Behavioral Science in Practice: Helping Local Governments Navigate COVID-19 through Multidisciplinary Collaboration

CENTER FOR ADVANCED HINDSIGHT

Duke UNIVERSITY

NC STATE UNIVERSITY

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Cabarrus | Catawba | Gaston | Haywood | Union

The Center for Advanced Hindsight at Duke University has partnered with the NC State College of Design, Lenoir-Rhyne University, and five North Carolina counties to form a multidisciplinary collaboration using behavioral science and design to improve county COVID-19 responses.

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Cabarrus | **Catawba** | **Gaston** | **Haywood** | **Union**

Executive Summary

In this report, we discuss our six-month project to help North Carolina counties improve their COVID-19 response. We show the power of an interdisciplinary approach at the intersection of behavioral science, human-centered design, and local government. COVID-19 has touched every part of our lives and we should not be expected to tackle it alone, or in predefined silos.

In Section I, we briefly review the rationale for launching this effort and summarize the dynamic structure of the project. This initiative was both unique and experimental in its collaborative nature–we hope that this structure lays the groundwork for future interdisciplinary undertakings to tackle broad, complex problems.

With Section II, we discuss the exploratory work that took place during the project. While a constant throughout, the majority of exploration took place in the first few months (in the form of literature reviews and qualitative interviews with county and community stakeholders) and was used to inform the general direction of our project.

In Section III, we provide the detailed rationales, methods, results, and implications of several studies conducted by our team. Here, we list several major takeaways:

Groups for Increased Focus

COVID-19 vaccine hesitancy is stronger among younger and more conservative people, as well as women and people of color. Social distancing and mask compliance are worse among those who live in rural areas, are more religious, are less educated, or are Republican.

Effective Messages

Regarding COVID-19 vaccination, consider clarifying the safety testing of the vaccine process. Messages should be tailored to specific populations, with particular attention to age, political ideology, religiousness, gender, and race/ethnicity. Just as much attention should be paid to building trust in the vaccine development process as building trust in the vaccine itself.

Social pressure and, in some cases, immediate action planning messaging is most effective for respondents who are Republican, live in rural areas, are more religious, and less educated.

People are much less likely to see themselves as being at risk of severe outcomes relative to others. Furthermore, they report being more willing to engage in both mask-wearing and social distancing for the sake of other people, rather than for their own sakes. As such, illustrative ads focused on the protection of oneself, one's loved ones, and one's community are more persuasive than ads focused on any of the three in isolation. Appeals to altruism may encourage CDC recommended behaviors and reduce vaccine hesitancy.

Effective Messengers

Regarding mask compliance and social distancing, individuals (regardless of party affiliation or residence) reported trusting their own doctor and local health experts the most. People living in rural areas, who are more religious, and who are less educated show less trust overall, and especially in sources such as Dr. Fauci or governmental health organizations that may be seen as partisan.

Regarding COVID-19 vaccination intentions, people generally listen to health experts and personal physicians, but Republicans trust most messengers less than non-Republicans, except for religious leaders and the President (at the time of the study, Donald J. Trump).

Local voices have the potential to be uniquely persuasive in encouraging vaccination and it is likely worth the investment for communities to create hyper-local media with an emphasis on personal motivations and storytelling.

Flu Vaccination

Roughly one-fifth of people endorse the myth that the flu shot can give you the flu. A wide array of messaging interventions work equally well, but messages that are too emotional and/or dramatic may backfire!

COVID-19 Vaccination

Safety concerns about the COVID-19 appear to derive not from the speed of the vaccine's creation itself, but fear that speed made it difficult to properly test the vaccine. Assuring people that the vaccine was thoroughly tested in a safe and apolitical process may be helpful to address hesitancy going forward.

Misinformation

Exposing individuals to misinformation strategies (e.g. emotional storytelling, fake expertise, the naturalistic fallacy, and conspiracy theorizing) can improve peoples' ability to detect and reject such techniques online.

With Section IV, we highlight a collection of guides and handouts informed by our exploratory and experimental research. Our goal here was to equip counties with the tools, strategies, and methods necessary for achieving sustainable behavior change—not only for the duration of this six-month engagement as it pertained to COVID-19 behaviors, but for continued efforts moving forward.

In Section V, we review several advertising and promotional items that were developed to provide immediate impact with regards to holiday gatherings and COVID-19 vaccination. Most notable are a Ways to Celebrate platform for holiday gathering and a collection of vaccine-focused videos.

With Section VI, we reflect on the challenges encountered throughout the project–from the rapidly changing COVID-19 environment to the novelty of this collaborative structure. In summarizing what we learned along the way, we built the foundation to conduct future

collaborative efforts that might not be constrained by the emergency status and broadness of the current project. We also discuss potential next steps and future directions to extend our work.

Most of the research we report on was conducted between August 2020 and February 2021 with some research still ongoing. The research was funded by and conducted in collaboration with the following North Carolina counties: Cabarrus County, Catawba County, Gaston County, Haywood County, and Union County. Additional funding was received from the University of North Carolina primarily for the COVID-19 vaccination promotional items.

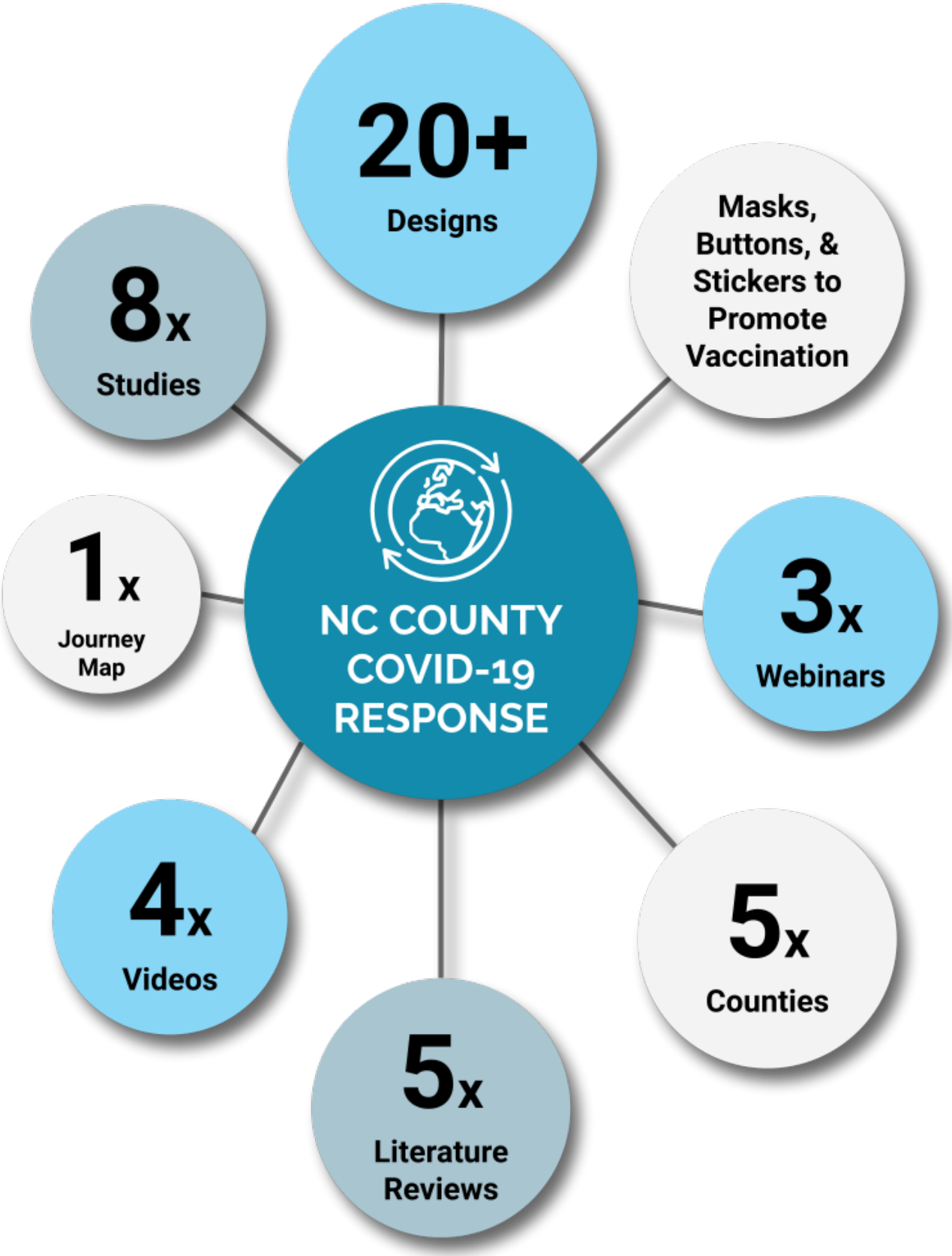
What We Heard from the Counties:

"Working with a group of individuals with expertise in behavior and the reasons why people make decisions is extremely valuable, as it gives us insights we can use to encourage people to get the COVID-19 vaccine now, and repurpose those tools later for other projects."
– Catawba County Representative

"Working with Center for Advanced Hindsight, NC State and other counties across North Carolina was an enriching experience and gave us an opportunity to look at the issues surrounding COVID-19 and vaccination from multiple lenses, ultimately making our response to the pandemic so much stronger."
– Catawba County Representative

"Gaston County has benefited greatly from its inclusion in the CAH COVID Counties project. We have learned and shared best practices with our peer Counties, benefited from the expertise of Duke and NC State Universities, and shared that learned experience to help shape Gaston County's communication and response to a serious and life-altering public health crisis. We would like to publicly thank our peer counties and the project leaders from the CAH COVID team as you all have helped make the residents of Gaston County more safe and be able to make informed decisions."
– Justin Amos, Budget and Evaluation Manager, Gaston County

"This collaboration was incredibly useful, from the research provided in the literature reviews, to the work done to survey NC residents to help in shaping our messaging. The Duke and NC State teams were flexible and responsive to meet the needs of the counties in this project as needs and timelines were seemingly ever evolving. Our staff learned a lot from working with their teams and we were very appreciative of their dedication and outside-the-box thinking."
– Adam Gaub, Public Information Officer, Gaston County


20+
Designs
Masks, Buttons, & Stickers to Promote Vaccination
8x
Studies
1x
Journey Map
NC COUNTY COVID-19 RESPONSE
3x
Webinars
4x
Videos
5x
Counties
5x
Literature Reviews

I. The Structure

On May 14, the World Health Organization published the following message: "Behavioural insights are valuable to inform the planning of appropriate pandemic response measures."[1] With that in mind, and knowing that much of the available funding in the United States is reserved for cities, the Center for Advanced Hindsight (CAH) proposed forming a working group of various counties across North Carolina to provide policy briefs, webinars, lab testing, and field testing with regards to public COVID-19 response efforts. The group would act as a forum to cross-pollinate effective strategies from region to region and to share materials, solutions, and evidence.

After several months of planning and organization, this collaborative project officially launched on August 27th with five participating counties—Cabarrus, Catawba, Gaston, Haywood, and Union—as well as significant support from the state of North Carolina. The cities of Concord and Kannapolis also joined in partnership with Cabarrus County. Each county formed a project team that spanned multiple departments including public health, communications, marketing, public information, and county manager's offices. Additionally, we partnered with the NC State College of Design to combine behavioral science and human-centered design in order to tackle applied problems centered around COVID-19 responses. With the inclusion of the CAH Government and CAH Health teams, as well as a researcher from Lenoir-Rhyne University, the project brought together more than 60 individuals working towards one common goal.

Each of these counties is unique, but they share many of the same challenges. With this collaboration, we hoped to avoid the duplication of effort that has slowed COVID-19 responses worldwide by learning from past approaches and sharing successful strategies. As a project team, we placed an emphasis on equipping counties with the tools, strategies, and methods necessary for achieving sustainable behavior change—not only for the duration of this six-month engagement, but for continued efforts moving forward. The COVID-19 pandemic is a public health crisis and the focus on technological advancements (e.g., vaccine development, contact tracing apps, etc.) is fully warranted. In addition to these advancements, however, we must also place a heavy emphasis on the fundamental understanding of the effectiveness of social and behavioral strategies.

The dynamic nature of the project structure allowed for flexibility and adjustments to be made as the counties' needs and requirements evolved. With that being said, the project structure can ultimately be summed up as follows:

[1] Kluge, H.H. (May 14, 2020). Behavioural insights are valuable to inform the planning of appropriate pandemic response measures. *WHO Europe*. Accessed July 21, 2020. https://www.euro.who.int/en/media-centre/sections/statements/2020/statement-behavioural-insights-are-valuable-to-inform-the-planning-of-appropriate-pandemic-response-measures.

Kickoff

Narrowed into three primary workstreams focused on addressing (i) Continued Distancing and Mask Compliance, (ii) Vaccine Adoption (regarding current flu vaccines and future COVID-19 vaccines), and (iii) Combating Misinformation.

Early Designs and Continued Exploration

As the workstreams continued exploratory work and intervention preparations, we produced a variety of guides and handouts for counties to use and learn from.

Workstream Pivot

We shifted our focus primarily to the Vaccine Adoption workstream in order to develop a practical package of information, guidance, and promotional items for counties to deploy as vaccination became increasingly available to the general public.

Sep. Oct. Nov. Dec. Jan. Feb.

Exploration and Early Work

Launched exploratory studies with county employees and residents, conducted literature reviews across workstreams, and ran the first of our many studies.

Vaccination Study and Holiday Designs

Launched the flu and COVID-19 vaccination study with county employees and residents, as well as produced a series of holiday safety videos and graphics.

Vaccination Promotional Items

The design, production, and distribution of COVID-19 vaccination promotional items (buttons, stickers, and masks) was the culmination of our research.

II. The Exploration

Our team's exploratory work included literature reviews, consistent open dialogue with county employees (in the form of surveys and weekly meetings), interviews, and a series of laboratory studies. Given the rapidly shifting environment surrounding COVID-19, this exploratory work started before the project even kicked off and continued throughout the entirety of the six months.

Literature Reviews

In total, we conducted five literature reviews. The first was a comprehensive literature review of key COVID-19 behaviors and interventions carried out during the first week of the project. This was not written up as a report, but rather, was used to develop the structure of this project, as well as to inform the subsequent literature reviews:

- The Psychology of Vaccination (open access)
- The Psychology of Misinformation (open access)
- Behavioral Science in Social Distancing and Mask Compliance
- Religion and Faith Leaders during COVID-19
- Behavioral Economics and the COVID-19 Vaccination

These literature reviews contain overviews of all relevant literature (both theoretical and empirical), key principles and factors, as well as general recommendations and/or suggested interventions. They were used primarily to inform our research throughout this project, as well as to educate county employees.

