

Case Study

The Impact of COVID-19 Prevention Imagery on Responses to Social Media Influencer Posts

Using social media influencers to deliver positive health behavior information is a proven public health communication strategy^{1 2}. Since 2016, PGP (The Public Good Projects) has leveraged social media influencers to deliver messages for campaigns ranging from mental health to opioid use disorder stigma to COVID-19 vaccination. At the height of the COVID-19 pandemic, [PGP, Hispanic Communications Network](#), and [World Voices Media](#) joined forces to increase vaccine confidence and decrease misinformation on social media within Hispanic communities. Together, we launched a nationwide, multifaceted campaign to detect and assess misinformation in Spanish and English through media monitoring, address misinformation at the source through media and social media platform policy, reactively intervene on misinformation, and proactively develop and execute affirmative cultural communication and outreach strategies. As a part of this work, we launched [El Beacon](#), a national network of vaccinated Hispanic influencers and volunteers, primarily with Hispanic social media followers, who are committed to sharing messages repeatedly for public health.

El Beacon influencers use their voices online to fight against health misinformation in their communities. All El Beacon influencers include extensive captions on their posts about their experience getting the COVID-19 vaccine, their reasons for getting vaccinated, and/or a call to action for their followers to also get vaccinated. Where posts differ is in the influencer's choice of image. Influencers are not required to include COVID-19 prevention imagery in their posts (such as masks, vaccination cards, or bandaids on the upper arm implying vaccination); they can choose to do so if they are comfortable. See Appendix A for examples.

¹ Bonnevie, E., Smith, S. M., Kummeth, C., Goldbarg, J., & Smyser, J. (2021). Social media influencers can be used to deliver positive information about the flu vaccine: findings from a multi-year study. *Health education research*, 36(3), 286-294.

² Bonnevie, E., Rosenberg, S. D., Kummeth, C., Goldbarg, J., Wartella, E., & Smyser, J. (2020). Using social media influencers to increase knowledge and positive attitudes toward the flu vaccine. *PLoS One*, 15(10), e0240828.

This case study examines the impact of COVID-19 prevention imagery (PI) on reactions and responses to content. This study aims to answer three key questions. First, do posts with and without PI have different engagement rates (likes and comments)? Second, do posts with PI receive a different proportion of comments related to COVID-19 vaccination than posts without PI? Third, do posts with PI receive a different proportion of positive comments related to COVID-19 vaccination than posts without PI? Results from this case study can be used to inform recruitment of influencers into future health campaigns, in decisions about influencer posting requirements, and to establish best practices when working with influencers on public health topics.

Methods

Since September 20, 2020, there have been 732 Instagram, Facebook, Twitter posts from El Beacon influencers. PGP analysts coded a stratified random sample of 100 influencer posts: 50 containing COVID-19 prevention imagery, and 50 not containing PI. The presence of PI was determined by the influencer: (1) wearing a mask, (2) displaying a bandage where they received their vaccination, (3) showing themselves getting vaccinated, or (4) holding their COVID-19 vaccination card. We coded posts without this imagery as not having PI.

A comment scraper was used to download all comments from the selected posts. Comments either from the El Beacon Instagram account or from the original poster (e.g., the influencer replying to a comment on their post) were deleted. After cleaning comments, there were 719 comments on the posts with PI, and 895 comments on the posts without PI. We coded comments for relevance and sentiment, using the following scheme:

Code scheme	Example comments
Positive- about COVID-19	<ul style="list-style-type: none"> I'm getting my shot tomorrow 🤒 Yes. It is so important to get vaccinated Beautiful couple! Thanks for sharing this! All about vaccination! 🙌👍👍
Positive- not about COVID-19	<ul style="list-style-type: none"> You are definitely shining 😊

	<ul style="list-style-type: none"> • Bella 😍 • Such a cute post 😍
Negative- about COVID-19	<ul style="list-style-type: none"> • I'm almost eligible for my booster but apparently it doesn't really help with omicron • JAJAJAJJA ya te pagaron? [hahaha have they already paid you?] • Hell no • #propaganda
Negative- not about COVID-19	<ul style="list-style-type: none"> • You got really fat³
Neutral	<ul style="list-style-type: none"> • Estás embarazada ? [Are you pregnant?]
Spam	<ul style="list-style-type: none"> • Team up? DM @[Account removed] 🔥
Emoji-only	<ul style="list-style-type: none"> • 🔥 • ❤️👏👏👏👏👏👏👏👏

Comments that only contained emojis and spam comments were not included in sentiment analysis. A simple random sample of 10% of comments was coded by a second analyst to test inter-rater reliability (IRR) and ensure coding accuracy across analysts. Sentiment, including initial coding and IRR, were coded using Microsoft Excel. All quantitative analysis was performed using SPSS statistics software. Significance was determined at $p < 0.05$. For more information on methods for cleaning, sampling, coding, and analysis, refer to Appendix B.

