English predominant laypersons groups (male 66.7% versus female 28.2%, *P*<.001). Medical and technical groups are equally likely to be created by a male or female. Facebook groups created by organizations occurred in 14 laypersons groups (6.1%), 1 medical group (5%), and did not occur in the technical group.



	Male	Female	Organization
Laypersons, n (%)	131 (56.7%)	86 (37.2%)	14 (6.1%)

English Predominant	105 (54.7%)	75 (39.1%)	12 (6.3%)
Non-English Predominant	26 (66.7%)	11 (28.2%)	12 (6.3%)
Medical	9 (45%)	10 (50%)	1 (5%)
Technical	1 (50%)	1 (50%)	0 (0%)

Figure 2. Gender of creator of COVID-19-related Facebook Groups, by group type.



	Layperson	Medical	Technical	*P* value*
Number of Reactions, mean (SD)	182 (265)	502 (633)	165 (216)	<.01
Number of Comments, mean (SD)	104 (207)	224 (311)	80 (86)	<.01

* *P* value calculated between layperson versus medical groups

Figure 3. Average number of reactions and comments per Top 100 post of COVID-19-related

Facebook Groups, by group type.

Post Characteristics

The largest laypersons group (CoronaVirus International) was created in late January 2020, while the largest medical (COVID-19 USA Physician/APP Group) and technical groups (Open Source COVID19 Medical Supplies) were created in mid-March 2020. At time of analysis, CoronaVirus International had 185,340 members, averaging 333 posts per day, was English predominant, and required security questions to join. COVID-19 USA Physician/APP group had 140,018 members, averaged 100 posts per day, was English predominant, and required security questions to join. Open Source COVID10 Medical Supplies had 61,935 members, was English predominant, and required security questions to join.

Medical groups had the highest user engagement, averaging 502 ± 633 reactions (*P*<.01) and 224 ± 311 comments (*P*<.01) per post, compared to layperson group's 182 ± 265 reactions and 104 ± 207 comments per post, and technical group's 165 ± 216 reactions and 80 ± 86 comments per post (**Figure 3**).

In comparing characteristics of the posts by groups (**Table 3**), layperson and medical groups had predominantly education and information sharing posts. Layperson groups had more posts sharing news about coronavirus (31 versus 10, *P*<.001), while medical groups had more academic based posts (21 vs 4, p *P*<.001). Technical groups were predominantly supply and equipment sharing posts (99, *P*<.001 compared to laypersons and medical groups), majority being idea sharing (72), followed by networking (11), requests for resources (9), and offer to provide resources (7). Medical groups had more supply and equipment posts compared to laypersons (17 vs 3, *P*<.001), including idea sharing posts (11 vs 1, *P*<.001). Medical groups provided more professional opinions compared to laypersons (18 vs 0, *P*<.001), while layperson groups provided more layperson opinions (12 vs 1, *P*<.001). There was only one post

per layperson and medical professional group. Layperson groups were more likely to share posts related to humor and motivation than medical groups (29 vs 3, *P*<.001), including humor (21 vs 0, *P*<.001), inspiration (4 vs 0, *P*<.001).

Table 3. Characteristics of Top 100 Posts, by Group Type

	Layperson	Medical	Technical	*P* value*
Categories, n				
Education and Information Sharing	55	60	1	0.476
News	31	10	0	<.001
Academic	4	21	0	<.001
Question	11	14	1	0.522
Personal experience	5	7	0	0.553
Resource	1	8	0	0.017
Movement-based advocacy	3	0	0	0.082
Supply and Equipment	3	17	99**	<.001
Idea sharing	1	11	72	0.003
Request for resources (demand)	2	2	9	1.000
Offer to provide resources (supply)	0	1	7	0.317
Networking	0	2	11	0.156
Opinion	13	20	0	0.184
Professional	0	18	0	<.001
Layperson	12	1	0	0.002
Conspiracy theory	1	1	0	1.000
Humor and Motivation	29	3	0	<.001
Humor	21	0	0	<.001
Support for healthcare workers	4	2	0	0.408
Inspiration	4	0	0	0.044
Mental health visibility	0	1	0	0.317
Evidence-Based, n				
Yes	28	39	42	0.095
No	72	61	58	
Crowdsourced, n				
Yes	19	38	42	0.003
No	81	62	58	
Poster Self-Identified, n				
Yes	1	91	12	<.001
No	99	9	88	

* *P* value calculated between layperson versus medical groups
** *P* value < .001 compared to laypersons and medical groups

Medical group posters were significantly more likely to self-identify (91 vs 1, *P*<.001), and more likely to request crowdsourcing in the group (38 vs 19, *P*<.001). There was no significant difference in the number of evidence-based posts between the groups, with 28

evidence-based posts on the laypersons group, 39 in the medical groups, and 42 in the technical group (*P*=0.095).