County Employees

County stakeholders were the single most valuable resource throughout our exploratory efforts. They discussed at length the challenges and successes they experienced in their county's COVID-19 response efforts, as well as provided critical feedback to all of our proposed studies and interventions.

County Stakeholder Surveys

In the first week of this project, we surveyed county employees to gain an understanding of past, present, and future COVID-19 navigation efforts from their perspective. Each of the five participating counties were represented, with respondents from multiple county departments including public health, communications, marketing, public information, and the county manager's office. The survey responses were used as a reference tool in the development, as well as the iterative adjusting, of the project structure.

A second survey was issued at the midpoint of the project to gauge the project's progress, as well as to inform adjustments in response to at-the-time impending vaccine rollout.

Workstream Sessions

Once the project structure was determined, we split up into three primary working groups: Masks & Distancing, Vaccination, and Misinformation. Our decision to focus on these three areas was based on county interest, feasibility, and relevance.These groups met bi-weekly to discuss developments and updates regarding their respective projects. While there was generally no overlap of county stakeholders from group to group, each workstream had representation from each participating county. Given all of the moving parts, this (along with consistent email updates and summaries) was the best way to ensure each county was up to date regarding all of the work that was being done.

Most importantly, these sessions allowed stakeholders to provide feedback in smaller group settings. Although these sessions were not intended to be a direct component of our exploratory work, they provided some of the most important insights.

County Conversations

Upon analyzing the responses to the first county employee survey, we held in-depth initial assessments with each county in order to ensure that we fully understood their priorities and expectations for this project. Given the novelty of the situation and the project structure, this communication was necessary to get us started in the right direction.

After focusing primarily on initial exploratory work and our three main workstreams for the first several months, we revisited county conversations and set up weekly cadences with each county. Each week, our project team met with key county stakeholders to address their most pressing questions and make sure that our work was in line with their ever-changing needs. These weekly cadences allowed all parties to stay on track and adapt to their current situations.

III. The Studies

While the approach we try to take is often centered around field experimentation - testing the ideas we have developed in real world contexts to (hopefully) demonstrate impact, given the timeline and urgent nature of this program, we instead opted to run studies that then informed the rollout of several campaigns, informed policy decisions or just generally informed our county partners. While we cannot be (experimentally) sure these latter activities had impact, we think and hope they did.

As such, what follows here are studies that have mostly been based on qualitative methods, surveys and laboratory experiments. When running qualitative research we sampled from contacts and networks the county partners provided, as well as networks of our own. For the surveys and laboratory experiments we recruited from online panels of participants (mostly through Amazon's Mechanical Turk, where participants were paid for participation) and by sharing through the county and our own networks. The participants were nearly all from North Carolina and we worked hard to try to ensure balanced samples wherever we could.

A Qualitative Exploration of Faith Groups

Rationale

After prioritizing the areas of risk for each county, the project team decided to pursue intervention opportunities within faith and religious communities around North Carolina.

Methods

First, we conducted a comprehensive literature review of religious participation during COVID-19. Afterwards, we conducted roughly 10 qualitative interviews with North Carolina faith leaders from the participating counties to better understand the barriers faced by congregations hoping to prevent further spread of the virus.

Results

Based on our interviews, we proposed the following recommendations for the integration of behavioral science into religious communities to promote safety during the ongoing pandemic:

- Emphasize safe substitutes for typical tradition, such as greeting someone.
- Create main modes of communicating safe practices (posters, flyers, vinyls, etc.) that relate directly to religious texts and scriptures.
- Break COVID-19 related messages down by religious sect. Allow for individual congregations to customize their own messages in ways compliant with safe behavior.
- Leverage holidays by creating themed messaging campaigns.
- Encourage faith leaders to publicize why it is important to engage in preventative behavior and how it betters the entire community.

Implications

Implementing such practices presented considerable upside by encouraging COVID-19 preventative behavior while preserving the traditional role of religion in a community.

Faith groups are organizations vital to many communities around the world and now face significant barriers due to COVID-19. The role religion plays is critical to many people–especially during hard times–but safe worship is imperative to mitigate the risk for congregation members. The use of behavioral science in addressing safety and compliance can provide significant insights helpful in promoting healthy worship among faith communities this holiday season and beyond.

You can see our full blog post here: Science and Faith: Behavioral Insights for Religious Communities during COVID-19.

SlowCOVIDNC App Advertising Study

Rationale

A study of influences on advertising the SlowCOVIDNC Exposure Notification App was undertaken between October 15 and November 20, 2020. The app was created by the North Carolina Department of Health and Human Services and publicly launched on September 21, 2020.

Building on prior research demonstrating the persuasiveness of appeals to altruistic motives, the study aimed to compare ads containing altruistic messaging (e.g., “protect your community”/ ”protect your loved ones”) to ads containing non-altruistic messaging (e.g., “protect yourself”). The study also aimed to compare more straightforward iconographic designs to more narrative illustrative designs.

Methods

Participants

695 participants representing 75 of North Carolina’s 100 counties were recruited online. 60% were women, 72% were white, and the average age was 37. Only 36% of participants were aware of the app and 15% of participants had already downloaded the app. Both awareness and number of downloads significantly increased over the course of study.

Study Design

Participants were randomly assigned to view one of nine banner ads for the SlowCOVIDNC Exposure Notification App. All nine banner ads are available in the Appendix (they were created in both English and Spanish). The control condition was the original state-designed banner ad present on the NCDHHS government webpage.

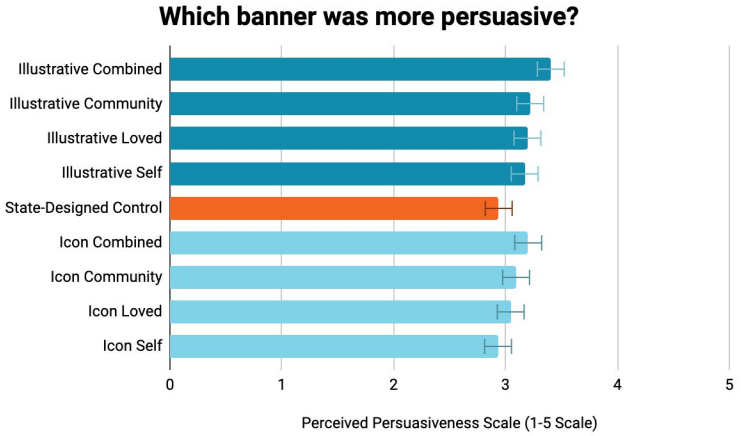
The remaining banner ads emphasized messages focused on protection either of oneself, one’s loved ones, one’s community, or a combination of all three and used either iconographic or illustrative designs.

After viewing their assigned banner ads, participants answered a number of questions about their pandemic-related behaviors, their perceptions of their assigned ad, and then provided information about themselves.

Results

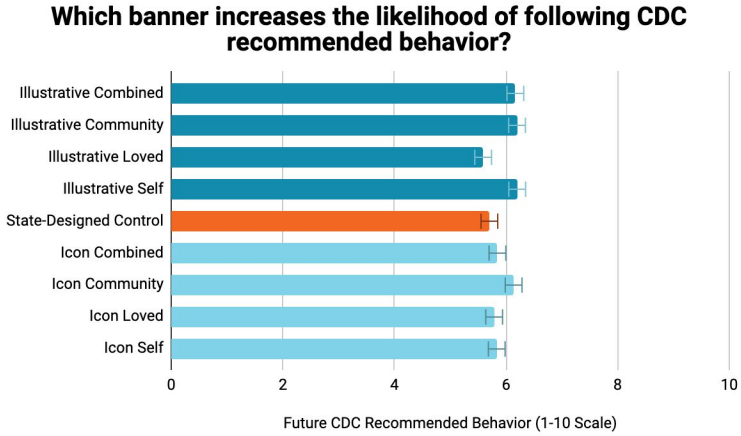
Effect on Perceived Persuasiveness:

The **illustrative combined banner ad** was perceived as more persuasive than the state-designed banner ad, followed by the **illustrative community banner ad**.



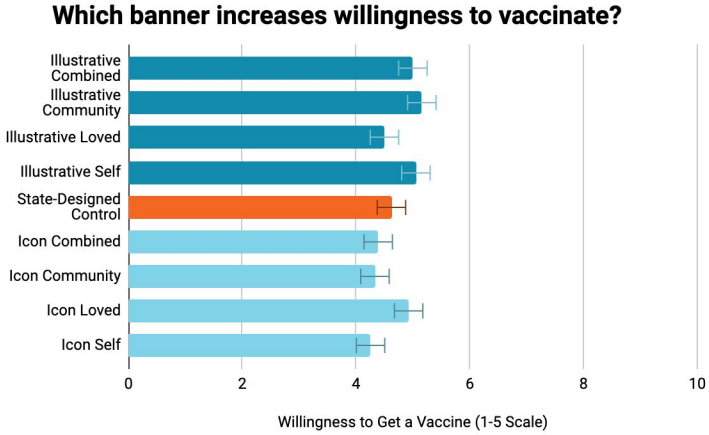
Effect on CDC Recommended Behaviors:

Illustrative banner ads as a whole led to greater intent to follow CDC recommended behaviors in the future compared to the state-designed banner ad. **Community based messages**, whether iconographic or illustrative, outperformed the state-designed banner ad.



Effect on Willingness to Get a COVID-19 Vaccine:

Illustrative banner ads as a whole led to greater willingness to get a FDA-approved COVID-19 vaccine than iconographic banner ads.



Qualitative Analysis of State-Designed Banner:

Participants viewing the state-designed banner ad were more focused on evaluating the banner ad itself than the app it advertised. Frequency of word use suggests a more cognitive reaction to the app. More negative evaluation words were used.

Qualitative Analysis of Illustrative Combined Banner:

Participants viewing the illustrative combined banner ad were more focused on considering the actual app. Frequency of word use suggests a more emotional reaction to the app. More positive evaluation words were used.

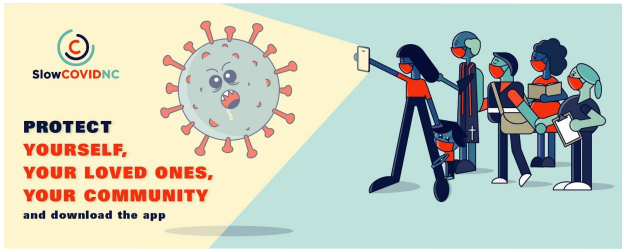
Implications

We recommend using either the illustrative combined banner ad or the illustrative community banner ad rather than the original state-designed banner ad to promote the SlowCOVIDNC Exposure Notification App. Both are perceived as more persuasive and result in greater intent to follow CDC recommended behaviors and willingness to obtain a COVID-19 vaccine.

Here are some additional findings of note:

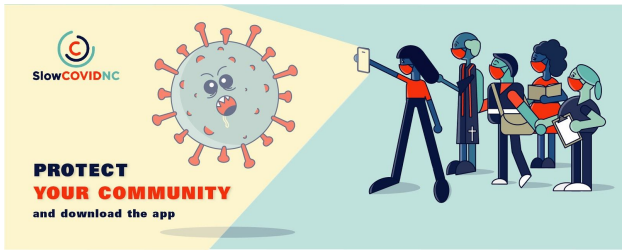
- Those who were less willing to download the app were more likely to be politically conservative, religious, and white.
- Those with greater prior awareness of the SlowCOVIDNC app were more likely to already closely follow CDC recommended behaviors such as mask-wearing and social distancing.
- Those who tend to engage in conspiratorial reasoning had greater prior awareness of the app but were less likely to express interest in downloading it.

Illustrative combined banner ad

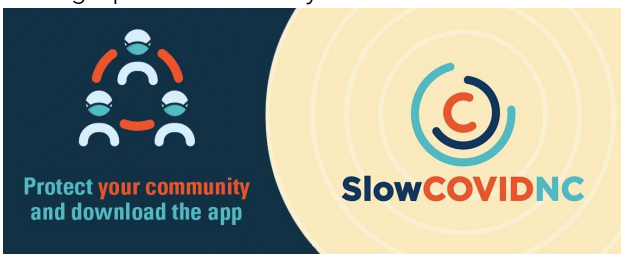


Iconographic combined banner ad

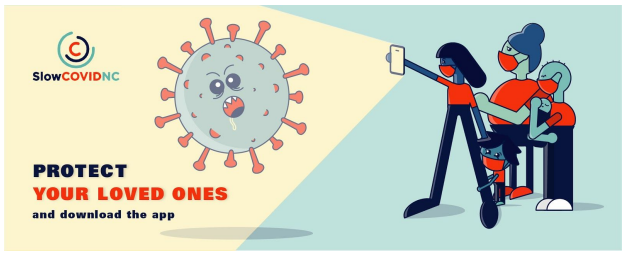
Illustrative community banner ad



Iconographic community banner ad

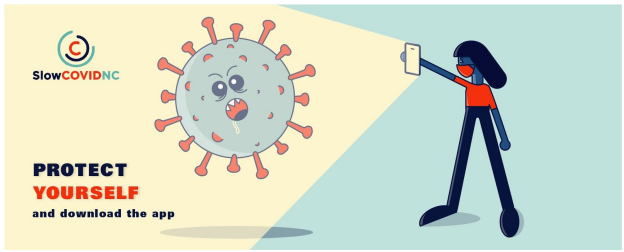


Illustrative loved ones banner ad



Iconographic loved ones banner ad

Illustrative self banner ad



Iconographic self banner ad

NC COVID-19 Experiences and Perceptions Study

Rationale

From October 22, 2020 to February 3, 2021, CAH conducted this research study to understand North Carolinians' experience with and perception of COVID-19. Participants were asked to answer questions about their attitudes and opinions about COVID-19 and the flu vaccination. Insights from this study have been, and will continue to be, incorporated into the counties' current and future COVID response strategies.

Methods

Participants

656 North Carolinian participants were recruited online. An additional 167 participants were recruited through county web channels (e.g., social media, email, website, etc.).

62% of participants were women and 77% were white. 37% of participants identified as Democrat, 30% as Independent, and 19% as Republican. 48% of participants lived in suburban neighborhoods, compared to 30% in rural areas and 22% in urban environments.

