

ORIGINAL ARTICLE

Lifting the Digital Curtain: Utilizing Social Media to Promote Health Content and Engage with Asian Populations

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Background/aims: The aim of this study was to understand how social media can be used to improve Asian subgroup engagement in a research registry.

Methods: A 10-week social media campaign was implemented with the goal of increasing the percentage of Asian participants in the Stanford Research Registry – platforms utilized include Facebook, Instagram, and Twitter through the Stanford Center for Asian Health Research and Education accounts. Participant data were disaggregated by race and ethnicity to better understand the diversity among Asian subgroups.

Results: The percentage of Asian participants increased from 14.3% at baseline to 23.8% at the end of the campaign (525 Asian identifying individuals to 1,871). The greatest increase occurred during the general outreach phase, which utilized all channels of outreach available. Frequencies of some ethnicities, such as Japanese, Korean, and Vietnamese, were higher in the Multi-Ethnic and/or Multi-Racial categories compared with their corresponding monoethnic groups.

Conclusions: Social media is a powerful tool that can be leveraged for targeted recruitment – in this study, we see how it can increase diversity among research participants and potentially be used as an effective tool for information dissemination. This work can be expanded in the future by examining other social media platforms more targeted toward Asian populations, and more thorough disaggregation to fully understand the diversity present in the Asian population.

Keywords: Asian health ■ social media ■ Internet ■ Asian subgroups ■ data disaggregation

As our lives become more intertwined with the digital landscape, an increasing number of individuals are relying on the internet and social media as their main sources of health information. Previously, people would turn to more traditional forms of media, such as television or newspaper articles; however, according to a 2020 Pew Research Center survey, 86% of US adults receive their news from a smartphone, computer, or tablet. The same study also found that 53% of survey respondents get their news from social media specifically.¹ As this trend emphasizes the growing shift away from traditional forms of media, it is important to look into both the ways social media can be utilized to disseminate pertinent health

literature and how to effectively target specific demographics. With this, it is necessary to address that although social media can be a beneficial tool to disseminate health information to the public, it is also susceptible to spreading health misinformation.² For example, in 2021 the Associated Press reported on false claims circulating on social media that Stanford University had come out with a study that showed face masks are both ineffective in containing the spread of COVID-19 and related to negative health effects.³ Even after the claims were debunked by numerous agencies and Stanford Medicine itself had denounced any current affiliation with the author of the paper, the study continued to circulate on social media.⁴⁻⁹

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POPULAR SCIENTIFIC SUMMARY

- The popularity of social media has increased drastically over time - it is a powerful tool that can be utilized to effectively disseminate health-related content to individuals from diverse demographics by outreaching to and engaging with target audiences. However, there is currently a gap in knowledge on how the Asian community interacts with health information available on the internet via social media.
- This 10-week social media intervention aimed to increase the proportion of Asian participants in the Stanford Research Registry in order for the registry to better reflect the percentage of Asian individuals living in the Bay Area.
- After the intervention, the proportion of Asian participants in the Stanford Research Registry increased from 14.3% to 23.8%. Participant data was disaggregated by race and ethnicity to better understand the diversity across Asian subgroups.
- Ensuring that research registry demographics are representative of the diverse general population is crucial, as racial and ethnic health disparities impact health outcomes. The present lack of diversity in clinical trial enrollment is especially concerning, since the evidence from clinical trials informs guidelines and confirms the safety, efficacy, and effectiveness of treatment recommendations.

Currently, there is a dearth of knowledge on how the Asian community interacts with digital health information, specifically in the context of social media. According to US Census data, the Asian population in the United States between 2000 and 2019 has nearly doubled.¹⁰ The six largest ethnic groups that make up the Asian population in decreasing order include Chinese (23%), Indian (20%), Filipino (18%), Vietnamese (9%), Korean (8%), and Japanese (6%). Although these are the six largest subpopulations, it is crucial to recognize that the term Asian encapsulates over 30 different nationalities and ethnic groups in the United States.¹¹ Within this diverse group, disproportionate burdens of health and other disparities can be seen.

Through this study, we hope to better understand how Facebook, Instagram, and Twitter can be used as channels of communication to target Asian subpopulations to effectively disseminate the relevant health content through current social media utilization strategies.