Discussion

Information sharing through social media has become mainstream during the COVID-19 pandemic. In a matter of weeks, over 257 new groups were formed on the social media platform Facebook, including groups made by laypersons, medical professionals, and technical Facebook users. In this study, we characterize how Facebook groups activities surrounding COVID-19 pandemic differ between laypersons, medical professionals, and technical groups, including members, user engagement, and type of posts.

Principle Results

Medical professional groups are more likely to be private, and require security questions and agreement to group policies, and posters were more likely to self-identify (name, specialty, location of practice) per community rules, suggesting a more professional community compared to laypersons. Despite the heavier security, they on average had more group members compared to laypersons (**Figure 1**) and had more engaged communities with larger number of reactions and comments per post (**Figure 3**). Strikingly, when characterizing the top 100 posts by group type, medical professionals were more likely to use the Facebook groups for education and information sharing, including academic posts (*P*<.001), idea sharing (*P*=.003), resource sharing (*P*=.02) and professional opinion (*P*<.001). Medical professionals were also more likely to request crowdsourcing compared to laypersons, such as asking questions about patient management, and resources such as personal protective equipment. Together, this evidence suggests that medical professionals intentionally utilize Facebook groups as a forum to facilitate collective intelligence (CI) to compensate for the dynamic and unfamiliar evidence and guidance surrounding the novel coronavirus and associated treatments. CI is the “wisdom

of crowds"[8] referring to the collective insight of groups [9]–[11], and has the potential to generate more accurate information or medical decision-making than individuals alone [12]–[14]. While previous studies on CI in medicine include activities such as case conferences and tumor boards [8], social media has been proposed as a facilitator of health information sharing[15] and CI across geographical distances[16]. This study's findings suggest the power of social media to facilitate CI beyond just geographical distances, but also across additional physical barriers of strict social distancing practices due to the COVID-19 pandemic, and intellectual barriers where conventional avenues of information searching and consulting is not yet available. Further investigations are necessary to study whether or not participation in Facebook groups improves knowledge base of medical professional participants, and Facebook group cognitive intelligence influences decision making.

On the other hand, laypersons groups were more likely to share news (P<.001), humor and motivation (P<.001), and layperson opinions (P<.001). Layperson groups were less likely to crowdsource, and only 3% of posts were movement-based advocacy (such as #stayathome). This suggests that laypersons utilize the Facebook Groups to form a community to share emerging news and share humor and inspiration, potentially to provide comedic relief as a coping mechanism. The COVID-19 pandemic has resulted in dramatic shifts in day-to-day living for many individuals, including working from home, social isolation, and adoption of hand hygiene and wearing masks. These changes were rapid and may result in anxiety and distress in laypersons. Humor has been well evidenced as an adaptive mechanism to stress [17], and reduce anxiety [18], [19], enhance mood [19], and can even be used as a tool for psychotherapy [20]–[25]. The role of news sharing and providing humor and inspiration functions analogously to a virtual support group, with the potential to connect individuals and foster reflections and conversations [26], [27]. Consequently, it may behoove healthcare professionals to utilize these layperson Facebook groups to communicate and educate, understand layperson perspectives

and experiences of the pandemic, provide supporting resources, and potentially facilitate grassroot movements (such as #stayathome, #wearamask).

The technical groups analyzed are a unique example of using Facebook groups for crowd sourcing, idea sharing, and networking at an international level. 99 of the 100 top posts in the technical group analyzed were in regard to supply and equipment, 72 of which were idea sharing, such as open sourcing designs for personal protective equipment, progress in designs for ventilators and ventilator splitters, etc. It had the most evidence-based posts and crowdsourced posts compared to medical and layperson groups. The technical group serves as an example of the benefits and new standard of using Facebook Groups for crowdsourcing and collective intelligence to face challenging times.