Study Design

The study consisted of six sections:

1. COVID Attitudes and Knowledge
2. Behavior Questions (e.g. mask compliance, distancing, handwashing, etc.)
3. Misinformation
4. Flu Vaccination Experiment
5. COVID Vaccination Experiment
6. Demographics

All participants saw Sections 1-3 and Section 6. In Sections 4 and 5, participants were randomly assigned into conditions. For the flu vaccination experiment, participants were randomized to view one of six statements promoting flu vaccination.

- The control statement was standard CDC flu vaccination messaging.
- The other statements employed proven behavioral messaging strategies, such as dissonance, social pressure, self-affirmation, immediate action planning, and paradoxical thinking.

After viewing their assigned statements, participants answered a number of questions about their flu vaccination intentions and their perceptions of the flu shot.

For the COVID vaccination experiment, participants were randomized to view one of two vignettes in which they were asked to imagine a scenario where the COVID vaccine had become available:

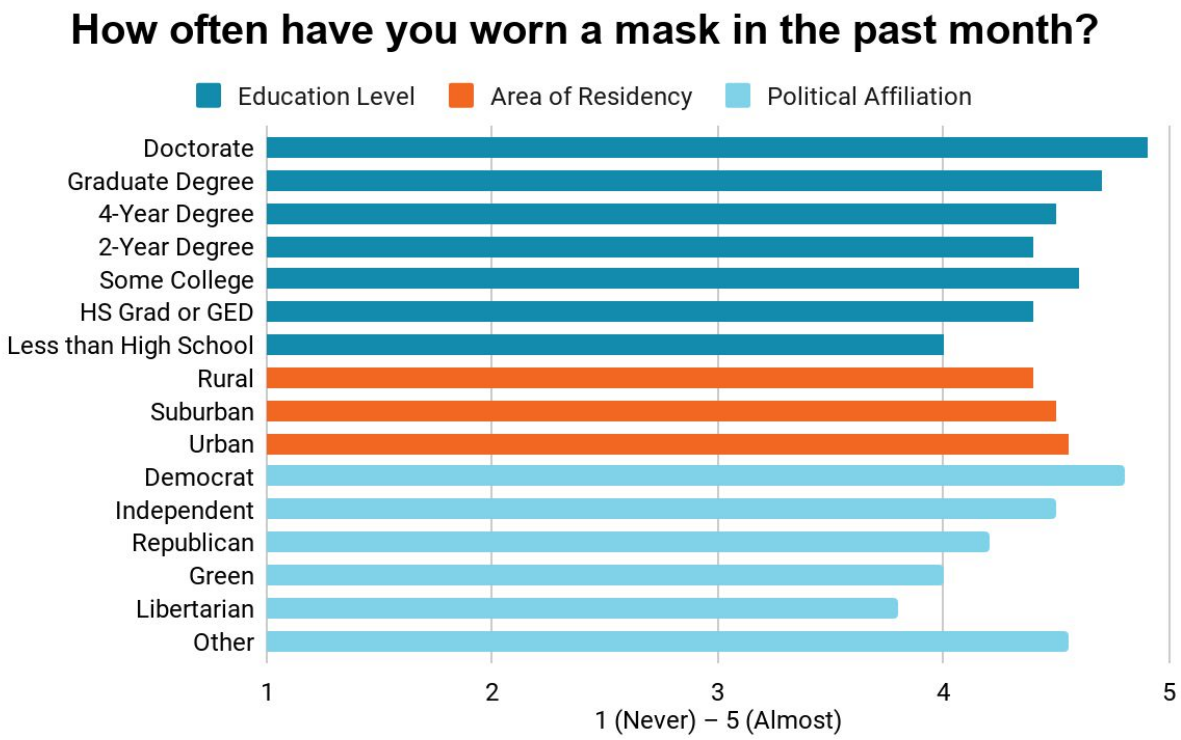
- One vignette described a scenario where the vaccine had been fast-tracked through the FDA approval process and was available before the start of 2021.
- The other vignette described a scenario where the vaccine was not fast-tracked and did not become available until the spring of 2021.

After viewing their assigned vignettes, participants answered a number of questions about their COVID vaccination intentions and perceptions.

Results

Mask Compliance:

People with **lower education levels**, those living in **rural areas**, **Republicans**, and people who identified as **more religious** were more likely to report less mask compliance in the past month.



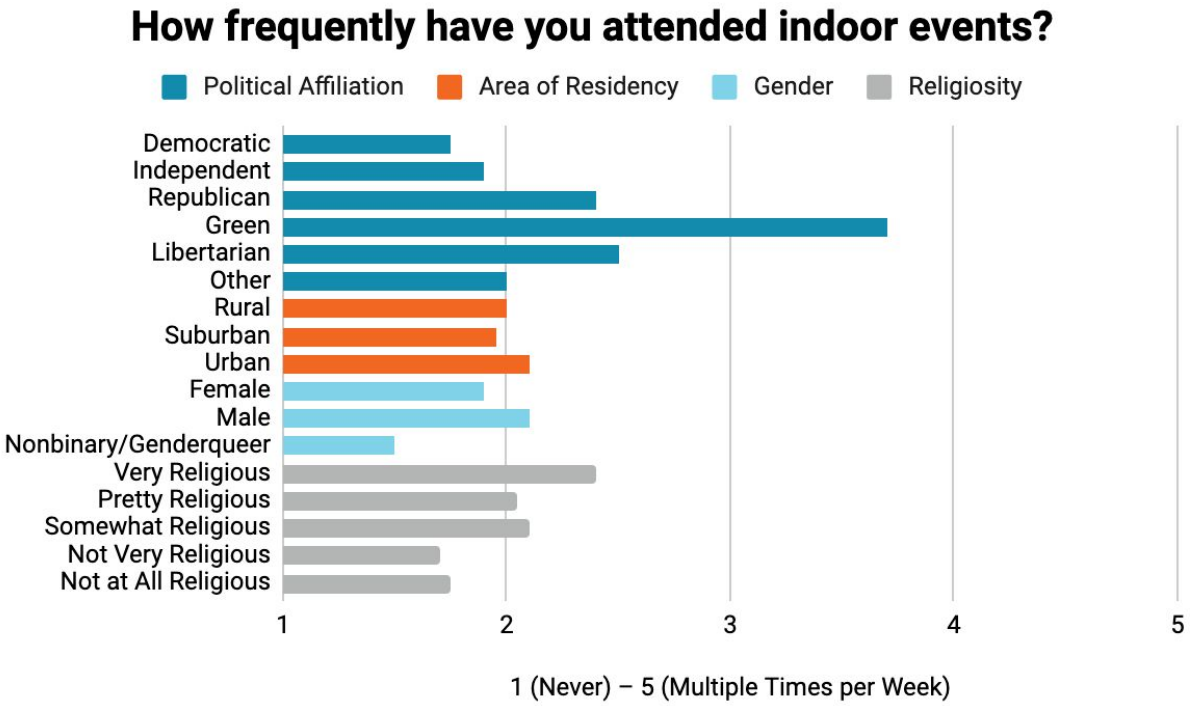
Distancing:

Those less likely to practice social distancing precautions included:

- **Republicans**
- Respondents with **lower education levels**
- Those who identify as **more religious**

Attending Indoor Events:

Republicans, people living in **urban** areas, **males**, and people who identify as **more religious** were more likely to report higher frequency of attending indoor events.

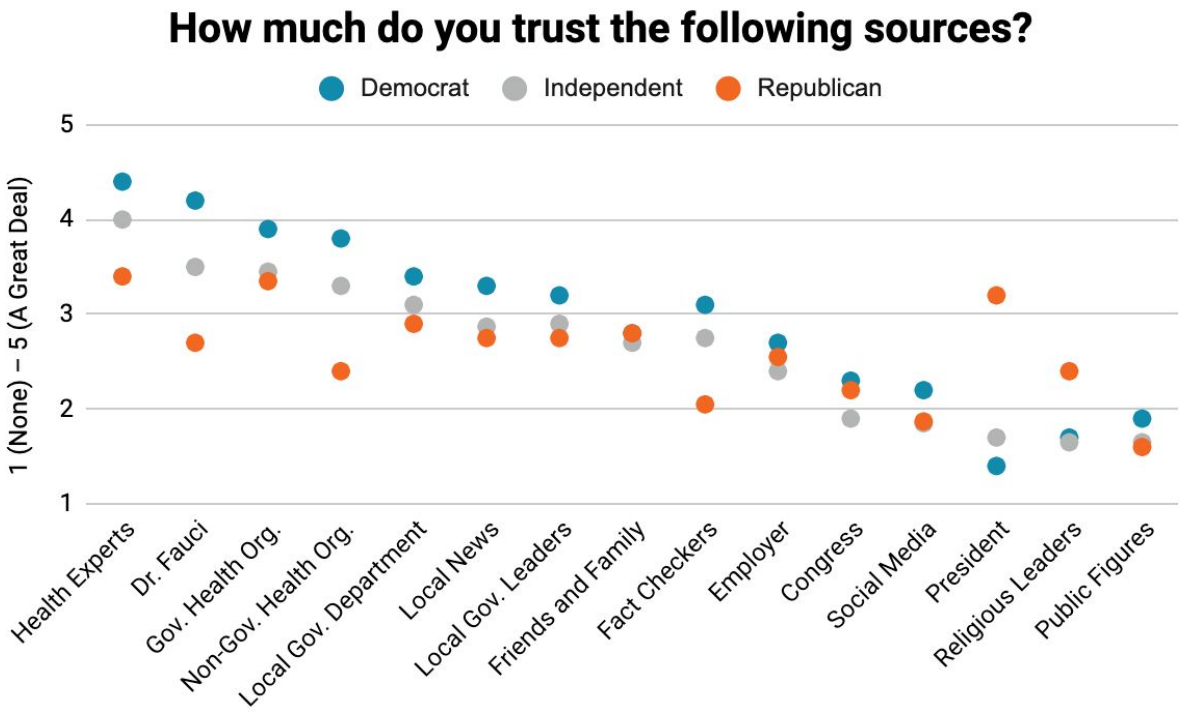


Misinformation:

The majority of respondents get up-to-date information from the **internet** (82.3%) with 48.6% and 41.5% of respondents getting COVID-19 information from **TV** and **social media**, respectively.

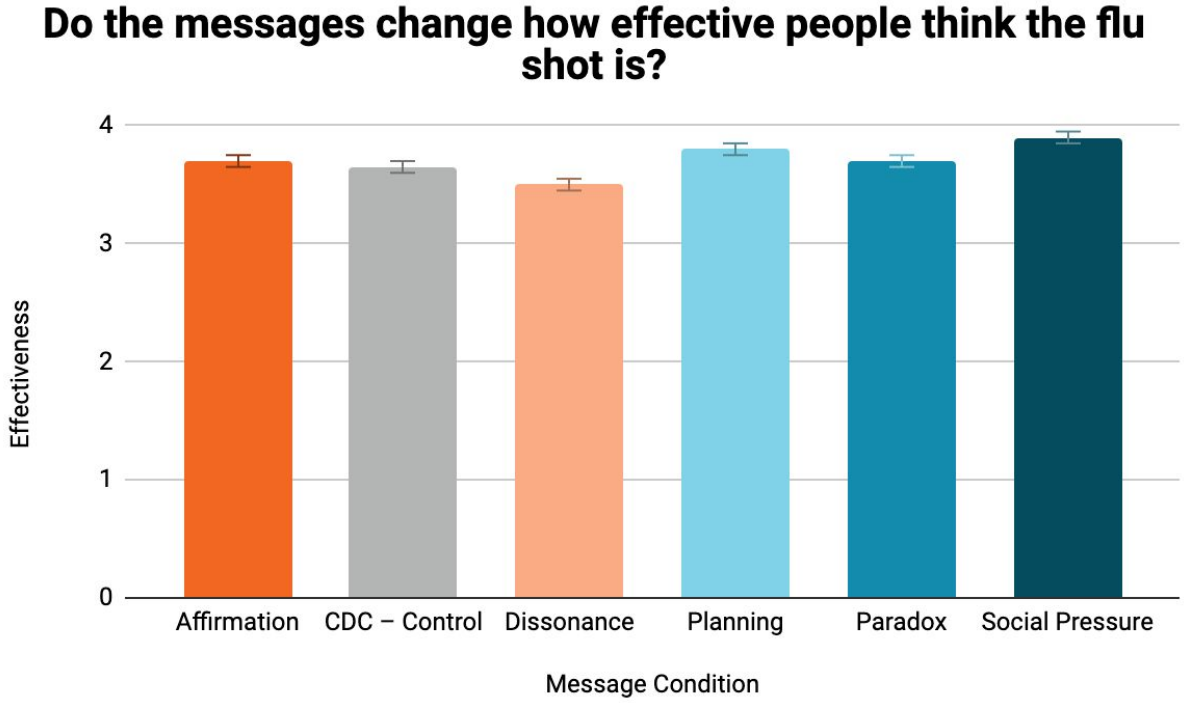
Of those who get COVID-19 information from social media, **Facebook** is the most popular with **Twitter** and **Instagram** rounding out the top three. When broken down by political affiliation, **Facebook** is more popular among **Republicans** while **Twitter**, **Instagram**, and **Reddit** are more popular among **Democrats**.

Of those who get COVID-19 information from TV, most **Republicans** watch **Fox** and most **Democrats** watch **CNN**. Democrats are also more likely to watch **ABC**, **NBC**, **CBS**, and **MSNBC**. Democrats and Republicans differ most in their trust of COVID-19 information from the President, non-government health groups (e.g., WHO, UN, etc.), religious leaders, Dr. Fauci, and health experts.