Results

Overall, there were 719 comments on posts with COVID-19 prevention imagery and 895 comments on posts without PI. All of these comments were included in comment language analysis and engagement metric analysis. On posts with PI, comments were predominantly in English (59.7%), followed by emoji only comments (22.1%), Spanish (16.6%), Portuguese (1.3%), and Persian (0.1%). On posts without PI, comments showed a similar proportion of comments in English (57.4%), a higher proportion of comments in Spanish (25.7%) and a lower proportion

³ This comment was not made on the post of an El Beacon influencer. Per Table 2, below, none of the sampled posts received negative- not COVID-19 related comments. This comment is included here as an example of the type of comment that would have been classified as negative- not COVID-19 related. All other comments in this table are from posts included in the sample of this case study.

of emoji only comments (16.0%), followed by both Spanish and English (0.2%), and Mandarin (0.1%).

Engagement Metrics

Engagement rate is the proportion of comments and likes on a post to the number of followers. Posts with PI showed an average engagement rate of 0.037 (SD= 0.03) and posts without PI showed an average engagement rate of 0.034 (SD= 0.03). Correlation testing showed that prevention imagery and engagement rate were not correlated ($p= 0.61$), and an independent sample t-test found no significant difference in average engagement rate on posts with and without prevention imagery ($p=0.61$).

Comment Sentiment

A total of 533 comments on posts with PI and 722 comments from posts without PI were included in the sentiment analysis. On posts with PI, 92.5% of comments were positive, 4.5% were negative, and 3.0% were neutral. A total of 66.2% of comments were related to COVID-19 (either positively or negatively) and 33.8% of comments were not related to COVID-19. Of these, all negative comments were related to COVID-19. Of the positive comments, the majority were related to COVID-19 (61.7%) and fewer were unrelated to COVID-19 (30.8%). See Table 2 for complete results.

On posts without PI, 50.1% were related to COVID-19 (either positively or negatively) and 49.9% of comments were not related to COVID-19. 92.2% of comments were positive, 3.3% were neutral, and 4.4% were negative. Of these, all negative comments were related to COVID-19. Of the positive comments, there was a nearly equal number of comments related to COVID-19 (45.2%) and not related to COVID-19 (47.1%). These results show that posts with and without PI receive nearly equal proportions of negative (4.5% vs 4.4%, respectively) and positive comments overall (92.5% vs 92.2%, respectively), with no significant difference in overall comment sentiment ($p=0.95$).

Posts do differ in the proportion of positive comments that relate to COVID-19. Posts with PI get a significantly higher proportion of positive comments about COVID-19 than posts without

PI (61.7% vs 45.2%, $p < 0.001$). Followers are 1.9 times more likely to comment about COVID-19 on a post with PI than on a post without it (OR= 1.95, CI: 1.55-2.46, $p < 0.001$).

Table 2. Results by Presence of Prevention Imagery		
	Posts with COVID-19 prevention imagery (n=50)	Posts without COVID-19 prevention imagery (n= 50)
Total comments	719	895
Comments removed for sentiment analysis (emoji only and spam)	186	173
Comments assigned sentiment	533	722
Comments about COVID-19 (positive or negative)	66.2% (353)	50.1% (362) ⁴
All positive comments (both about and not about COVID-19)	92.5% (493)	92.2% (666)
Positive- COVID-19 related	61.7% (329)	45.2% (326)
Positive- Not COVID-19 related	30.4% (164)	47.1% (340)
Negative- COVID-19 related	4.5% (24)	4.4% (32)
Negative- Not COVID-19 related	0.0% (0)	0.0% (0)
Neutral	3.0% (16)	3.3% (24)

⁴ Four comments expressed neutral sentiment about vaccines and COVID-19. These comments are included in the count as being about COVID-19.

Implications

This case study reinforces PGP's previous finding that social media influencers can be used to positively communicate health information about COVID-19 and vaccination. Leveraging influencers allows us to communicate urgent public health messages to hard to reach populations, such as young people of color and Spanish speakers, and communities with varied interests, such as gaming or fashion. The findings from this case study affirm that our influencers are reaching their audiences with the urgent message to get vaccinated.

The findings from this case study have several implications for our work with influencers in the future. First, these findings can be useful for recruitment of influencers who are interested in becoming involved in PGP's health campaigns. Despite the fact that conveying pro-vaccination and COVID-19 health information can be a lightning rod for criticism and negative debates in certain online spaces, we did not find this to be true on influencer posts. Based on these results, we can confidently tell prospective influencers that the majority of comments on influencer posts are typically positive.

Second, these findings can help us provide guidance to influencers on the types of images we need or prefer they post. For many public health topics, such as mental health, there is no specific prevention imagery. For other topics, such as smoking or opioid use, the imagery may be triggering. For future campaigns on topics without prevention imagery, these findings assure us that followers do thoroughly read a post's captions and recognize that the influencer is involved in public health promotion.