Of note, laypersons groups were significantly more likely to be created by males. Surprisingly, this is not the case in medical and technical groups, where the group creators were equal male versus female. This suggests that despite gender disparities in social media leadership positions globally, this gender gap is not evident in social media use of medical professionals. Previous studies indicate that women in medicine in particular turn to social media for mentorship and networking [28], [29], and that social media is a potential gender equalizer in medicine [30]. However, this does not discount persistent biases that may still be present in Facebook group interactions. Consequently, additional studies would be valuable investigating how social media interacts with and influences gender roles in medicine.

Comparison with Prior Work

Current publications evaluating the use of information sharing through social media has focused on the negative effects including rapid dissemination of false information [5], [7], [9], [10]. Misinformation propagated by social media is not unique to the Coronavirus pandemic. Previous studies have demonstrated that only 53% of health-related posts by medical professionals on Twitter are supported by medical evidence [10]. Additionally, studies of social

media posts related to the Ebola pandemic that arose in 2014 demonstrate a similar rate of false information [9], [11]. Our study similarly reveals a small fraction of posts that are evidence-based, with equal likelihood of a layperson post versus a medical professional host to include evidence (28 vs 39, p=0.095). Only 1% of posts from both medical and layperson groups were conspiracy theories, suggesting it may be more of a paucity of information surrounding the novel coronavirus that explain the low number of posts based in evidence. Regardless, the potential to rapidly propagate misinformation on social media could be dangerous, in both healthcare professional groups and layperson groups. Layperson groups in particular, may benefit from a moderator or peer "champions"[31] to encourage evidence based discussions and respectful user engagement.

Previous literature has also described the potential of Facebook groups as support groups and community building for patients [31]–[33], or by the medical community as an education tool to facilitate discussion, community building, material sharing [34], and mentorship [35]. Our study complements this body of literature, and highlights that virtual community building via Facebook groups is accelerated during unprecedented times, such as during the COVID-19 pandemic. However, future research is necessary to understand virtual community interactions, and recommendations for building impactful and secure Facebook Groups.

Limitations

A potential limitation to our study is the assumption that findings are representative of the global culture of Facebook groups or other social media forums. We recognize that our work is merely a small sample of the immense diversity of Facebook groups, and the different communities that contribute to each group and the resulting culture. Furthermore, as a cross-sectional study, our data collection represents only one time point of the dynamic social media content. Our findings serve as a beachhead to establish the importance of understanding

social media response to the COVID-19 pandemic, and its potential to facilitating collective intelligence, crowdsourcing, and community building.

Conclusions

In this study, we characterize how Facebook groups activities surrounding COVID-19 pandemic differ between laypersons, medical professionals, and technical groups. Medical professionals utilize Facebook groups as a forum to facilitate collective intelligence (CI) and are more likely to use the Facebook groups for education and information sharing, including academic posts, idea sharing, resource sharing, and professional opinion. This study's findings suggest the power of social media to facilitate CI beyond just geographical distances, but also across additional physical barriers of strict social distancing practices due to the COVID-19 pandemic. Laypersons groups were more likely to share news and humor and motivation, suggesting utilization of Facebook Groups to provide comedic relief as a coping mechanism. Further investigations are necessary to study Facebook groups' roles in facilitating collective intelligence, crowdsourcing, education, and community building.

Conflicts of Interest

None declared

References

[1] "Coronavirus Resource Center," *Johns Hopkins University*, 2020. https://coronavirus.jhu.edu/.

[2] L. K. Lades, K. Laffan, M. Daly, and L. Delaney, "Daily emotional well-being during the COVID-19 pandemic," *Br. J. Health Psychol.*, 2020, doi: 10.1111/bjhp.12450.

[3] S. K. Brooks *et al.*, "The psychological impact of quarantine and how to reduce it: rapid review of the evidence," *The Lancet*. 2020, doi: 10.1016/S0140-6736(20)30460-8.

[4] R. M. Merchant and N. Lurie, “Social Media and Emergency Preparedness in Response to Novel Coronavirus,” *JAMA - Journal of the American Medical Association*. 2020, doi: 10.1001/jama.2020.4469.