Flu Shot Messaging:

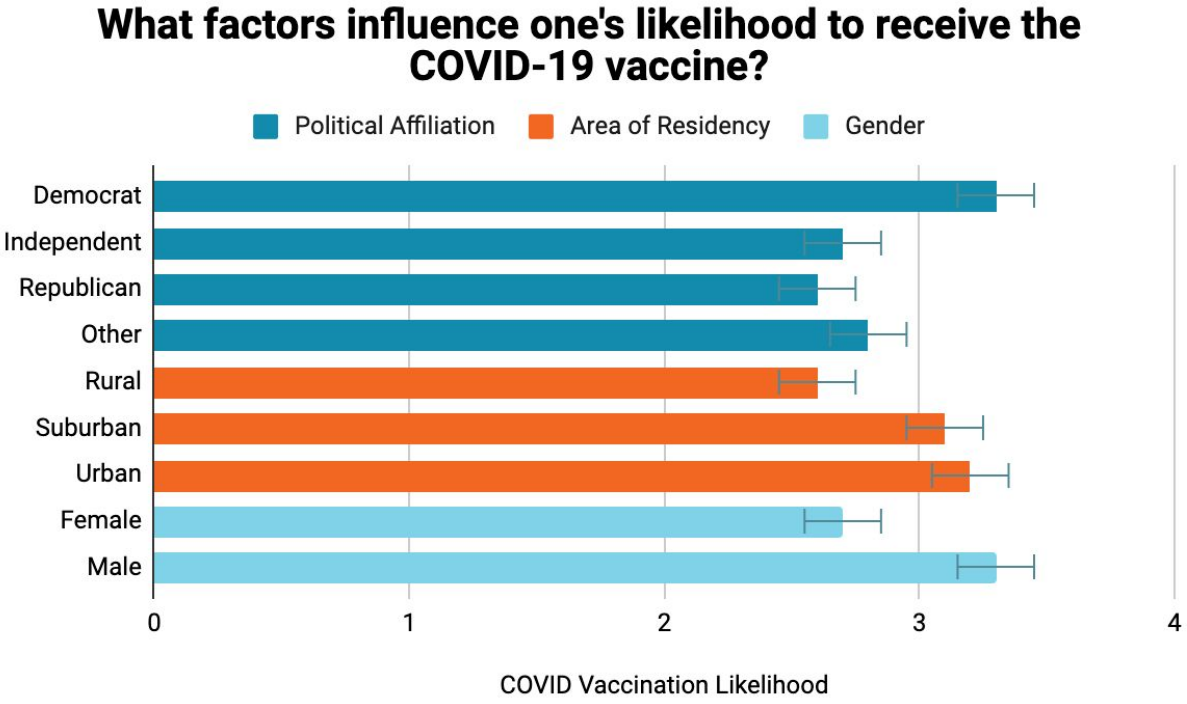
While most of the messages had about the same impact on intentions to vaccinate, social pressure messaging was more successful at convincing participants that the flu shot was effective in preventing disease.



Social pressure messaging was more effective than other messaging among **Republican** respondents and respondents who identify as more **religious**. **Immediate action planning** messaging was more effective than other messaging among **rural** respondents.

COVID Vaccine Likelihood:

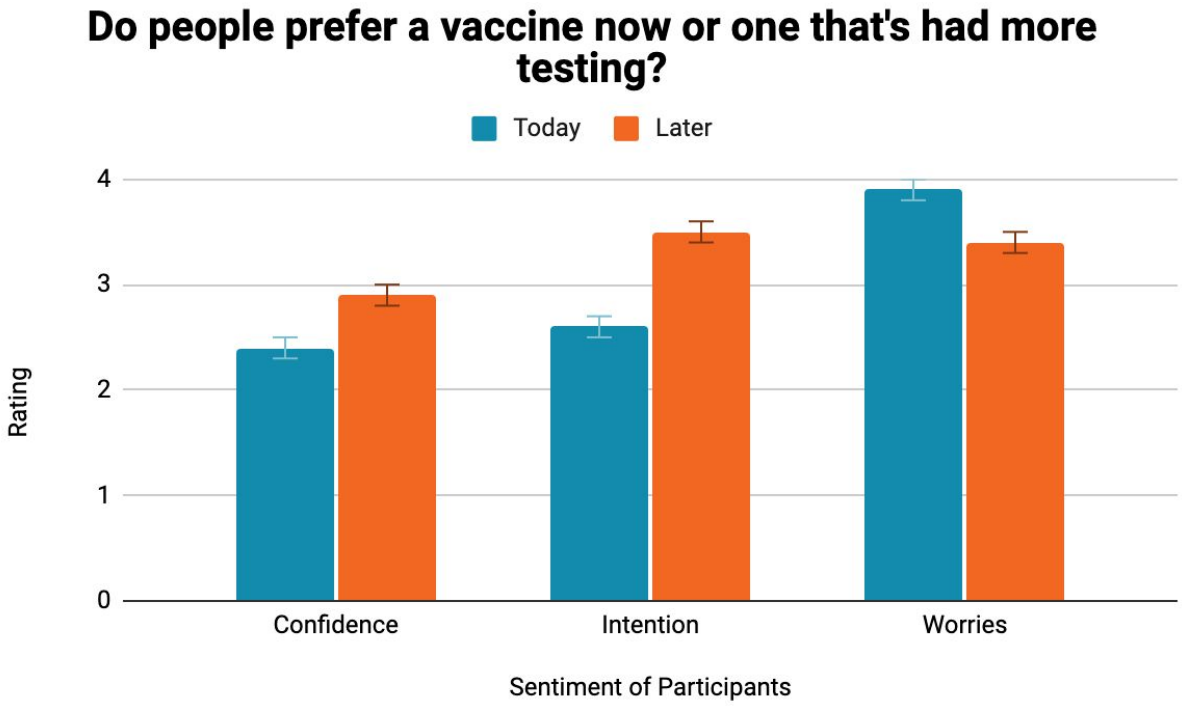
Rural respondents, those who identified as **women**, **Republicans**, **Independents**, and respondents with **lower education levels** were less likely to report that they will get the vaccine.



COVID Vaccine Experiment:

When compared to the vignette that described a scenario where the vaccine had been fast-tracked through the FDA approval process, the vignette that described a scenario where the vaccine was **not fast-tracked**:

- Increased the likelihood to get vaccinated
- Improved confidence in its efficacy
- Reduced concerns about side effects



Implications

Because social distancing, mask compliance, and vaccine adoption are worst amongst certain groups, counties may consider targeting those who identify as:

- Republican
- Living in rural areas
- More religious
- Lower education

These audiences are most likely to trust health experts, religious leaders, local government health leaders, and Dr. Fauci.

Social pressure (and, in some cases, immediate action planning) messaging appears to be effective for respondents who identified as being in one or more of the above groups. It is also important to emphasize the time taken to produce the vaccine and the thoroughness of the approval process.

Pulling this all together, communications featuring local health experts that use social pressure messaging either on local Fox channels or on Facebook may be a good way to target these groups.

NC Flu and COVID-19 Vaccination Study

Rationale

The goals of the study were 1) to gather information from North Carolina city and county employees about beliefs and behaviors related to COVID-19 and the flu, with an emphasis on vaccination; and 2) to test a number of potential interventions designed to increase awareness of the benefits of getting vaccinated for the current flu season.

The results of this survey helped us to identify specific barriers keeping people from vaccinating for the flu this year, as well as to better understand perceptions of COVID-related risk and intentions to get vaccinated when a COVID-19 vaccine became available.

Methods

Participants

1271 county health and government officials in North Carolina, as well as an additional 625 county residents, were recruited through county web channels (e.g. social media, email, website, etc.) for a final usable sample of 1,896 people.

79% of participants were women, 85% were white, and the average age was 46. 27% of participants identified as Democrat, 27% as Independent, and 34% as Republican. 55% of participants lived in suburban neighborhoods, compared to 35% in rural areas and 10% in urban environments. The most common household income was $100,000+.

Study Design

After being asked a number of COVID-19 and flu-related questions, participants were shown one of four messages about the COVID-19 vaccine. These messages differed in two ways:

- The vaccine was available either in December 2020 or June 2021;
- The vaccine was either fast-tracked through FDA approval without normal safety testing, or went through the full safety testing process.

Participants indicated how willing they'd be to receive the COVID-19 vaccine in the specific scenario they read about.

Afterwards, participants saw two of seven possible interventions for a public health campaign about the flu and provided feedback on each campaign.

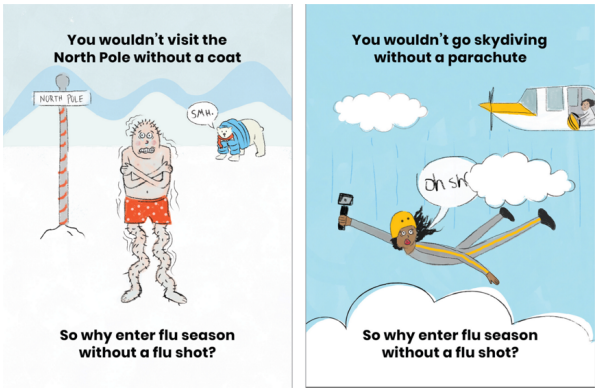
The interventions included:

- Control: CDC Language (text-based)
- Dissonance (text-based)
- Christmas – social pressure and norms (picture-based)
- We Can Do It – collective responsibility and local examples (picture-based)
- Recklessness – humor; portrayal of skipping vaccines as reckless (picture-based)
- Grandma’s Recipe – portrayal of vaccines as safe and “natural” (picture-based)
- Apples – reduce “chemical” fear (picture-based)

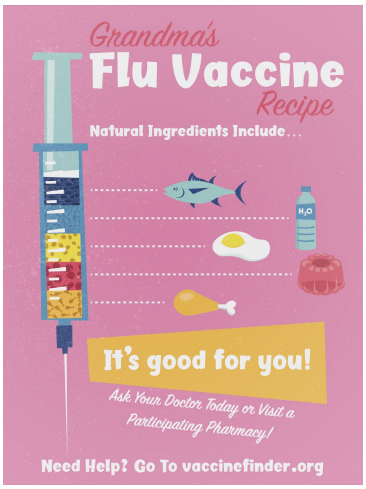
Christmas – Social Pressure and Norms

We Can Do It – Collective Responsibility and Local Examples

Recklessness – Humor; Portrayal of Skipping Vaccines as Reckless



Grandma's Recipe – Portrayal of Vaccines as Safe and "Natural"

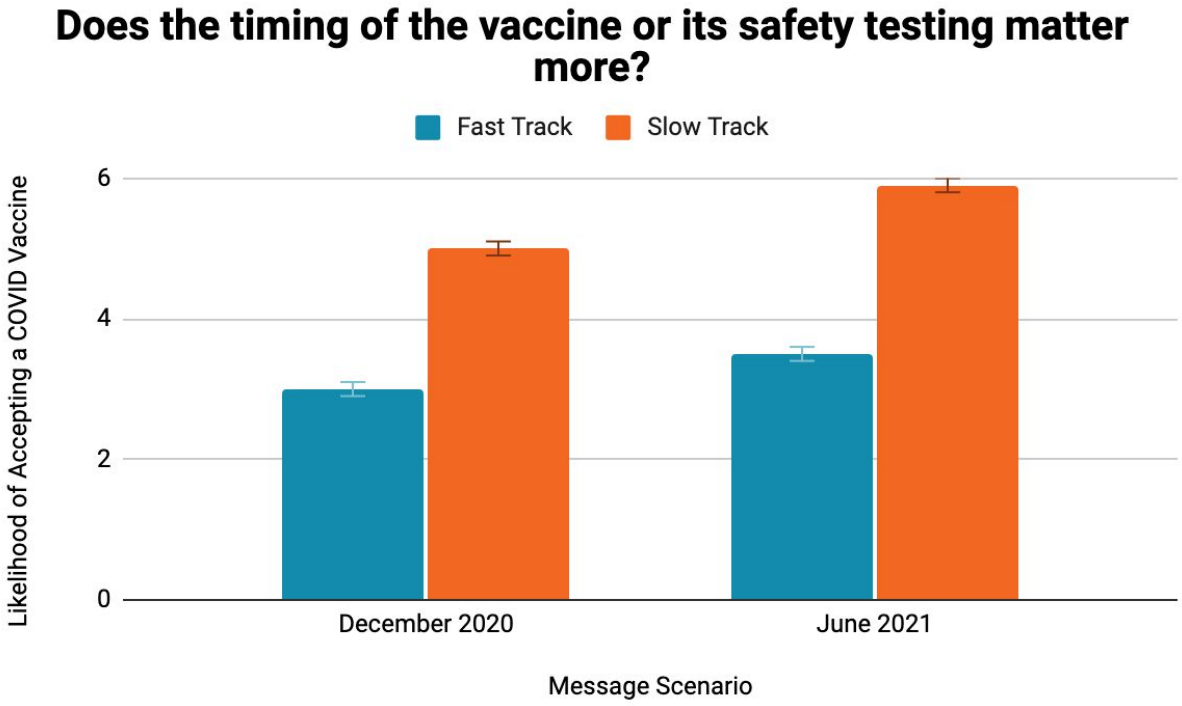


Apples – Reduce Chemical Fear

Results

COVID-19: Attitudes, Behaviors, and Vaccination

Our experiment suggests that people aren't necessarily worried about the speed of the vaccine's availability–they're worried about its safety. Knowing that a vaccine was properly tested does much more to increase people's willingness to receive it than knowing that the vaccine took longer to be approved. While this held true for every group in our study, the slow-tracked vaccine was less reassuring for **people of color** and **Republicans**.



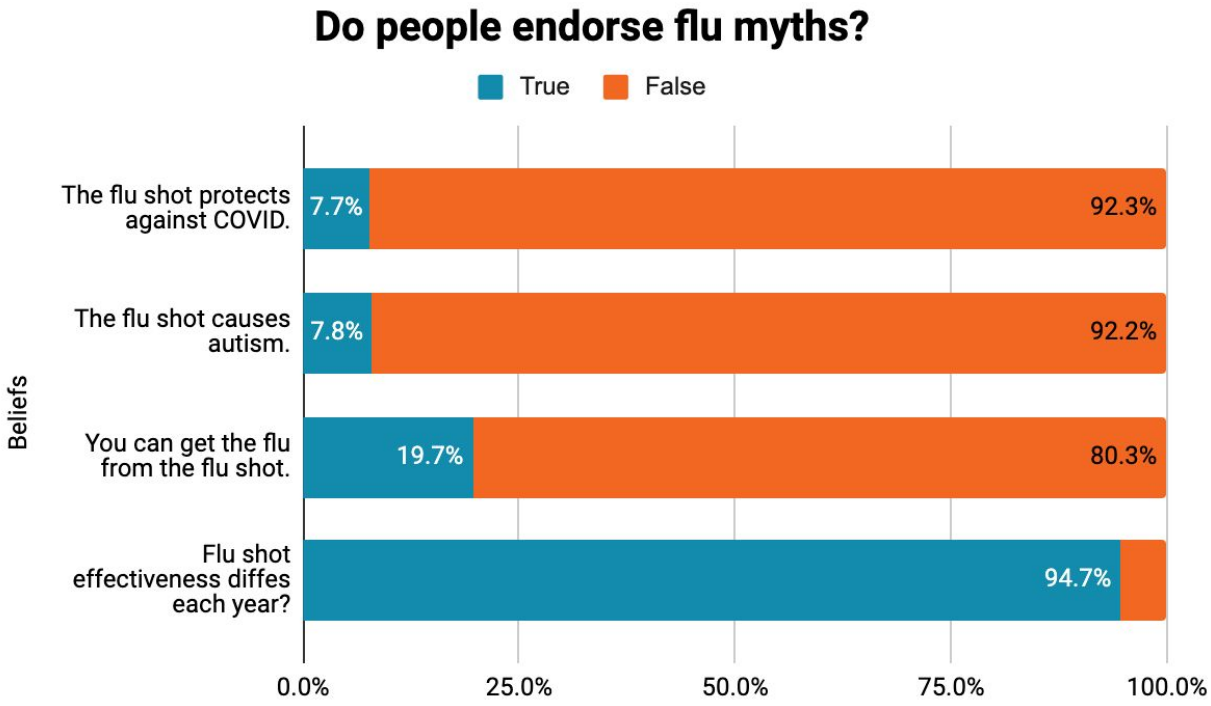
The most trusted sources for COVID-19 vaccination differed greatly by political party, with **Republicans** trusting most sources less except for **religious leaders** and the **President**. Across everyone in our study, the most trusted sources included personal **doctors**, **health experts**, and **government health groups**, such as the CDC.