Defining social media

The term social media has evolved in the past few years – it was first used in 1994 by Darrell Berry to describe

social environments that emerge from real and virtual spaces and has now expanded to include blogs, forums, photo/video sharing platforms, gaming, virtual reality, and more.¹² In academia, there is no agreed-upon definition for social media. For the scope of this study, we will be referencing the definition proposed by Joseph Bayer, Penny Trieu, and Nicole Ellison, which states that social media is 'computer-mediated communication channels that allow users to engage in social interaction with broad and narrow audiences in real time or asynchronously'.¹³ This definition succinctly encapsulates the nature of popular platforms in the Asian community, such as Facebook, Twitter, YouTube and Instagram. As mentioned earlier, the popularity of social media has increased over time – from 2005 to 2014, the proportion of US adults who were using social media exponentially increased from 8% to 72%.¹⁴

Social media in relation to health information

As the field of social media and health research is relatively new and continuously changing, there are still many gaps in the literature with regards to the long-term effects of using social media for health communication. However, there have been a handful of studies that have discussed the more immediate impact of social media on health communication. For example, we have seen how social media can be utilized in interventions to positively affect behavior change due to its unique characteristics. In a randomized controlled trial, Zhang et al. showed how social media can be used to increase physical activity through both supportive and competitive relationships between participants.¹⁵ Such characteristics include the ability to enter spaces anonymously and ease of access to technology currently owned devices.¹⁶ Anonymity in the health content field can be both a positive and negative aspect. It can allow for individuals to engage with stigmatized content, such as LGBTQ+ health and mental health; however, it also allows individuals who want to generate false information to evade accountability.¹⁷

In addition to interventions, social media can function as a support space for individuals to explore on their own. Users can find communities through forums, hashtags, and other accounts. In these spaces, they can passively view health resources, actively post their own experiences, or engage with both healthcare professionals or laypeople depending on the audience or who is in the community. Through these interactions, even those on the peer-to-peer level, we have seen how patients with mental illnesses have gained a feeling of belonging and insight into handling their own condition.¹⁸

At the organizational level, prominent entities such as the World Health Organization and the Centers for

Disease Control and Prevention have used social media to release information instantaneously.¹⁹ Especially now with the ongoing pandemic, urgent reports and updates about the situation are constantly being sent out – utilizing social media platforms and engaging their audiences to share credible information to their networks can increase the public's exposure to scientifically correct information and help slow down the spread of the virus. The WHO surveyed Gen Z (those born between 1997 and 2015) and Millennials (those born between 1981 and 1996) regarding their interaction with the COVID-19-related content on social media, and 43.9% stated that they would share scientific content to their profiles.²⁰ This initial sharing allows their networks to perceive the post and can potentially start a chain of sharing and engagement to further broaden the audience of the post. It is necessary to note that there is a considerable difference between generations and the sources they use to access health information. In a 2019 article, Oedekoven et al. finds that the expected frequency of individuals stating general practitioners or the internet as an information source differs between ages. Figure 1 in this study plots age against the expected frequency of common sources of health information. Expected frequency was graphed using adjusted age trend models based on the survey answers of 4,144 respondents. The sources included in these models are general practitioners, pharmacists, specialists, and the internet. While the proportion of respondents that cited general practitioners are always above the other three choices and has a slight increase as age increases, up until the age of 50 the proportion of respondents that selected the internet as a source is well above the other two. Slightly past the age of 50, however, the expected frequency decreases and is below the proportions for pharmacists and specialists. From this graph, we can

conclude that the younger someone is, the more likely they are to reference the internet as a source for health information.²¹

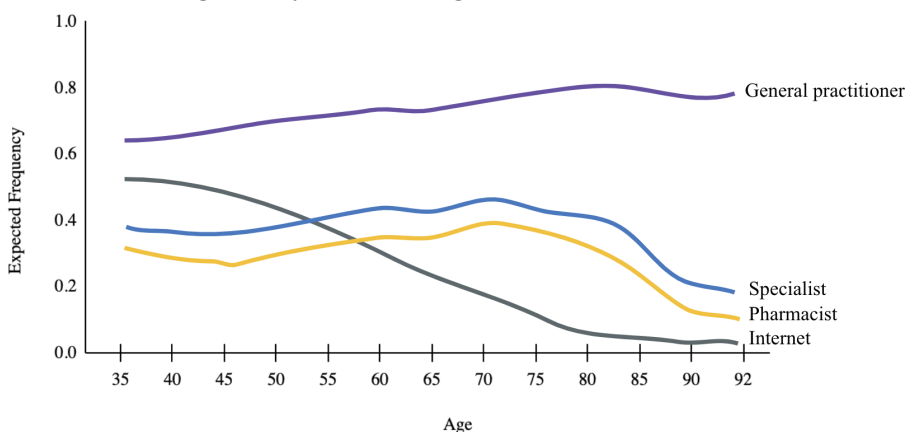
In addition to patients using social media to consume and share health information, healthcare practitioners have been utilizing social media as a tool to share information, provide insight into health policies, promote health behaviors, and interact with the public and other professionals.¹⁴ Along with these practices, healthcare professionals can also gain a sense of community, participate in professional networking, stay up to date and discuss the latest literature, and increase personal awareness through having a presence of social media (Figure 2).