[5] Y. Wang, M. McKee, A. Torbica, and D. Stuckler, “Systematic Literature Review on the Spread of Health-related Misinformation on Social Media,” *Social Science and Medicine*. 2019, doi: 10.1016/j.socscimed.2019.112552.

[6] R. Kouzy *et al.*, “Coronavirus Goes Viral: Quantifying the COVID-19 Misinformation Epidemic on Twitter,” *Cureus*, 2020, doi: 10.7759/cureus.7255.

[7] A. Depoux, S. Martin, E. Karafillakis, R. Preet, A. Wilder-Smith, and H. Larson, “The pandemic of social media panic travels faster than the COVID-19 outbreak,” *Journal of Travel Medicine*. 2020, doi: 10.1093/jtm/taaa031.

[8] K. Radcliffe, H. C. Lyson, J. Barr-Walker, and U. Sarkar, “Collective intelligence in medical decision-making: A systematic scoping review,” *BMC Med. Inform. Decis. Mak.*, 2019, doi: 10.1186/s12911-019-0882-0.

[9] A. W. Woolley, C. F. Chabris, A. Pentland, N. Hashmi, and T. W. Malone, “Evidence for a collective intelligence factor in the performance of human groups,” *Science (80-.).*, 2010, doi: 10.1126/science.1193147.

[10] J. Krause, G. D. Ruxton, and S. Krause, “Swarm intelligence in animals and humans,” *Trends in Ecology and Evolution*. 2010, doi: 10.1016/j.tree.2009.06.016.

[11] J. Surowiecki, “The Wisdom of Crowds: Why the Many are Smarter Than the Few and How ...,” *How Collect. Wisdom Shapes Bus. Econ. Soc. Nations New York Doubleday*, 2004, doi: 10.1111/j.1744-6570.2006.00060_10.x.

[12] K.-D. Wolff, A. Rau, and A. Kolk, “Perforator flaps from the lower leg for intraoral reconstruction: Experience of 131 flaps.,” *J. cranio-maxillo-facial Surg. Off. Publ. Eur. Assoc. Cranio-Maxillo-Facial Surg.*, vol. 46, no. 2, pp. 338–345, Feb. 2018, doi:

10.1016/j.jcms.2017.11.019.

[13] W. Toyokawa, H. R. Kim, and T. Kameda, “Human collective intelligence under dual exploration-exploitation dilemmas,” *PLoS One*, 2014, doi: 10.1371/journal.pone.0095789.

[14] R. H. J. M. Kurvers, M. Wolf, M. Naguib, and J. Krause, “Self-organized flexible leadership promotes collective intelligence in human groups,” *R. Soc. Open Sci.*, 2015, doi: 10.1098/rsos.150222.

[15] K. M. Sternberg, S. L. Loeb, D. Canes, L. Donnelly, and M. H. Tsai, “The use of Twitter to facilitate sharing of clinical expertise in urology,” *J. Am. Med. Informatics Assoc.*, 2018, doi: 10.1093/jamia/ocx055.

[16] Y. Lu, Y. Wu, J. Liu, J. Li, and P. Zhang, “Understanding health care social media use from different stakeholder perspectives: A content analysis of an online health community,” *J. Med. Internet Res.*, 2017, doi: 10.2196/f.7087.

[17] M. Schneider, M. Voracek, and U. S. Tran, “‘A joke a day keeps the doctor away?’ Meta-analytical evidence of differential associations of habitual humor styles with mental health,” *Scand. J. Psychol.*, 2018, doi: 10.1111/sjop.12432.

[18] B. M. Savage, H. L. Lujan, R. R. Thipparthi, and S. E. DiCarlo, “Humor, laughter, learning, and health! A brief review,” *Adv. Physiol. Educ.*, 2017, doi: 10.1152/advan.00030.2017.

[19] Á. Menéndez-Aller, Á. Postigo, P. Montes-Álvarez, F. J. González-Primo, and E. García-Cueto, “Humor as a protective factor against anxiety and depression,” *Int. J. Clin. Heal. Psychol.*, 2020, doi: 10.1016/j.ijchp.2019.12.002.