Flu: Attitudes, Beliefs, and Vaccination

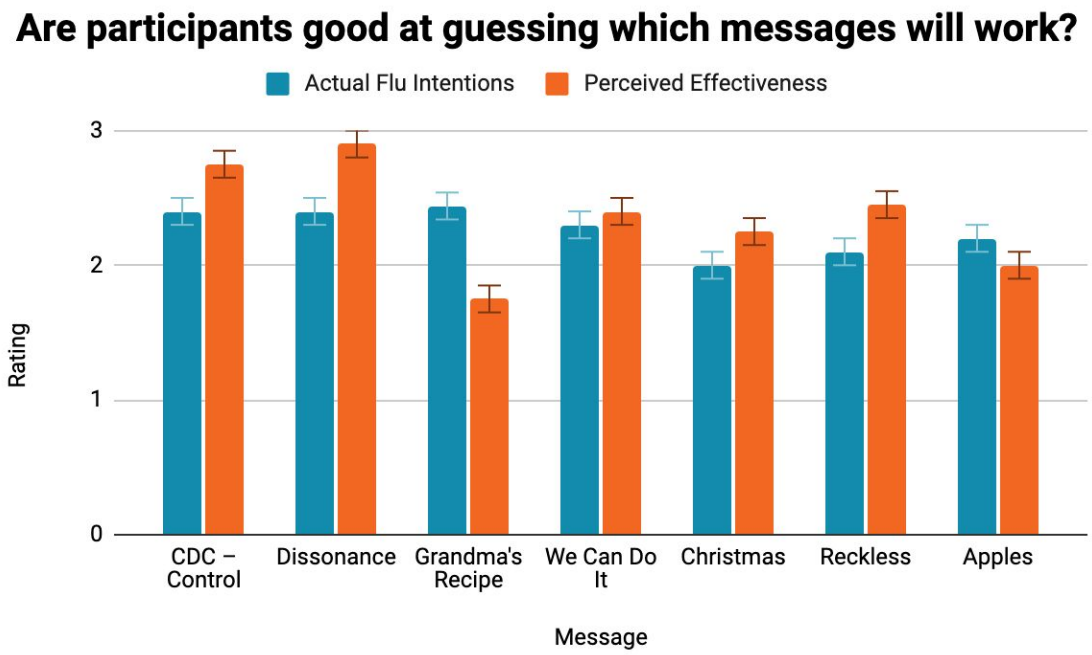
Most of our participants were highly in favor of the flu shot, though a minority had neutral to negative beliefs.

Our participants were especially likely to have been vaccinated. The 2019-2020 flu shot uptake was 68% compared to a national average of 48%. For the 2020-2021 flu season, uptake was at 64% as of December. **Democrats** were much more likely to get a flu shot than **Republicans** and **Independents**, across all conditions. Of the 36% who hadn't received a flu shot at the time of the study, 45% said they very likely would not, further suggesting a small but meaningful group of vaccine refusers exists in our samples.

People are generally good at identifying flu truths and falsehoods. However, 19.7% of participants endorsed the myth that the flu shot could give you the flu, with 33.8% of **people of color** and 23.0% of **Republicans** holding this belief.



The average likelihood of flu shot acceptance was fairly similar (albeit low) for all messages, with the Christmas and Recklessness conditions performing the worst. Notably, participants' ratings of the messages weren't a good predictor of how persuasive they actually were: average likelihood of acceptance did not correlate with how motivating the participants found the messages or with how much they liked each of the messages. For example, in the graph below, participants thought Grandma's Recipe would not be motivating at all, but it was one of the best-performing messages.



Implications

Regarding flu attitudes, beliefs, and vaccination intentions:

- Most county employees who took the survey do get vaccinated, although 20% believed the flu shot can give you the flu.
- People who haven't gotten a flu shot by December are mostly resistant to various interventions.
- A wide array of different approaches worked about equally well, although people consciously considered them very different!
    - Be careful about relying on user opinion on how effective messages are.
- Messages that are too emotional and/or dramatic may backfire!

Regarding COVID-19 attitudes, behaviors, and vaccination intentions:

- A sizable majority take COVID precautions.
    - But men, White people, and Republicans are less likely to.
- Fear of COVID is high.
- Generally, people listen to health experts and their doctor…
    - But Republicans trust most messengers less than non-Republicans, except for religious leaders and the President.
- Safety is the major reason why people are concerned about the COVID-19 vaccine. Fear of a new vaccine seems more rooted in safety than speed itself.

Consider clarifying the safety testing of the vaccine process and using personal physicians as messengers, especially as people want vaccination at their doctor's.

Misinformation Vaccination Game

Rationale

According to inoculation theory, preemptively exposing, warning, and familiarizing people with the strategies used in the production of fake news helps confer cognitive immunity when exposed to real misinformation[2,3]. In other words, showing someone an example of using emotional storytelling to spread misinformation (e.g., "My cousin's baby was diagnosed with autism soon after her vaccinations") can improve one's ability to detect similar misinformation in the future. Prior work has demonstrated success with a gamified approach to psychological inoculation with respect to fake news[4], people who played the game showing reduced reliability ratings for fake news posts, even weeks after playing.

Testing an Inoculation Game for Vaccination Misinformation

Alongside the developers of the previous fake news game, CAH developed an inoculation game for vaccination misinformation. The game focuses on four specific techniques used to spread vaccine misinformation–emotional storytelling, fake expertise and scientism, the naturalistic fallacy, and conspiracy theorizing. Each technique is represented by a character in the game. We developed two versions of the game–one in which you were meant to defeat these characters and stop the spread of misinformation with counter-information, and another in which you were meant to help these characters to spread misinformation. Prior inoculation games took the perspective of the villain, and therefore we wanted to test which perspective (hero or villain) was more effective (and more enjoyable).

Methods

Participants

A total of 691 participants from the United States completed the study via an online survey platform.

Study Design

We conducted an online study in which participants played the vaccination inoculation game (hero or villain) or a control game (tetris). After completing the game, they rated a number of social media posts, which either used the misinformation techniques from the game or not, on three dimensions–manipulativeness, confidence in manipulativeness rating, and likelihood of sharing the post on social media.

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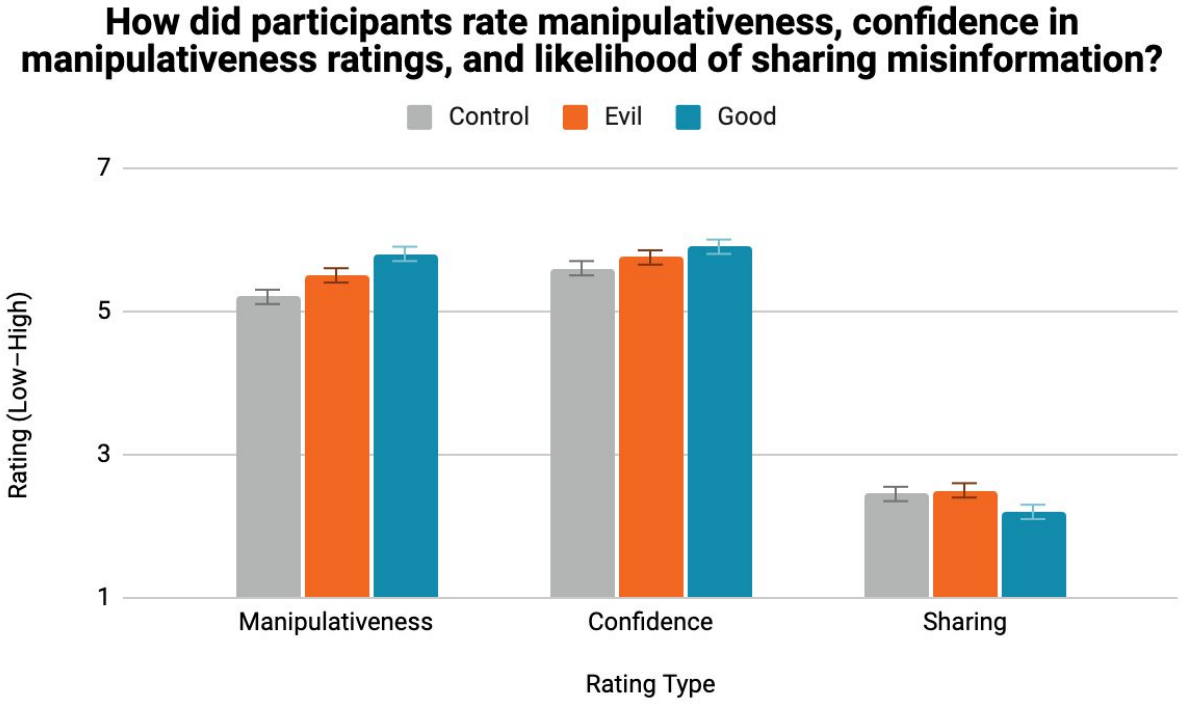
[2] Compton, J., Jackson, B., & Dimmock, J. A. (2016). Persuading others to avoid persuasion: Inoculation theory and resistant health attitudes. *Frontiers in psychology*, *7*, 122.
[3] McGuire, W. J., & Papageorgis, D. (1961). The relative efficacy of various types of prior belief-defense in producing immunity against persuasion. *The Journal of Abnormal and Social Psychology*, *62*(2), 327.
[4] Roozenbeek, J., & van der Linden, S. (2019). Fake news game confers psychological resistance against online misinformation. *Palgrave Communications*, *5*(1), 1-10.

Results

Overall, the study demonstrated increased manipulativeness and confidence ratings in the two inoculation games relative to the control for posts that used misinformation techniques. Only the hero version of the game saw a reduction in sharing likelihood. Furthermore, a majority of participants stated that they liked or loved the game and would recommend it to others.



Implications

Exposing individuals to the following misinformation strategies in a gamified context can improve peoples' ability to detect and reject such techniques online:

- **Emotional storytelling** – Anecdotes that stir strong emotions like fear and disgust
- **Fake expertise** – Using fake credentials and citing debunked or made-up research
- **The naturalistic fallacy** – Appealing to the intuition that "natural is better" and "chemicals are bad"
- **Conspiracy theorizing** – Blaming powerful, secretive institutions

Election Day Study

Rationale

On Election Day, November 3, 2020, a team of research assistants from Lenoir-Rhyne University surveyed residents of Catawba County following voting at randomly selected precincts around the county. Insights from this study informed recommendations for strategies to increase CDC behavior adherence, combat misinformation, and decrease COVID-19 vaccine hesitancy.

Methods

Participants

Following a random cluster sampling of 16 polling precincts in Catawba County, 511 voters were invited to participate in this study, of whom 196 agreed to answer questions (38%). Demographically, these individuals well-represented the diversity of Catawba County including their age (M = 45.2), gender (50.5% women), and race and ethnicity (78% White; 10% Black; 5% Hispanic; 3% American Indian; 2% Asian; 5% more than one category).

On a scale in which 1 was “extremely conservative” and 7 was “extremely liberal”, participants tended toward conservatism and, on a scale in which 1 was “not at all religious” and 7 was “extremely religious”, participants tended toward religiousness.

Study Design

We aimed to better understand adherence to CDC recommended behaviors (e.g., mask-wearing, social distancing), attitudes toward a forthcoming COVID-19 vaccine, and misinformation related to the pandemic in a sample that well-represented a typical NC county with both urban and rural populations.

Results

Compliance with CDC Recommended Behaviors

Across all three CDC recommended behaviors, social distancing was least closely followed and handwashing was most closely followed, with mask wearing in between. Despite following this behavior least closely, people think that social distancing is the most effective CDC recommended behavior.

Of 599 individuals who were randomly selected for observation outside of polling locations, 68% were properly wearing a mask, 8% were improperly wearing a mask, and 24% were not wearing a mask.