Credibility of information on social media

As mentioned earlier, the internet allows for greater access to health literature and can open communication between patients and healthcare professionals; however, online content and interactions are susceptible to false information and can perpetuate falsehoods if left unchecked.²² This false content adds to what the World Health Organization calls an 'infodemic', which is when there is an abundance of (false) information that can cause individuals to partake in potentially harmful risk-taking behaviors and mass confusion. This is partially due to the fact that with the sheer number of health-related content being posted on the internet, the amount of false information is also likely to increase.²³

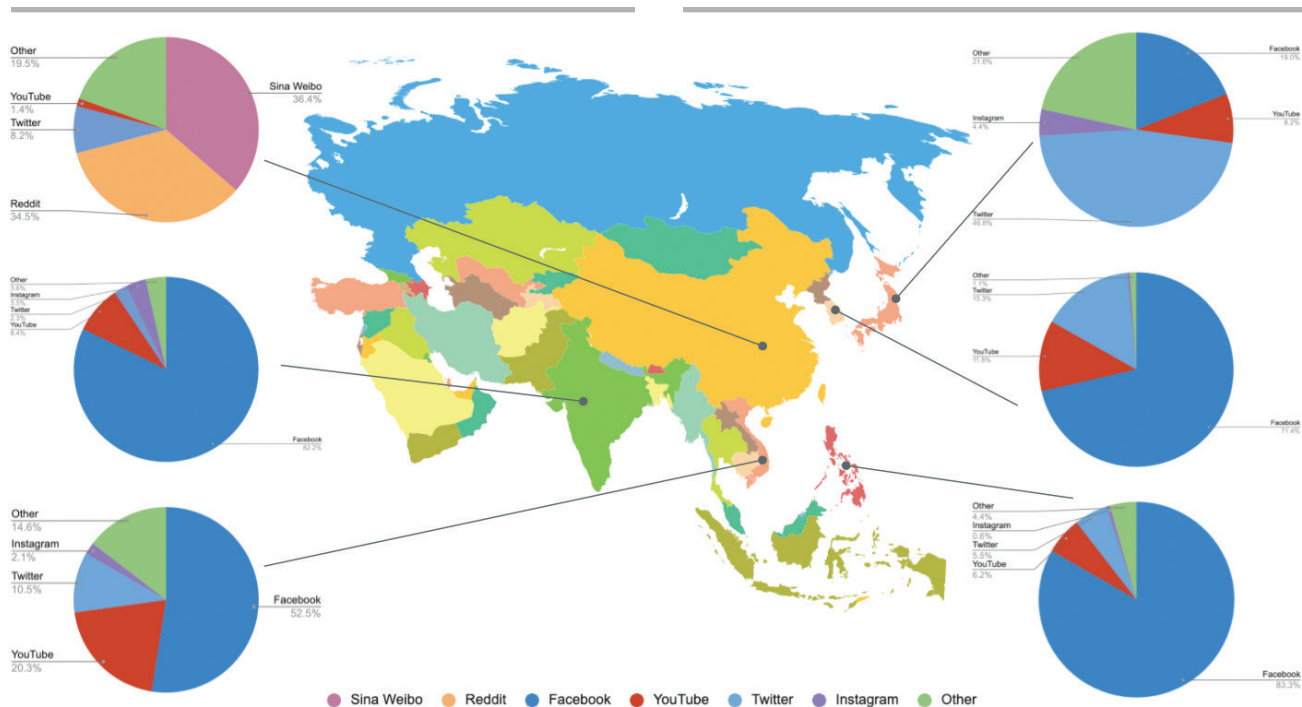
There are three general types of false information: misinformation, disinformation, and malinformation.²⁴ The definitions of these terms are constantly being refined; however, according to Baines and Elliott's framework, information, misinformation, disinformation, and malinformation can be defined in the following ways:

Expected frequency for the most common sources based on adjusted models and average survey scores vs. Age



Source: Adapted from Oedekoven et al.²¹

Figure 1. Expected frequency of common sources of health information versus age.