[20] C. Panichelli, A. Albert, A. F. Donneau, S. D’Amore, J. M. Triffaux, and M. Ansseau, “Humor associated with positive outcomes in individual psychotherapy,” *Am. J. Psychother.*, 2018, doi: 10.1176/appi.psychotherapy.20180021.

[21] A. H. Chapman and M. Chapman-Santana, “The use of humor in psychotherapy.,” *Arq.*

Neuropsiquiatr., 1995, doi: 10.1590/S0004-282X1995000100024.

[22] L. R. Franzini, “Humor in therapy: The case for training therapists in its uses and risks,” *J. Gen. Psychol.*, 2001, doi: 10.1080/00221300109598906.

[23] A. Kopytin and A. Lebedev, “Humor, self-attitude, emotions, and cognitions in group art therapy with war veterans,” *Art Ther.*, 2013, doi: 10.1080/07421656.2013.757758.

[24] M. Gelkopf, “The use of humor in serious mental illness: A review,” *Evidence-based Complementary and Alternative Medicine*. 2011, doi: 10.1093/ecam/nep106.

[25] J. Richman, “Points of correspondence between humor and psychotherapy,” *Psychotherapy*. 1996, doi: 10.1037/0033-3204.33.4.560.

[26] Y. Zhao, J. Zhang, and M. Wu, “Finding users’ voice on social media: An investigation of online support groups for autism-affected users on facebook,” *Int. J. Environ. Res. Public Health*, 2019, doi: 10.3390/ijerph16234804.

[27] B. Baker and I. Yang, “Social media as social support in pregnancy and the postpartum,” *Sex. Reprod. Healthc.*, 2018, doi: 10.1016/j.srhc.2018.05.003.

[28] J. G. Y. Luc, N. L. Stamp, and M. B. Antonoff, “Social media in the mentorship and networking of physicians: Important role for women in surgical specialties,” *Am. J. Surg.*, 2018, doi: 10.1016/j.amjsurg.2018.02.011.

[29] E. M. Corsini *et al.*, “Global impact of social media on women in surgery,” *Am. Surg.*, 2020.

[30] N. L. Stamp, J. G. Y. Luc, M. Ouzounian, F. Bhatti, T. N. Hici, and M. B. Antonoff, “Social media as a tool to rewrite the narrative for women in cardiothoracic surgery,” *Interact. Cardiovasc. Thorac. Surg.*, 2019, doi: 10.1093/icvts/ivy358.

[31] S. R. Partridge, P. Gallagher, B. Freeman, and R. Gallagher, “Facebook groups for the management of chronic diseases,” *Journal of Medical Internet Research*. 2018, doi: 10.2196/jmir.7558.

[32] N. Maganty, M. Ilyas, Z. Ginsberg, and A. Sharma, “Social media as a platform for

information and support for melanoma patients: Analysis of melanoma facebook groups and pages," *J. Med. Internet Res.*, 2018, doi: 10.2196/derma.8482.

[33] K. Rolls, M. Hansen, D. Jackson, and D. Elliott, "How health care professionals use social media to create virtual communities: An integrative review," *J. Med. Internet Res.*, 2016, doi: 10.2196/jmir.5312.

[34] L. Nicolai *et al.*, "Facebook groups as a powerful and dynamic tool in medical education: Mixed-method study," *J. Med. Internet Res.*, 2017, doi: 10.2196/jmir.7990.

[35] S. Pinilla *et al.*, "Undergraduate Medical Students Using Facebook as a Peer-Mentoring Platform: A Mixed-Methods Study," *JMIR Med. Educ.*, 2015, doi: 10.2196/mededu.5063.