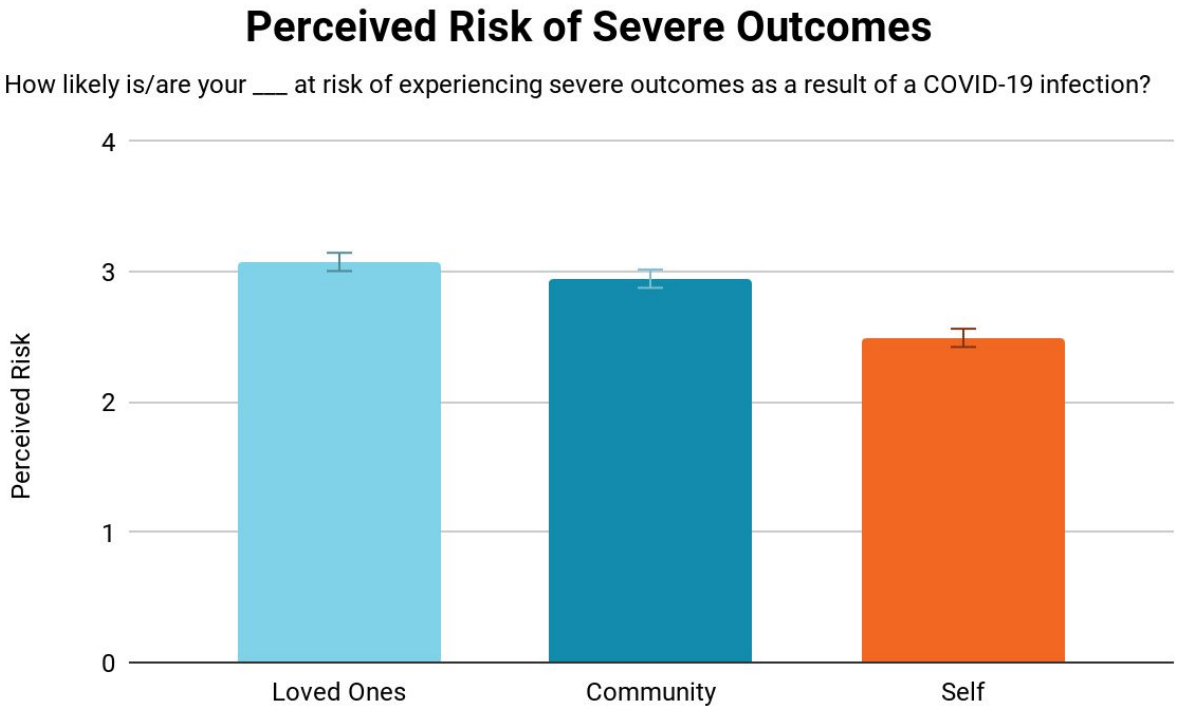
Mask-wearing proved most divisive among demographic groups. **People of color** were more likely to follow the mask-wearing recommendation, but there were no racial and ethnic differences for social distancing or hand-washing. Likewise, more **religious individuals** were less likely to follow the mask-wearing recommendation, but religiousness was unrelated to social distancing or hand-washing. **Conservatism** was negatively related to all three CDC recommended behaviors, with mask compliance being the least likely. **Education** and **income** levels were unrelated to all three CDC recommended behaviors.

Age was not strongly related to mask-wearing and hand-washing, but it was strongly related to social distancing. **Older participants** were more likely to closely follow the recommendation to maintain a six-foot distance from individuals who don't live in their households.

Perceptions of CDC Recommended Behaviors and Risk

Participants thought that wearing a face mask was more likely to protect others from infection with COVID-19 rather than themselves. Likewise, social distancing was also thought to be more protective of others than self. Unsurprisingly, then, participants reported being more willing to engage in both mask-wearing and social distancing **for the sake of other people, rather than for their own sakes**.

Relatedly, participants were much **less likely to see themselves as being at risk of severe outcomes** if they became infected with COVID-19 than their loved ones or their community. As expected, this difference was less pronounced for older participants, but even older participants generally saw themselves as less vulnerable than their loved ones and community.



People who were observed properly wearing a mask were more likely to perceive greater risk of severe outcomes from COVID-19 for themselves, their loved ones, and their community than those who were improperly wearing a mask or not wearing one at all. However, the relationship was strongest between mask-wearing and perceived risk to the community. That is, **people who saw their community as in greater danger were more likely to mitigate that risk by wearing a mask properly**.

Vaccine Behavior and Attitudes

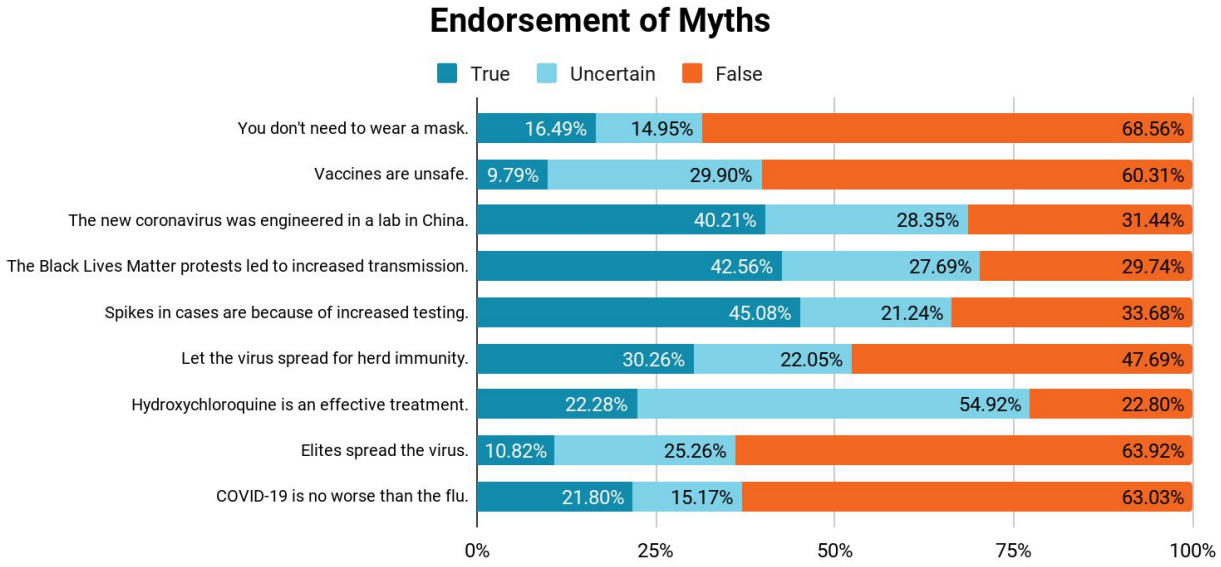
Half of participants indicated that they would be very likely or extremely likely to get a COVID-19 vaccination approved by the FDA when it was available with 27% percent indicating that they were not at all likely to get a COVID-19 vaccination. **Younger** and **more conservative individuals** were less likely to say they would get the vaccine, as were **women** and **people of color**. Likelihood of getting the vaccine was unrelated to years of **education** and **income level**.

There was a **strong relationship between getting a flu shot in 2020 and likelihood of getting a COVID-19 vaccination** with 66% of people who got a flu shot reporting that they were very or extremely likely to get a COVID-19 vaccine compared to only 26% of those who did not get a 2020 flu shot.

The most commonly reported concerns about a COVID-19 vaccination were **political interference with vaccine development** (59%), **the speed of vaccine development** (41%), and **worries about vaccine safety** (37%). Conversely, religious objections (3%), a lack of trust in scientists (14%), and thinking the vaccine wouldn't be effective (19%) were the least reported concerns. **People of color** were more likely to have safety concerns and **women** were more likely to have concerns about the speed of development, political interference, vaccine safety, and trustworthiness of scientists.

Misinformation

78% of participants endorsed at least one of the nine pandemic myths assessed. The three most commonly endorsed myths were "Spikes in cases are because of increased testing," "The new coronavirus was engineered in a lab in China," and "The Black Lives Matter protests led to increased transmission." Acknowledging that the BLM myth has political overtones, we analyzed the data both with and without that particular myth and found similar results.



Endorsement of these myths was more likely for people who are **conservative**, **religious**, **prone to conspiratorial thinking** (i.e., believing "our lives are controlled by plots hatched in secret places"), and **white**. Myth endorsement was not related to gender, age, years of education, or income.

More **myth endorsement was related to less closely following CDC recommended behaviors and less likelihood of getting the COVID-19 vaccine**. In addition, **people who endorse myths at higher rates think they, their loved ones, and their community are less at risk for severe outcomes from COVID-19**. This relationship is particularly strong for the perception of risk of severe health outcomes for the community.

Implications

- Despite thinking that social distancing is the most effective CDC recommended behavior, it is the behavior people say they follow least closely. Thinking that something is effective does not necessarily translate into action.
- Mask-wearing is the most controversial CDC recommended behavior, dividing people along demographic and ideological lines.
- People seem particularly motivated by a concern for others, especially their loved ones and community; appeals to altruism may encourage CDC recommended behaviors and reduce vaccine hesitancy.
- Messages promoting the COVID-19 vaccine should be tailored to specific populations, with particular attention to age, political ideology, religiousness, gender, and race/ethnicity. Just as much attention should be paid to building trust in the vaccine development process as building trust in the vaccine itself.
- Myths are common and harmful. Addressing them clearly and consistently is critical.

"Why Vaccinate?" Study

Rationale

Between December 21, 2020 and January 24, 2021, college students and community members participated in a study aimed at understanding COVID-19 vaccine hesitancy and how to better reduce it. Results from an experiment within the study supported a prediction that local voices can persuade better than non-local voices to reduce vaccine hesitancy.

Methods

Participants

A random sample of 400 students from a small liberal arts college in the piedmont of North Carolina were invited to participate in this study–62 accepted (16%). This relatively low rate of participation may be due to the timing of the study during the winter break between semesters. In addition, 683 members of the community who had previously enrolled in a class on the pandemic offered by the college during summer 2020 were also invited to participate–152 accepted (22%).

The community members (M = 57.8) were older than the college students (M = 21.1), but were otherwise comparable in gender (75% women) and race/ethnicity (89% White; 3% Black; 5% Hispanic; 2% American Indian; 5% more than one category). The community members were equally as religious as the college students, but they were somewhat more politically liberal.

Study Design

Participants were randomly assigned to view one of three videos:

- Informational control video of a nonlocal scientist discussing facts about the COVID-19 vaccine with a reporter.
- Nonlocal persuasive video featuring celebrity science communicator Hank Green discussing his motivations for getting a COVID-19 vaccine.
- Local persuasive video featuring university faculty and administrators discussing their motivations for getting a COVID-19 vaccine.

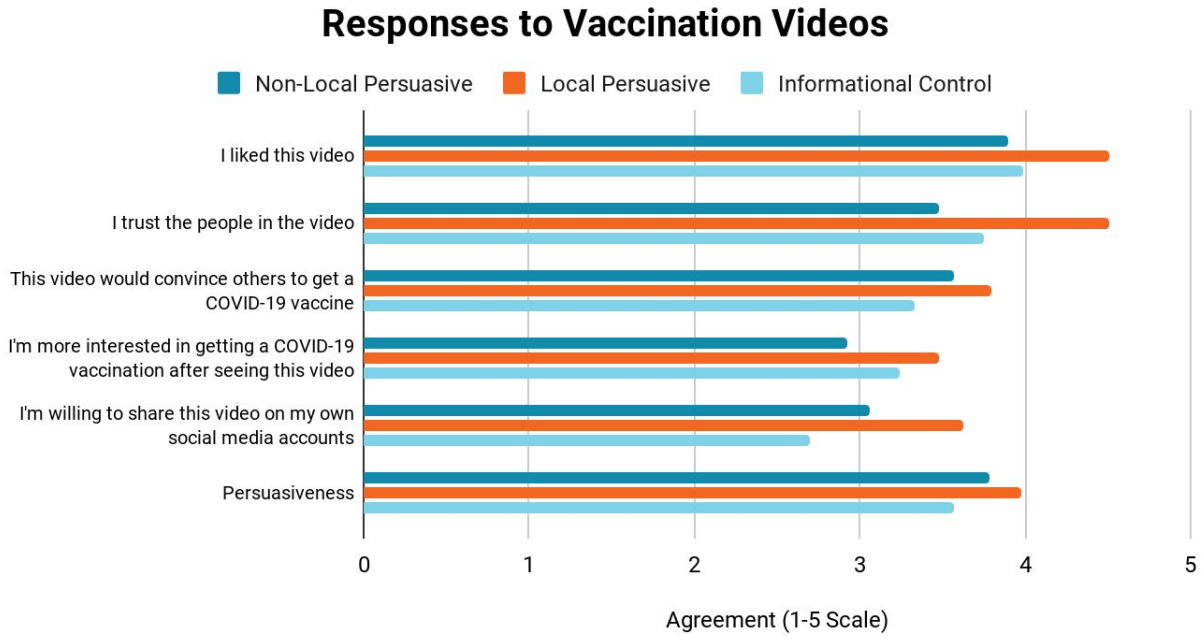
They were then asked to evaluate the video for effectiveness and persuasiveness. Additional vaccine perceptions and behavioral intentions were also collected.

Results

Effects of Videos

Participants who were randomly assigned to watch the **local persuasive video** indicated more interest in getting a COVID-19 vaccination after seeing the video, liked it more, were more willing to share the video on their social media accounts, believe it more likely to convince others to get a COVID-19 vaccine, trusted the individuals in the video more, and found the video more persuasive overall than participants who were randomly assigned to watch the nonlocal persuasive or informational control videos. There were no differences among the videos in addressing concerns about the COVID-19 vaccine, nor were there effects on behavioral intent and perceptions of the vaccine.

Qualitative analysis indicated a greater amount of engagement and agreement with the local persuasion video compared to the nonlocal persuasion and informational control videos.



Vaccine Behavior and Attitudes

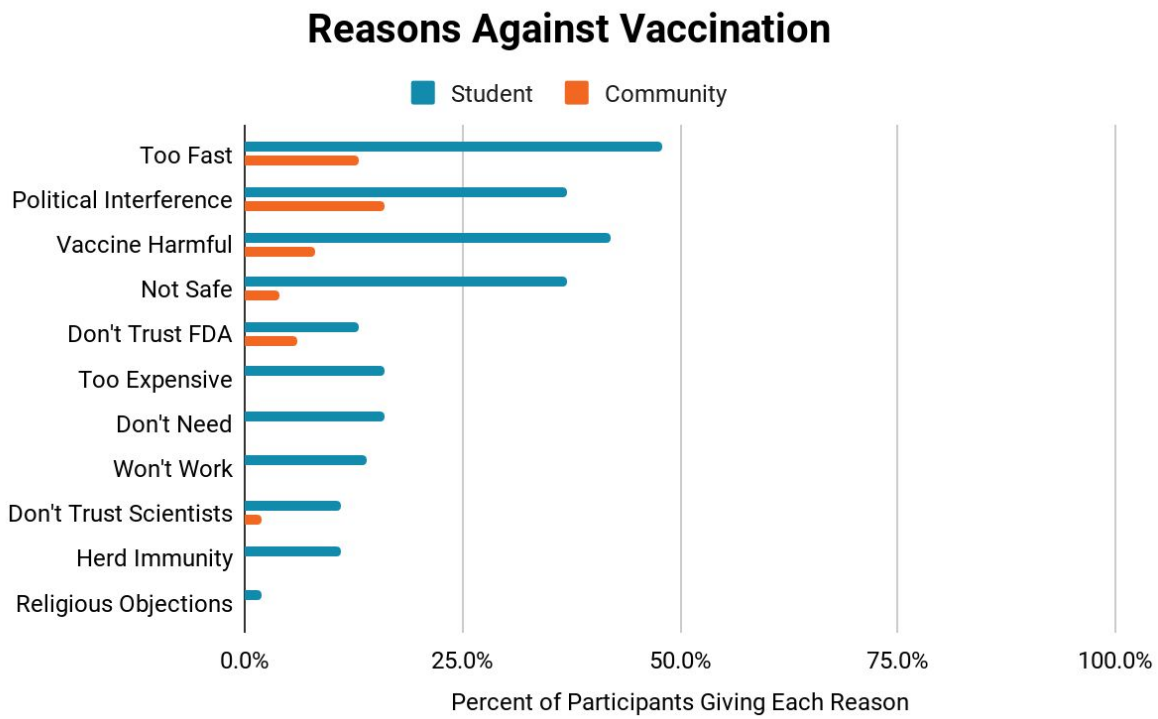
Across all conditions, 8.9% of participants had already obtained at least a first dose of a vaccine (entirely community members), and an additional 65% indicated that they were at least somewhat likely to get one when eligible with 21% indicating that they were not at all likely to get a COVID-19 vaccination. **Younger** and **more conservative individuals** were less likely to say they would get the vaccine.