Adapted from ©julydfg via Canva.com.²⁶ Pie-chart data from StatCounter.²⁷

Figure 2. Social media market share by Asian country.

- Information – if there is no intention to deceive and the proposition is ‘truth equivalent’ to the message, then the content is considered to be information.
- Misinformation – if there is no intention to deceive, but the proposition is not truth equivalent to the message, then the content is considered to be misinformation.
- Disinformation – if there is intention to deceive and the proposition is not truth equivalent to the message, then the content is considered to be disinformation.
- Malinformation – if there is intention to deceive and the proposition is truth equivalent to the message, then the content is considered to be malinformation.

Defining and addressing forms of false information depend on not only the content but the intention behind the message as well. The frequency of misinformation, disinformation, and malinformation has increased during the COVID-19 pandemic era. As the pandemic and infodemic are still occurring, how this type of content manifests is still evolving.

Asian populations and social media

Within the Asian population, social media usage can differ between ethnic subgroups. Looking at the available data relating to the six Asian subgroups denoted by the 2010 US Census, we see that Facebook and YouTube seem to have the largest engagement across the various subgroups.²⁵ In addition, localized message-based applications, such as WeChat, LINE, and Kakao Talk,

Table 1. Count of the Asian population in California broken down by ethnicity.

Asian makeup of California population		
Ethnicity	Count	Percentage
Asian alone	5,556,592	14.9 (from total population)
Chinese	1,451,537	26.12
Filipino	1,575,707	28.36
Indian	590,445	10.63
Japanese	428,014	7.70
Korean	505,225	9.09
Vietnamese	647,589	11.65
Other Asian	459,075	8.26

have sizable user bases in and out of the United States – Supplementary Table 1 provides an overview of which social media platforms are most popular among Asian populations. There are currently very limited data specific to the Asian American population, and so a majority of the sources for this table draw from populations outside of the United States as well.

Overall, there is overlap in which platforms are popular among Asian subgroups, except in the Chinese population. This is because the mainland Chinese government has enacted heavy censorship of foreign internet companies, including Google, YouTube, Facebook, etc. This regulation effort has been known as the ‘Great Firewall’ and has directed traffic to Chinese companies like Tencent and Sina Corp.²⁸

Besides China, other Asian countries have localized platforms that are also popular in their respective populations. For example, Kakao Talk and LINE are message-based applications (similar to WeChat) that are popular in Korea and Japan, respectively. Although these services – in addition to WhatsApp which is popular in India and a handful of Southeast Asian countries – are message based, they play an equally important role in the information dissemination social media ecosystem.

METHODS

Preliminary data

In March 2021, the Stanford Center for Asian Health Research and Education (CARE) partnered with the Stanford Medicine Research Registry to increase the number of Asian volunteers. As of March 25, 2021, the registry had a total of 525 Asian participants. At the time, the registry survey did not include disaggregated data on Asian subgroups – after partnering with CARE the survey was updated to match the US Census's race and ethnicity classification section, which allows us to gain a better understanding of which groups are being represented in the registry.^{29,30}

After the survey was updated, Stanford CARE then began to promote the registry through their social media channels, mailing lists, and other outreach methods. From March 25, 2021 to May 24, 2021, this first push is labeled as the 'General Outreach' phase.

After this general push to increase the number of Asian research volunteers, we wanted to utilize social media to target specific ethnicities in order for the numbers in the registry to reflect the general population percentages based on the 2010 Census data (provided in Table 1).^{31,32} Specifically, this would mean tailoring future outreach to Japanese, Vietnamese, and Korean audiences in order to increase sign-ups from those communities. While the table describes the Asian population in relation to all of California, it is also important to recognize that the population of Santa Clara county, where Stanford University is located in, is estimated to be approximately 38.9% Asian.³³

The protocol for the Stanford Medicine Research Registry (Protocol 25422) was approved by the Stanford University Institutional Review Board. Because this social media study did not use identifiable private information, it does not fall under the umbrella of human subject research. Thus, IRB approval was not required for the study.