Supplementary Files

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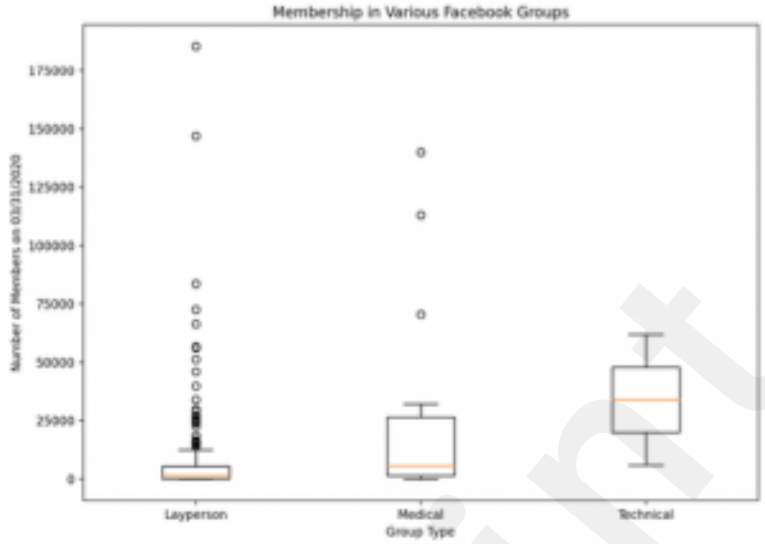
Figures

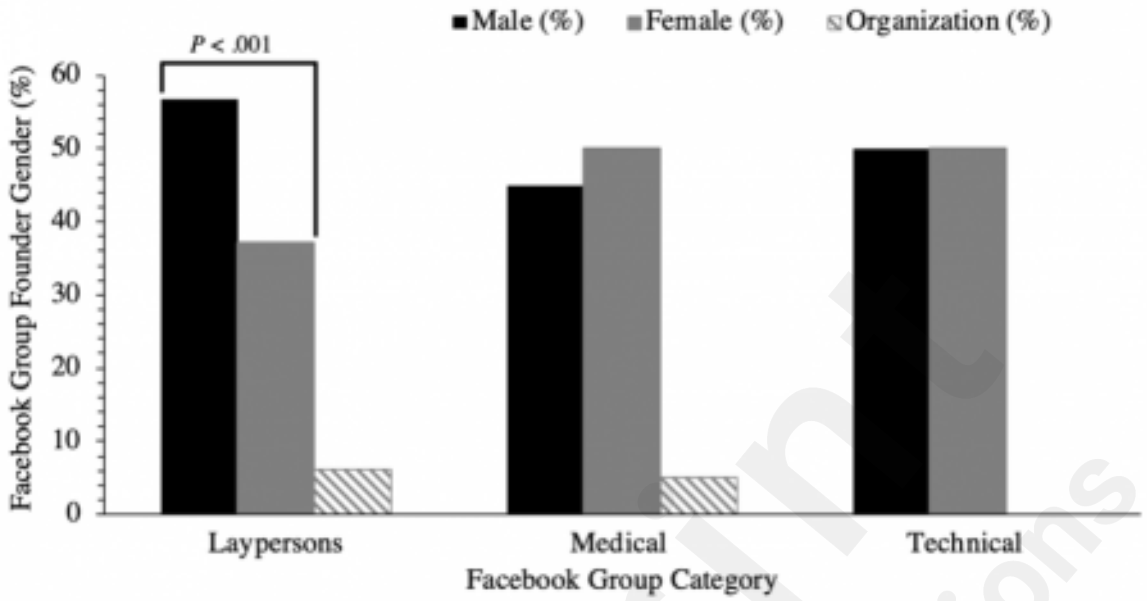
Characteristics of COVID-19-related Facebook Groups, by group type.



	Laypersons	Medical	Technical
Number of Members, mean (SD)	7,623 (19,480) *	21,215 (35,040) *	33,948 (39,578)
Public Privacy Setting, n (%)	123 (54) **	3 (12) **	2 (100)
Security Requirement to Join Group, n (%)			
Yes	98 (43) ***	21 (81) ***	2 (100)
Request	110 (48)	4 (15)	0
No	21 (9)	1 (4)	0
English Language, n (%)	193 (84)	20 (77)	2 (100)