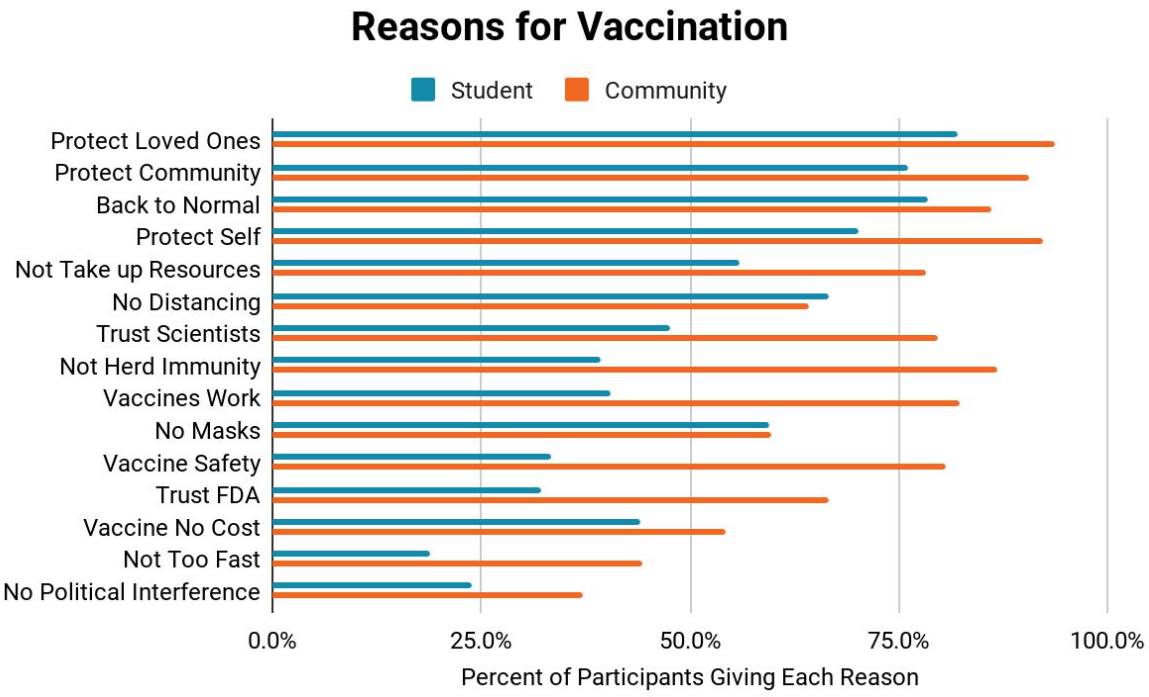
The most commonly reported concerns about a COVID-19 vaccination were the **speed of vaccine development** (27%), **political interference with vaccine development** (24%), and **worries about vaccine safety** (21%). Conversely, religious objections (1%), a belief that herd immunity without vaccination is a better approach (4%), a lack of trust in scientists (5%), and thinking the vaccine wouldn't be effective (6%) were the least reported concerns.

The most commonly reported reasons for getting a COVID-19 vaccination were a **desire to protect one's loved ones** (89%), **one's community** (85%), and **oneself** (84%) as well as a **desire to get back to normal** (83%).

Differences between College Students and Community Members

College students were less likely to obtain a COVID-19 vaccine (when eligible to receive one) than community members, even when controlling for age, gender, race/ethnicity, political affiliation, and religiousness. Likewise, college students were less comfortable with being among the first groups to get the vaccine, thought it would be less safe and effective, and were less willing to sign a pledge committing to get the vaccine.





As can be seen in the figures above, **college students were far more likely to express concerns about the vaccine compared to the community members** and were also less likely to endorse reasons to get a vaccine.

Implications

- COVID-19 vaccine hesitancy has been steadily decreasing in the past year, but there remains a gap between public health goals (vaccinating at least 70-85% of the population) and public acceptance of the vaccine.
- Local voices have the potential to be uniquely persuasive in encouraging vaccination. It is likely worth the investment for communities to create hyper-local media with an emphasis on personal motivations and storytelling.
- People seem particularly motivated by a concern for their loved ones and community; appeals to altruism may encourage vaccine acceptance, as may an emphasis on returning to normal.
- Vaccine related educational opportunities abound for college students and younger persons in general. As vaccine supply begins to outstrip demand, this will likely be a key demographic.

COVID-19 Vaccine Messaging Test

Rationale

CAH is currently finalizing the design for a research study testing different messages intended to increase uptake of the COVID-19 vaccine when it is available to the general public. While the major intent of this study is to help determine what messages and themes resonate with vaccine-hesitant individuals, the survey will also help uncover more fine-grained information about COVID-19 safety behaviors and vaccine concerns.

Methods

Participants

A large sample of at least 1500 Americans will be recruited along demographic lines to match North Carolinian populations as much as possible.

Study Design

Participants will be assigned to one of seven different experiences:

- **Control:** No message at all.
- **Safety:** A message focusing on the rigorous safety trials the vaccine went through.
- **Normalcy:** A message focusing on how the vaccine will help us return to normal life.
- **Risk Comparison:** A message focusing on how the risk of vaccination is much smaller than the risk of COVID-19.
- **Patriotism:** A message focusing on how vaccination is a patriotic American's duty.
- **Appeal for Black Americans:** A message focusing on acknowledging Black Americans' distrust of vaccination and framing the COVID-19 vaccine as their right.
- **Collectivism:** A message focusing on the many different people who have worked together to make vaccination accessible to the American public.

After viewing their assigned statement, participants will rate it on a number of dimensions, then indicate how likely they are to receive a COVID-19 vaccine.

Participants will then be asked about their perceptions of the COVID-19 vaccine, their safety behaviors around COVID-19, and their thoughts about the end of the pandemic.

Results

Results are pending the completion of the study by the end of March 2021.

Implications

Implications are pending the completion of the study by the end of March 2021.

IV. Guides and Handouts

COVID-19 Communications Guide

Using behavioral science, local governments can adopt the following recommendations in their communications to effectively engage with community members and motivate continued social distancing and mask wearing.

COVID-19 Communications Guide

Using behavioral science, local governments can adopt the following recommendations in their communications to effectively engage with community members and motivate continued social distancing and mask wearing.

Do's vs. *Don'ts*

Make the Message Simple, *Don't Over Rely on Scientific Terms*

While it is important to provide up to date COVID-19 data to community members, avoid too many technical terms. **Bounded rationality** demonstrates that if readers cannot easily understand the message, they will gloss over the information. Prioritize the key point and use catchy phrases in communications.

Prime the Desired Behavior, *Don't Send Messages out of Context*

Sometimes people need a little "nudge" to behave in a prosocial way. Use simple signage to prime a desired behavior and remind people to social distance and wear masks. Consider posting signage on handwashing in bathrooms and included a popular song to mark handwashing duration.

Pair Fear with Actionable Prompts, *Don't Provoke Extreme Emotion*

Communications that elicit **fear can be effective**, but only when **paired with actionable prompts** to avoid the threat. Be specific in how to reduce the spread of COVID-19 versus only emphasizing the deadly nature of the virus. **Avoid provoking any heightened reactions** to content. While fear tends to increase perception of risks, anger reduces it.

Frame Restrictions in Terms of Gains, *Don't Use Loss-Framed Messaging*

The **Prospect Theory** demonstrates that people make decisions based on expected gains or losses. For COVID-19 communications, focus on the **positive benefits gained** from social distancing and mask wearing. Loss-framed messages in this context may elicit anger and frustration instead of fear, and can cause people to rebuke the communication.

Emphasize Desired Behavior Engagement, *Don't Publicize Non-Adherence*

Social norms are highly effective in motivating behavior and people are more willing to cooperate with rules if they believe others are also complying. **Emphasize engagement** in social distancing and mask wearing over non-adherence. **Show your appreciation** for community member compliance to motivate ongoing cooperation.

Keep it Local, *Don't Use National Examples Only*

Localize communications and appeal to people's pride in the community. Consider incorporating popular local expressions or mascots into your messages. Additionally, **leverage community partners**, like churches, to collaborate on and distribute communications.

Have Consistent Cadence and Format, *Don't Send Constant Notifications*

Many community members may already have **"COVID-Fatigue"** and will ignore messages if they are sent too frequently. Send communications in a **consistent cadence and format**, and consider limiting to 1-2 messages per week.

Behaviorally Annotated Mask Posters

Strategically placed posters are one of the most effective channels for counties to consistently spread public health recommendations and guidelines. Rather than develop customized posters for each county, we created a set of posters encouraging mask compliance in both indoor and outdoor settings. The posters were then annotated with behavioral principles to show counties exactly which behavioral insights were being leveraged in each component of the poster. In doing so, our objective was to show counties how they could leverage behavioral principles in their own communication efforts.

Mask Posters (English)

Behaviorally Annotated Mask Posters (English)

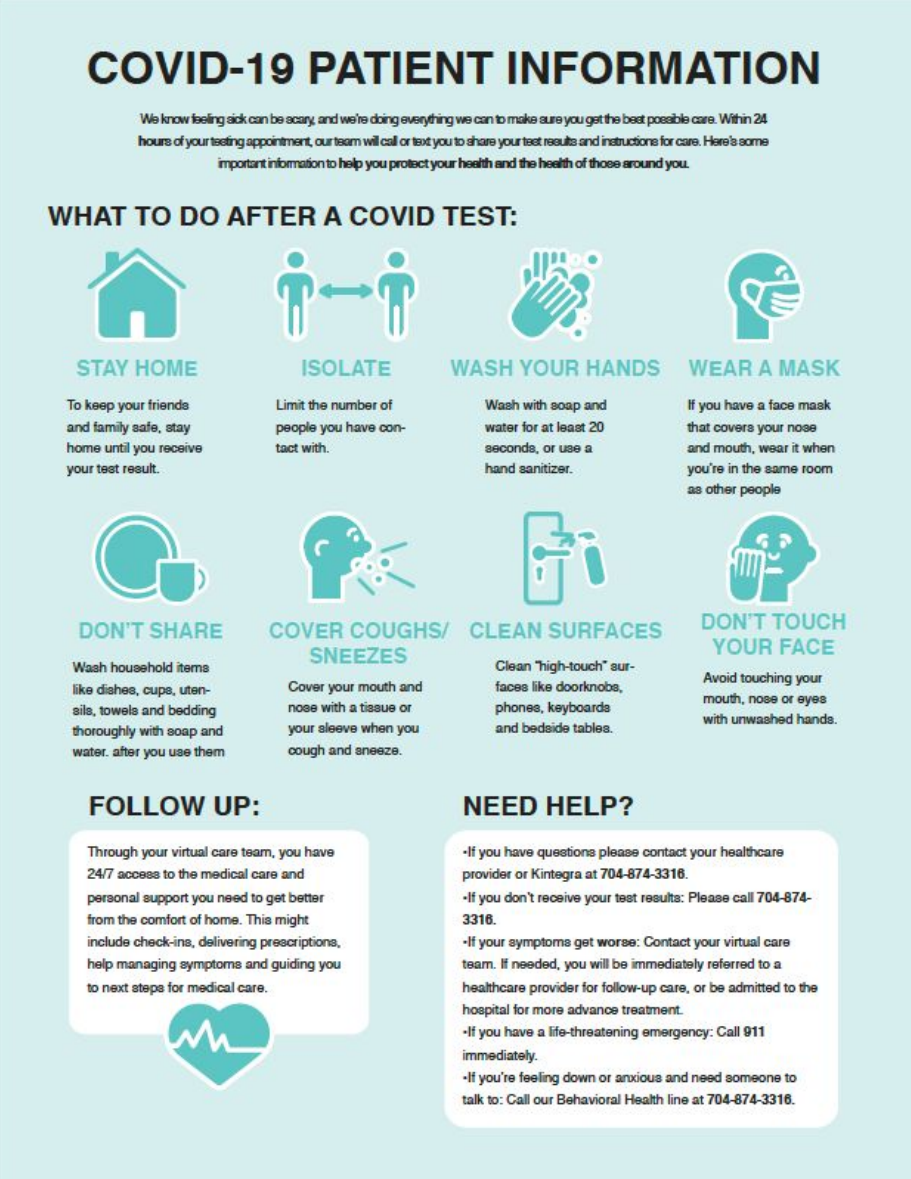
Behaviorally Annotated Mask Posters (Spanish)

Post-COVID Test Education Handout

After being tested for COVID-19, patients generally receive a handout educating them on what to do following the test. These handouts varied across counties, as well as test providers, but they shared several similarities that made them difficult to read:

- Lengthy (often more than one page)
- Text only (no images or graphics)
- Repetitive information

The updated handout was easier to read and more attractive, increasing the likelihood that patients would actually retain the education material.



COVID-19 PATIENT INFORMATION

We know feeling sick can be scary, and we're doing everything we can to make sure you get the best possible care. Within 24 hours of your testing appointment, our team will call or text you to share your test results and instructions for care. Here's some important information to **help you protect your health and the health of those around you.**

WHAT TO DO AFTER A COVID TEST:

STAY HOME

To keep your friends and family safe, stay home until you receive your test result.

ISOLATE

Limit the number of people you have contact with.

WASH YOUR HANDS

Wash with soap and water for at least 20 seconds, or use a hand sanitizer.