Design

From June 1, 2021 to August 10, 2021, a 10-week campaign to promote the Stanford Research Registry REDCap survey through the Stanford Center for Asian Health and Research's social media accounts was implemented. The campaign utilized three different

social media channels: Facebook, Instagram, and Twitter. Graphics and text posts were created to promote the link to the Stanford Research Registry for the first 9 weeks – these posts were uploaded to social media following the schedule described in the supplementary materials.

The first 3 weeks focused on Facebook, the second 3 weeks focused on Instagram, and the final 3 weeks focused on Twitter. There were four posts a week – Tuesdays featured a basic text post with the registry link, Thursdays had a generic graphic that read 'Stanford Research Registry', and Saturdays and Mondays featured graphics that emphasized the importance of diversity, representation, and community in research. The following day after each post, the post would be uploaded to the account's story/fleet for 24 h. This was done for all organic posts, except on August 3 when Twitter removed the fleet option from its platform. The content was posted in the evenings at approximately 8PM CT.

For the final week of the campaign, a paid video ad was implemented to understand how paid outreach compares with organic outreach. The video was an animated version of Graphic #3 and was 30 sec long. The text in the video and in the post body was edited to follow Facebook's advertising guidelines. The target audience traits selected can be found in Supplementary Table 3. The week of paid outreach was done via Facebook Ads Manager. The ad was set to run in the 30 mile radius around Stanford University. This radius includes major cities, such as San Jose, San Francisco, and Oakland. In 2020, Facebook decided to no longer allow advertisers to select specific races and ethnicities to target through the 'Multicultural Affinity' tags due to discrimination concerns.³⁴ Instead, advertisers have used user interests as a proxy. In addition to interests such as 'Asia' and 'Asian Pacific American', this ad campaign selected 'Lived in Japan', 'Lived in Philippines', 'Lived in South Korea', and 'Lived in Vietnam' due to the fact that these populations have low representation in the Stanford Research Registry.

With each post, hashtags were also utilized. The 11 hashtags listed in the supplemental materials were used on all Facebook and Instagram posts. Because Twitter posts have a character limit, limited hashtags were used. In addition, throughout the duration of the Facebook phase of the campaign, once a week one of the posted graphics was shared to various Facebook groups and pages. The group member and follower count were added together to calculate the total potential outreach of the posts (see Supplementary Table 5).

Because the goal of this campaign is to raise the number of Asian registrants in the research registry, a majority of the selected hashtags and Facebook groups were all related to Asian identity and/or health care. Hashtags are short phrases or acronyms preceded by the pound symbol.³⁵ They operate as a classification system

and are used by social media users to find niche topics of interest, brand content, and consolidated posts.³⁶ Because of this, hashtags such as #aapi and #medicine were used to tag that the posts made about the research registry related to these topics.

Measures

The effectiveness of this campaign was measured through the number of Asian participant registrations through the Stanford Research Registry. An initial baseline count was taken on May 24, 2021. Throughout the intervention, we received updates on the data on June 6, 2021, July 13, 2021, and August 3, 2021 (at the end of each social media platform's 'phase' of the campaign).

The Stanford Research Registry asks basic demographic questions, including the race and ethnicity of the participant. A side-by-side comparison between the REDcap Survey and Question 9 of the 2020 US Census, which the Stanford Research Registry race portion is modeled after, can be found in Supplementary Fig. 1.^{29,37} The options for Asian ethnicities that are listed include Asian Indian, Japanese, Chinese, Korean, Filipino, Vietnamese, and Other Asian. Participants can select multiple races/ethnicities and can fill what they identify as in the 'Other' option if it is not represented in the choices above.

Throughout the campaign, registrants were categorized into the following groups: Indian, Japanese, Chinese, Korean, Filipino, Vietnamese, Other Asian + Other, Multi-Ethnic (Asian), Multi-Racial (Asian). The 'Multi-Ethnic (Asian)' category included participants who selected multiple Asian ethnicities and the 'Multi-Racial (Asian)' category included those who selected multiple races/ethnicities with at least one of the selections falling into the Asian category.

RESULTS

From March to August 2021, the number of Asian participants enrolled in the Stanford Research Registry increased from 14.3 to 23.8% (525 to 1,871 Asian identifying individuals). Figure 3 visually showcases the increase over the outreach phases. The greatest increase occurred during the 'General Outreach' phase where multiple outreach mediums were used at once. During the initial 'General Outreach' phase, the total number of Asian volunteers saw a 230.29% increase (525 to 1,734 participants). A table detailing the ethnic breakdown of the Asian research participants during this phase can be found in the supplementary materials (Supplementary Table 6).