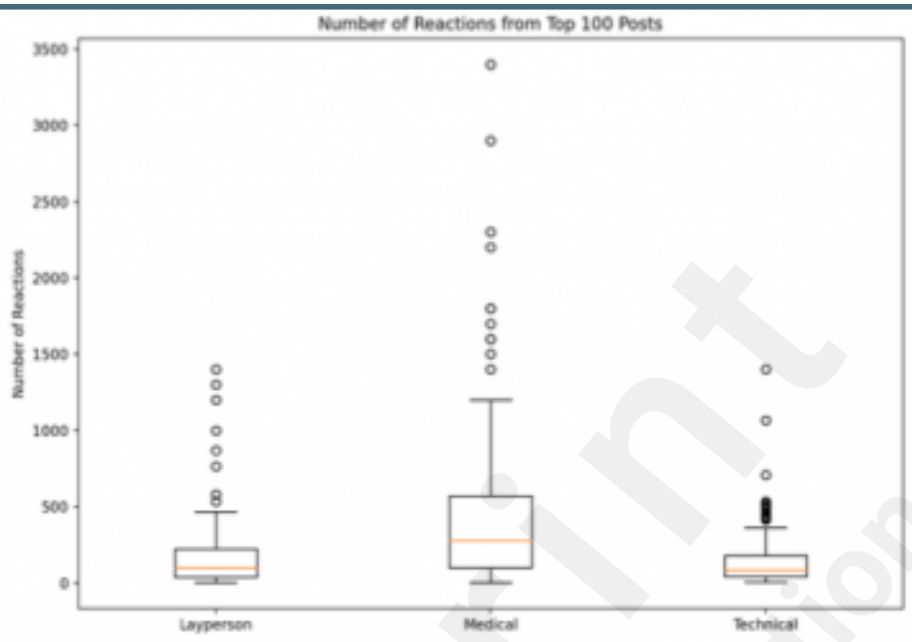
* $P < .01$ between these two values
** $P < .001$ between these two values
*** $P < .001$ between these two values

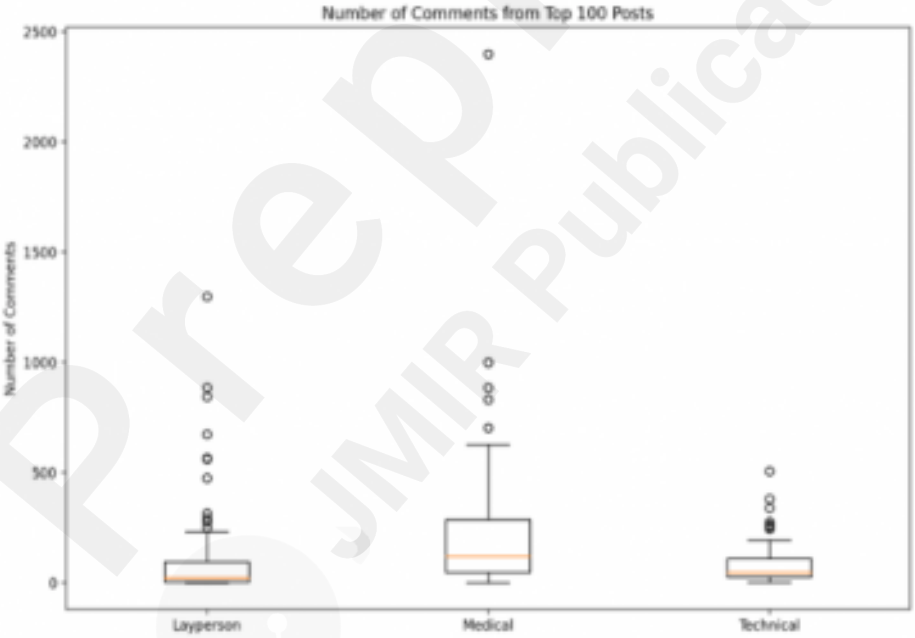
Gender of creator of COVID-19-related Facebook Groups, by group type.



	Male	Female	Organization
Laypersons, n (%)	131 (56.7%)	86 (37.2%)	14 (6.1%)
English Predominant	105 (54.7%)	75 (39.1%)	12 (6.3%)
Non-English Predominant	26 (66.7%)	11 (28.2%)	12 (6.3%)
Medical	9 (45%)	10 (50%)	1 (5%)
Technical	1 (50%)	1 (50%)	0 (0%)

Average number of reactions and comments per Top 100 post of COVID-19-related Facebook Groups, by group type.





	Layperson	Medical	Technical	*P* value*
Number of Reactions, mean (SD)	182 (265)	502 (633)	165 (216)	<.01
Number of Comments, mean (SD)	104 (207)	224 (311)	80 (86)	<.01

* *P* value calculated between layperson versus medical groups