COVID-19 and other vaccination campaigns are unique in the opportunity for an influencer to include prevention imagery, such as masks, vaccination cards, or bandaids. For campaigns like El Beacon, where there is the option of including prevention imagery, we can present influencers with the choice of content to post, with the reassurance that including PI will not significantly impact their engagement rate or overall sentiment of comments. Instead, including PI only changes the proportion of positive comments they receive that relate to COVID-19. Presenting influencers with these findings may, in fact, encourage more influencers to choose to include prevention imagery in their posts. However, if an influencer still prefers not to include PI, based on these findings we feel confident that followers will read the caption and receive

the campaign’s message. When it comes to influencers who are hesitant to participate in a public health campaign, or feel their audience would be more receptive to a post without PI, it is better to include that influencer and reach their niche audience than to exclude them from the campaign.

It is important to note that the coding scheme adopted for this study was conservative. We removed as many confounding factors and opportunities for bias in our coding as possible (see Appendix B). For example, we purposely removed emoji-only comments (such as 🙌 or 👍) to avoid potential biases in interpretation. This means that when we present our findings on the percent of comments related to COVID-19, we exclude all of those followers whose emoji comments were actually a response to the COVID-19 prevention imagery and/or the COVID-19 related caption. Additionally, there is little way to know why someone likes a post; all those who did so as a positive response to the COVID-19 prevention imagery and/or the COVID-19-related caption are left out of our findings, giving us the most conservative interpretation of each post’s response sentiment. Based on these results, we feel confident in saying that, even in the absence of direct reference to the topic in an influencer’s image, a majority of those who view and comment on an influencers’ post are aware of the post’s pro-vaccine message.

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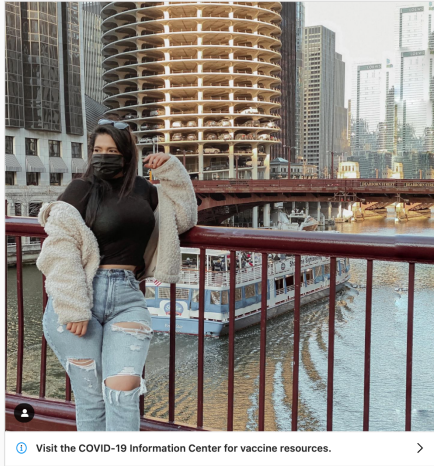
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Appendix A

Example influencer posts with COVID-19 prevention imagery



Example influencers posts without COVID-19 prevention imagery



Appendix B

Cleaning and Sampling Posts

Since September 20, 2020, there have been 732 Instagram, Facebook, Twitter posts from El Beacon influencers. 47.5% (n=348) of these were Instagram Stories, which are posts that only appear for 24 hours. Any comments made on an Instagram Story are only sent to the original poster and are not visible to other followers or the public. As such, we did not include any Instagram Stories in our sample. Additionally, two posts were on Facebook and two posts were on Twitter. To eliminate as many confounders as possible, we removed these four posts from our sample. Of the 380 Instagram feed posts, 29 had been deleted since they were posted. As we could not get the comments from these posts, these 29 posts were removed from our sample. After cleaning the data, 351 posts were included in the final sample.

Posts were coded as having or not having COVID-19 prevention imagery (PI). The presence of PI was determined by the influencer: (1) wearing a mask, (2) displaying a bandage where they received their vaccination, (3) showing themselves getting vaccinated, or (4) holding their COVID-19 vaccination card. We coded posts without this imagery as not having PI. If a post contained multiple pictures in a carousel, and the second or later picture contained COVID-19 imagery but the first picture did not, it was coded as "COVID-19 imagery- not first image." Of the 351 posts, 23.4% (n=82) had COVID-19 imagery, 73.2% (n=257) did not, and 1.7% (n=6) were "COVID-19 imagery- not first image." To eliminate as many confounders between posts with and without COVID-19 imagery as possible, "COVID-19 imagery- not first image " carousels were excluded from further samples or analysis.

Seven posts with COVID-19 imagery did not have any comments on them, and 14 posts without COVID-19 imagery did not have any comments on them. As the intent of this analysis was to examine comments, posts without comments were excluded from further sampling and analysis.

We stratified images by presence of COVID-19 prevention imagery, and a random sample of 50 posts was taken of both groups, for a total of 100 posts coded. This was 61.0% of posts with COVID-19 imagery, and 19.5% of posts without COVID-19 imagery.

Cleaning and Sampling Comments

A comment scraper was used to download all comments from the selected posts. Comments either from the El Beacon Instagram account or from the original poster (e.g., the influencer replying to a comment on their post) were deleted; this included 186 comments on posts with COVID-19 imagery and 173 comments on posts without COVID-19 imagery were excluded from sentiment analysis. After cleaning comments, there were 719 comments on the posts with PI, and 895 comments on the posts without PI. We coded comments for relevance and sentiment (see Table 1).

After coding all comments, a simple random sample was taken of 10% of comments: this was 72 comments from posts with COVID-19 imagery and 89 comments from posts without COVID-19 imagery. These posts were then coded by a second evaluator using the schema above. The inter-rater reliability (IRR) was 87.5% on posts with COVID-19 imagery and 78.7% on posts without COVID-19 imagery. The evaluators met to reconcile differences in coding and increased IRR to 100.0% on both sets of comments.

Sentiment, including initial coding and IRR, was coded using Microsoft Excel. All quantitative analysis was performed using SPSS statistics software. Significance was determined at $p < 0.05$.