Table 2 showcases the number of Asian Stanford Research Registry participants over the course of the outreach phases disaggregated by ethnicity. During this timeframe, all ethnic categories saw an increase. The percentage increase during the Facebook Only, Instagram Only, and Twitter Only organic posting phases were 2.42, 1.80, and 2.43%, respectively. Each of these phases were 3 weeks long. The percentage increase over the 1 week of paid advertising through Facebook was 1.03%.

By the end of the outreach campaign, the number of individuals who identified as either Japanese (26), Korean (34), or Vietnamese (19) compared with the number of times Japanese (110), Korean (99), and/or Vietnamese (74) were selected in the Multi-Ethnic and Multi-Racial categories combined was greater.

DISCUSSION

The purpose of this study was to better understand how different channels of social media can be used to target various Asian subpopulations to increase representation in the Stanford Research Registry. Comparing the

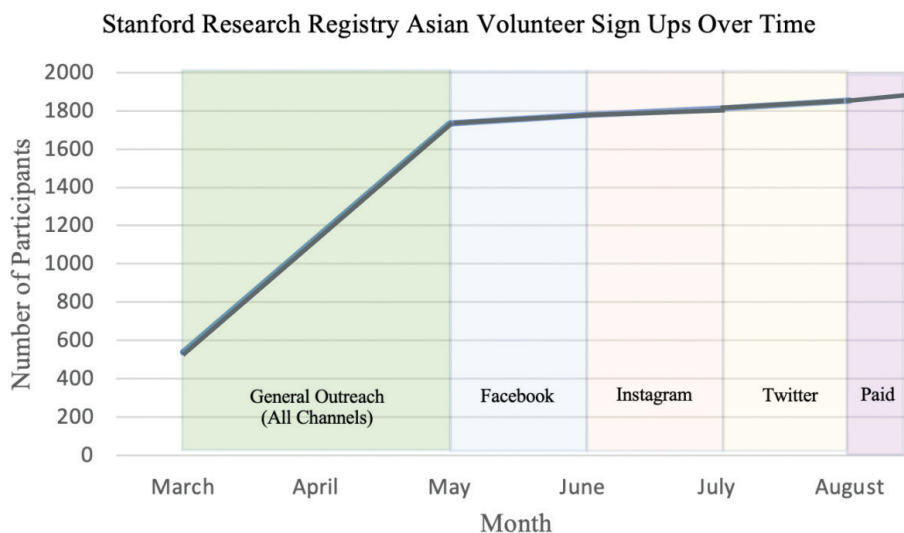


Figure 3. Graph of the number of Asian individuals enrolled in the Stanford Research Registry over time.

Table 2. Number of Asian participants in the Stanford Research Registry (broken down by ethnic group) throughout the 10-week intervention.

Asian Research Registry Participant Count Over Time						
Ethnicity	3/25/2021	5/24/2021	6/22/2021	7/13/2021	8/3/2021	8/11/2021
Indian	140	347	354	365	372	376
Japanese	0	19	20	22	24	26
Chinese	192	385	390	396	402	405
Korean	0	31	32	32	33	34
Filipino	95	134	137	139	141	142
Vietnamese	0	17	17	18	19	19
Other Asian	2	34	37	38	38	38
Multi-ethnic (Asian)	8	120	124	129	133	134
Multi-racial (Asian)	88	647	665	670	690	697
Total	525	1,734	1,776	1,808	1,852	1,871

baseline numbers with the final number of registry volunteers, we found that there was a sizable increase from 525 participants to 1,871 by the end of the social media campaign. Between the phases, the registry saw the largest net increase in Asian participants during the General Outreach phase.

Participants were counted as Asian if they self-identified as Asian on the registration survey by selecting at least one of the following choices; Indian, Japanese, Chinese, Korean, Filipino, Vietnamese, Other Asian, or by selecting the Other racial category and writing in an Asian ethnicity in the fill-in text box. Individuals who selected other and wrote in that they were 'multi-racial' or 'mixed' or 'bi-racial' were not included in the count due to the fact that Asian identity was not explicitly indicated. Individuals who selected only one of the Asian ethnicities were counted for their respective ethnic category. Those who selected multiple Asian ethnicities and no other racial categories were filtered into the Multi-Ethnic (Asian) group, while those who selected any of the Asian ethnicities in addition to one or more of the other racial groups were categorized into the Multi-Racial (Asian) group. In the results, we see that the individuals in the Multi-Ethnic and Multi-Racial groups make up a large percentage of research registrants. Why this is the case can be attributed to multiple reasons including immigration trends, a shift in the way Americans understand their own identity, and the growing diversification of Americans.³⁸⁻⁴⁰ However, compared with data from 2019 which states that multiracial, non-Hispanic Asians made up only 14% of the US Asian population, multiracial Asians are currently overrepresented in the research registry.⁴¹ This could be due to a few possibilities: difference in willingness to participate in research, variation in English proficiency between races and ethnicities, or that users who were exposed to the content happen to belong to multiracial/multi-ethnic backgrounds.^{42,43}

To better understand which ethnicities were represented in the Multi-Ethnic and Multi-Racial groups,

those categories were also disaggregated. Overall, the data for the Multi-Ethnic and Multi-Racial groups were sorted into the six Census-based subgroups and an Other Asian & N/A category. The Multi-Racial data table also includes rows for non-Asian races. The Other Asian & N/A category includes not only those who selected the Other Asian category and specified an ethnicity (e.g. 'Taiwanese' or 'Thai') but also those who either were not specific enough in their write-in answer (e.g. 'Southeast Asian' or 'Central Asian') or left the write-in option blank. Rather than sorting each individual by creating rows for every combination of races and ethnicities, these two tables show the frequency that each race/ethnicity was selected or written in during the survey. Write-in answers were reviewed to ensure that their written answers reflected the selected races and ethnicities – if there was conflict (e.g. not selecting the White and Chinese boxes and instead only writing in '50% Chinese 50% White' in the fill-in portion), the numbers would be adjusted to reflect the specified identity. Looking at the results, some ethnicities in the Multi-Ethnic and Multi-Racial tables have higher frequencies than their corresponding monoethnic group, such as the Japanese, Korean, and Vietnamese groups. In the future, breaking down the data even further by disaggregating the Other Asian identity would also be of interest as such analysis could offer insights into the trends among other Asian subgroups outside of the six explicitly outlined by the US Census.

This intervention used the social media accounts of the Stanford CARE – the Facebook, Instagram, and Twitter pages of Stanford CARE all had less than 100 followers at the beginning of each of the phases. If this experiment were to be replicated by different profiles, the reach and engagement of each of the posts would likely differ from these findings, due to the fact that they would be influenced by the number of followers the profile has.⁴⁴ Because of the numerous factors that go into reach and engagement (such as follower count, relevance of content to profile, and level of active engagement from

the audience), the exact impact of such a campaign is difficult to predict precisely from profile to profile. Even over the past few months, the CARE social media accounts have been seeing a change in follower count – for example, the Twitter account has tripled its follower count, thus affecting its projected reach. In addition, because social media is changing in real time, the groups and hashtags utilized in this study may not have the same impact at a future point in time.⁴⁵ This can be considered a limitation of the study as the generalizability is affected by these factors.

It is also important to note that during the same time this campaign was implemented, other content was being shared to the CARE accounts as well. These posts also affect the social media metrics – for instance, in July the Faces behind CARE series was published to CARE social media accounts and did especially well on Instagram. This contributed to an increase in reach and impression seen after the Instagram phase of the Research Registry campaign. In addition, with each phase, the previous phase's content is still available on the platforms, which means the total exposure time of each post from phase to phase is different.

Another limitation of this study was that outreach response was often dependent on other users. What this means exactly is that although the account could control when and what the actual post said on the Stanford CARE page, when posting the content to other pages, groups, and accounts as outreach, sometimes gatekeepers such as moderators would delay the actual posting time or reject the post from being sent altogether. As a result, the exact impact correlated to each phase is hard to define as interference between social media platforms exists. The restrictions and privacy settings of the groups also influenced whether the CARE page itself or a personal account was allowed to post to the group. Many groups did not allow business pages to join according to their rules, and so a personal Facebook account was used; this likely deflated page engagement numbers compared with if the CARE page itself was allowed to directly post to the group.

The content and engagement related to this campaign were generated through both organic and paid means. Organic content is content that was not paid to be promoted.⁴⁶ Although the content itself can be similar, the audience of organic and paid posts differ – organic audiences are more likely to be familiar with the account and its content, while paid posts tend to target new audiences and convert them into new followers.⁴⁷ Both forms can be useful for research recruitment – in the past, many studies have used traditional forms of recruitment, such as printed flyers, newspaper ads, tabling at events, cold-calling, and radio/television advertisements; however, social media can be a more targeted and cost-effective method for study recruitment.⁴⁸ In a review of 30 studies, 12 studies

found that social media was the most effective recruitment method, while three studies found that it was equally as effective as other methods.⁴⁹ When discussing the results for this campaign, it is important to recognize that the Paid Outreach phase only lasted 1 week, compared with the other phases. At a first glance, the percent increase of Asian participants during this phase seems slightly lower than other phases, but taking into account that it was one-third of the time of the organic Facebook, Instagram, and Twitter phases, if we triple the number to estimate what the impact of what a 3-week long paid campaign could have resulted in, the performance is projected to be above the other three social media phases. Although this campaign only used attribute-based targeting through Facebook's internal ad tools to publish content during the paid outreach week, there are multiple advertising options that effectively target audiences. The effectiveness and cost of these options vary based on the ad goals and metrics selected, but two other Facebook advertising methods include personally identifiable information (PII)-based targeting and look-alike audience targeting.⁵⁰ These methods utilize information that allows advertisers to directly specify their audience through personal data, including emails, phone numbers, postal codes, IP addresses, and external website interaction tracking.^{51–53} Despite concerns on the platform user end of consumer data collection, this plethora of data allows advertisers to highly tailor their advertisements and audiences to increase engagement. In the future, utilizing these tools to scale and precisely reach relevant audiences could amplify engagement and enrollment results. In addition to considering these advanced audience targeting methods, looking into device targeting would be meaningful, especially since the type of device used to view the post may affect how the audience interacts with the content due to differences in user intent, format, attention span, etc.^{54–57}

In this intervention, we saw that the 'General Outreach' phase had the largest percent increase compared with the other phases. There are multiple possibilities why this was the case, including the timing of the phase, the fact that it was the first time that the Stanford Research Registry-related content was shared to the audience by CARE, and other outside events and campaigning could have also had an effect. It is also notable that during the General Outreach phase, Asian American and Pacific Islander Heritage Month was taking place. This could have impacted the type of content seen on the feeds of users (it is possible that more Asian American Pacific Islander content was highlighted during this time), which may have influenced social media users' behavior to click the link and sign up. Also, during this first phase, it was the first time the audience saw this content from the CARE account. Individuals who are currently already engaging with CARE's content are likely to be interested in the Stanford

Research Registry as it aligns with their interests. On a similar note, after this initial posting, it is possible that engagement was lower later as the posting schedule continued due to the repetition of content. Something else of importance is what various outside events and news were also occurring at this time that could have impacted registration rates. Notably, in the month of May, Stanford Medicine began enrolling children under 12 years in the nationwide Pfizer COVID-19 vaccine trial, which caused registration numbers to increase overall.⁵⁸

Reflecting on this campaign, we can see how social media channels can be used to highlight and recruit healthcare and research efforts. However, it is also important to understand that when targeting a specific demographic, it is necessary to select the social media platform(s) that will engage the target audience effectively. As mentioned earlier, various social media platforms are popular with different Asian populations. In the future, utilizing social media platforms (WeChat, KakaoTalk, etc.) to better target Asian populations would be recommended.

Through this campaign and our study results, we were able to gain insight into how social media can be leveraged as a powerful tool for recruitment to target populations of interest. Understanding how to effectively target and reach an audience through online methods can have an impact on research recruitment as well; these outreach methods can be used to not only increase the overall numbers of participants enrolled in clinical trials but also increase participant diversity.^{59–62} This application especially pertinent, as there is still a lack of diversity in clinical trial enrollment.⁶³ A lack of proper representation among clinical trial participants is concerning, as the results from clinical trials shape guidelines and recommendations, thus influencing patient health outcomes.⁶⁴ In this case, we looked specifically at the Asian population to diversify the Stanford Research Registry and were able to increase Asian representation in the Stanford Research Registry from 14.26 to 23.83% during this campaign. While this number is yet to reach the 38.9% Asian population of Santa Clara county, it is a step toward properly reflecting the demographic make-up of the Bay Area. It is important to note that the generalizability of these findings depends on various social media factors that are constantly changing. However, this work offers a novel comparison and a possibly more cost-effective and targeted method for research recruitment, which, in turn, can positively impact health outcomes through clinical trial enrollment and precision public health.

ARTICLE INFORMATION

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