WEAR A MASK

If you have a face mask that covers your nose and mouth, wear it when you're in the same room as other people

DON'T SHARE

Wash household items like dishes, cups, utensils, towels and bedding thoroughly with soap and water. after you use them

COVER COUGHS/ SNEEZES

Cover your mouth and nose with a tissue or your sleeve when you cough and sneeze.

CLEAN SURFACES

Clean "high-touch" surfaces like doorknobs, phones, keyboards and bedside tables.

DON'T TOUCH YOUR FACE

Avoid touching your mouth, nose or eyes with unwashed hands.

FOLLOW UP:

Through your virtual care team, you have 24/7 access to the medical care and personal support you need to get better from the comfort of home. This might include check-ins, delivering prescriptions, help managing symptoms and guiding you to next steps for medical care.

NEED HELP?

- If you have questions please contact your healthcare provider or Kintegra at **704-874-3316**.
- If you don't receive your test results: Please call **704-874-3316**.
- If your symptoms get **worse**: Contact your virtual care team. If needed, you will be immediately referred to a healthcare provider for follow-up care, or be admitted to the hospital for more advance treatment.
- If you have a life-threatening emergency: Call **911** immediately.
- If you're feeling down or anxious and need someone to talk to: Call our Behavioral Health line at **704-874-3316**.

Promotional Item Distribution Guide

Rather than simply providing counties with promotional items and leaving them to their own devices, we developed specific, context-specific language and templates to help guide county distribution efforts. This distribution guide was focused primarily on the Vaccination Promotional Items and leveraged relevant behavioral principles, such as:

Subject line focuses on core behavior

- *[URGENT] Help Our Community COVID-19 Efforts by Sharing This Video We Created!*

Keeping the request concise

- Please share this brief video to help inform your friends, family, and co-workers about how the COVID-19 vaccines were developed!

Showing your work (highlight the time and effort put in by so many organizations)

- Your help means so much to us–our weeks of planning and development with researchers and designers at N.C. State, Duke and PNTA will be for nothing if you don't help us to spread our video far and wide.

Appealing to sense of community

- Let's make Bull City proud!

Make it easy to share (just click on the link)

Using authority to grab attention

- Have pastors, administrators, doctors, and local business leaders promote the materials.

Checklist (easy, defined steps)

- 1. Click the video to watch
- 2. Copy this link and share with friends and family on social media!
- 3. To go the extra mile, copy this message to send to your friends and family!

Vaccination Journey Map

There are a number of steps required for a person to successfully receive a vaccination. Our team has consulted interviews, survey results, and scientific articles to build out a map of the vaccine journey. This document is designed to help local governments identify the ideal places and methods for intervention, depending on the specific issues their own populations face.

We identify six particular stages of interest:

1. Learn about the vaccine
2. Decide to get vaccinated
3. Prepare to get vaccinated
4. Get vaccinated
5. Vaccine aftercare
6. Share the vaccine experience with others

For each of these stages, our map breaks down the barriers that people might face in achieving it, potential messaging strategies to address those barriers, useful messengers to apply those strategies, and additional intervention opportunities that go beyond messaging. Please click here to access a full-size version of our vaccination journey map:

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Stages	Learn about the vaccine	Decide to get vaccinated	Prepare to get vaccine	Get vaccinated	Vaccine aftercare	Share experience with others
Steps What is the step-by-step process of completing each stage in the vaccination journey?	1. Hear about the vaccine for the first time. 2. Seek out more information about the vaccine.	1. Consider what they've heard about the vaccine. 2. Those who are unsure may seek out more information.	1. Look into how, when, and where to receive a vaccine. 2. Those who will get vaccinated at a doctor's office make an appointment. 3. Others may plan to attend public vaccination events, drive-through vaccinations, etc.	1. Make it to the vaccination location on time. 2. Successfully receive first shot. 3. Three weeks later (for most vaccines), get the second vaccination.	1. Keep taking measures to stay safe between the first and second shot. 2. If minor arm pain or fever symptoms are experienced, some care may be needed.	1. Tell friends, family, and coworkers about vaccination. 2. Post about the vaccine experience on social media.
Barriers What challenges, beliefs, or obstacles could prevent people from moving through each stage?	Good information may be hard to find for people who are underserved, like the unhoused. Credible sources like medical organizations may be distrusted, especially by historically marginalized populations. Their messages might come off like they want to persuade people to just get vaccinated, rather than really respecting their concerns. On the other hand, people spreading misinformation may sound and feel more credible by playing into existing beliefs or using vivid anecdotes.	The COVID-19 vaccine is brand new and was created with new technology at record speed. This frightens people afraid of side effects, especially long-term ones. Political unrest and politicization of the pandemic/vaccine also play a major role. Some people may distrust the scientific process because they believe political forces pushed for the vaccine to be approved before it was safe. Others may feel required to avoid the vaccine to stick to their political beliefs.	Knowing when you can get vaccinated can be difficult, given the rollout of different phases. Even if you're eligible for vaccination, you may find it difficult to get an appointment given high levels of demand. Vaccinations are also available in different places (pharmacies, doctor's offices, health departments) depending on where you live. People who live in remote areas, have a lack of transportation, or don't have a lot of spare time may struggle to get to vaccination locations.	Long waits at vaccination events or appointments could cause people to give up. Fear of catching COVID-19 while waiting for a vaccine might encourage people to stay home. Two shots means twice the opportunity to forget an appointment and fail to return.	Proper vaccine aftercare may be misunderstood due to a lack of information. Some people may experience allergic reactions to the vaccine, which may worry others. Users may be less likely to socially distance or wear masks after the first and second shots if they believe there is no more risk. People may think they have 100% complete immunity against COVID-19.	Ideally, we want people to share positive experiences and encourage those around them to get vaccinated. But people with negative experiences may be more likely to share them, and their stories may be more vivid. People whose friends, family, or coworkers are not pro-vaccination will be hesitant to try and convince them. Underserved populations may not have access to platforms like social media to share their experiences.
Effective messaging What messages can we offer in response to these barriers?	Information from reliable sources can be trusted. Medical professionals are here to inform, not persuade. Misinformation can be recognized by the use of fake credentials and personal stories. Historically, marginalized populations have good reasons to mistrust medicine, but have greater risk from COVID-19. Vaccine access is their right.	The vaccine, while not completely without risk, is safe and trustworthy. The process of its development was thorough and complete. You're not a guinea pig. Many people tried it long before it was ever released to the public. Getting the vaccine is the patriotic thing to do - let's band together to protect our country, state and community.	In this stage, the concern is less around persuading and motivating people and more about using messaging to help overcome structural obstacles. Clear communication about when, where, and how people can get vaccinated will be critical to overcome this barrier. Offering people ways to plan their vaccination (like registration systems) is also crucial.	We won't be safe until we all take the final step and get vaccinated. You wouldn't want half of a lottery ticket - don't settle for half of a vaccine! As soon as you've gotten your first COVID-19 vaccine, take a minute to set a reminder for the second shot.	The vaccine is highly effective after 2 doses but it cannot gaurantee complete immunity - keep on wearing your mask! Feeling a little under the weather after you get your COVID-19 shot is a sign that the vaccine's working. Vaccinated people might be able to pass on COVID-19 even if they don't get sick, so stay careful to keep your family safe.	Let other people know why you chose to get your COVID-19 shot! Tell the world how good it feels to be protected against COVID-19. Take this chance to show you're part of the solution and share your COVID-19 vaccination experience.
Useful messengers Who can help us get our messages across?	Healthcare providers, especially personal doctors and pharmacists; trusted members of social networks.	Respected local celebrities and figures; personal doctors and pharmacists.	Local government officials; pharmacists or other healthcare providers who can deliver vaccination; local news and media.	Healthcare workers preparing and giving the vaccine.	Healthcare providers; local celebrities and figures who have already been vaccinated.	Vaccinated individuals, including local celebrities and figures; social media influencers and users.
Intervention opportunities What can we do to knock down barriers and encourage vaccination?	Distribute the vaccination promotional ads we've created through multiple channels to increase their impact. Public signs and pamphlets can help people without Internet access learn about the vaccine. Social media and online advertisements can send targeted messages to specific communities that engage with their special concerns. Activities like our Vaccination Game can be used to help people recognize and resist misinformation.	Encourage religious leaders to support the vaccine in their communities. Send messaging from most trusted sources who have pull in the local community. Acknowledge fears and show transparency in messaging to encourage trust. Emphasize how safe and effective the vaccine is and that it's been carefully tested.	Offer videos and posts with instructions for getting the vaccine. Have mobile vaccination stations in public areas for convenience. Consider arranging vaccination events in further-flung communities. If possible, build a robust system to help people track when and where the vaccine becomes available.	Send text message reminder 2 days before the 2nd vaccination, with a request for the user to confirm their appointment. Send calendar invites for both shots at the same time, or have the user book two appointments at the same time. Hold open-air vaccination events where possible to lessen the risk of COVID-19 transmission.	Hand out masks with positive vaccination messaging to people post-vaccination to encourage mask-wearing as a continued behavior and promote what they are doing to others. Offer clear instruction around vaccination aftercare. Maintain safety precautions even in areas where individuals have already been vaccinated (until herd immunity is reached).	Use the email sharing script to easily share the vaccination promotional ads with others and encourage them to do the same. Create a campaign highlighting the experiences of locals who have been vaccinated against COVID-19. Use promotional items like buttons and stickers to let people advertise their vaccinated status. Consider working with local businesses to reward vaccinated individuals. Design social media features for sharing your vaccination experience.

V. Advertising and Promotional Items

Holiday Safety Video and Graphics

Any time people get together, there is an increased risk of COVID-19 transmission. Whether people planned on hosting or attending an event, we provided some tips for gathering safely and preventing the spread of the virus over the winter holidays. These tips were delivered via two connected initiatives that leveraged the strengths of graphic design and behavioral science in the form of videos, images, and checklists.

All materials are accessible at https://waystocelebrate.com/. The website was designed to provide an experience for public viewers and an easy download-to-distribution for organizations.

Members from the public could explore the safety holiday tips via the two interactive journeys optimized to encourage commitment to action and sharing:

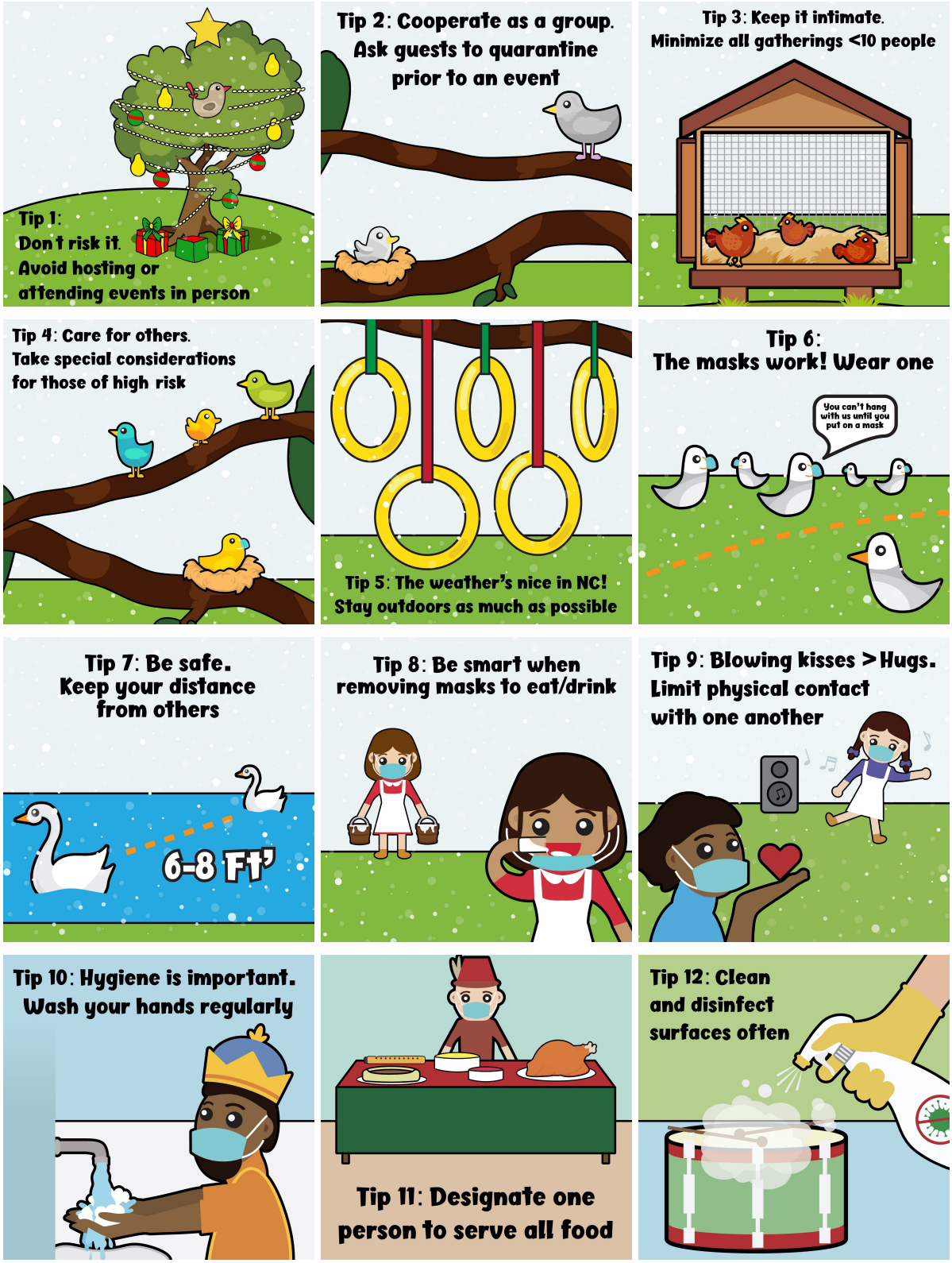
1. Safe Ways to Celebrate video supported with relevant checklists
2. Healthy Holiday Tips for each of the 12 days of Christmas

Viewers also had the option: “Please click here if you are a municipality, county, state, or company that is interested in distributing this material,” which redirected people to one of two pages (Videos and Checklists or Healthy Holiday Tips) where they could download and share all of the videos and graphics, with customized sizes and versions for different platforms.

Safe Ways to Celebrate Video:

Safe Ways to Celebrate Checklists:

12 Days of Christmas:

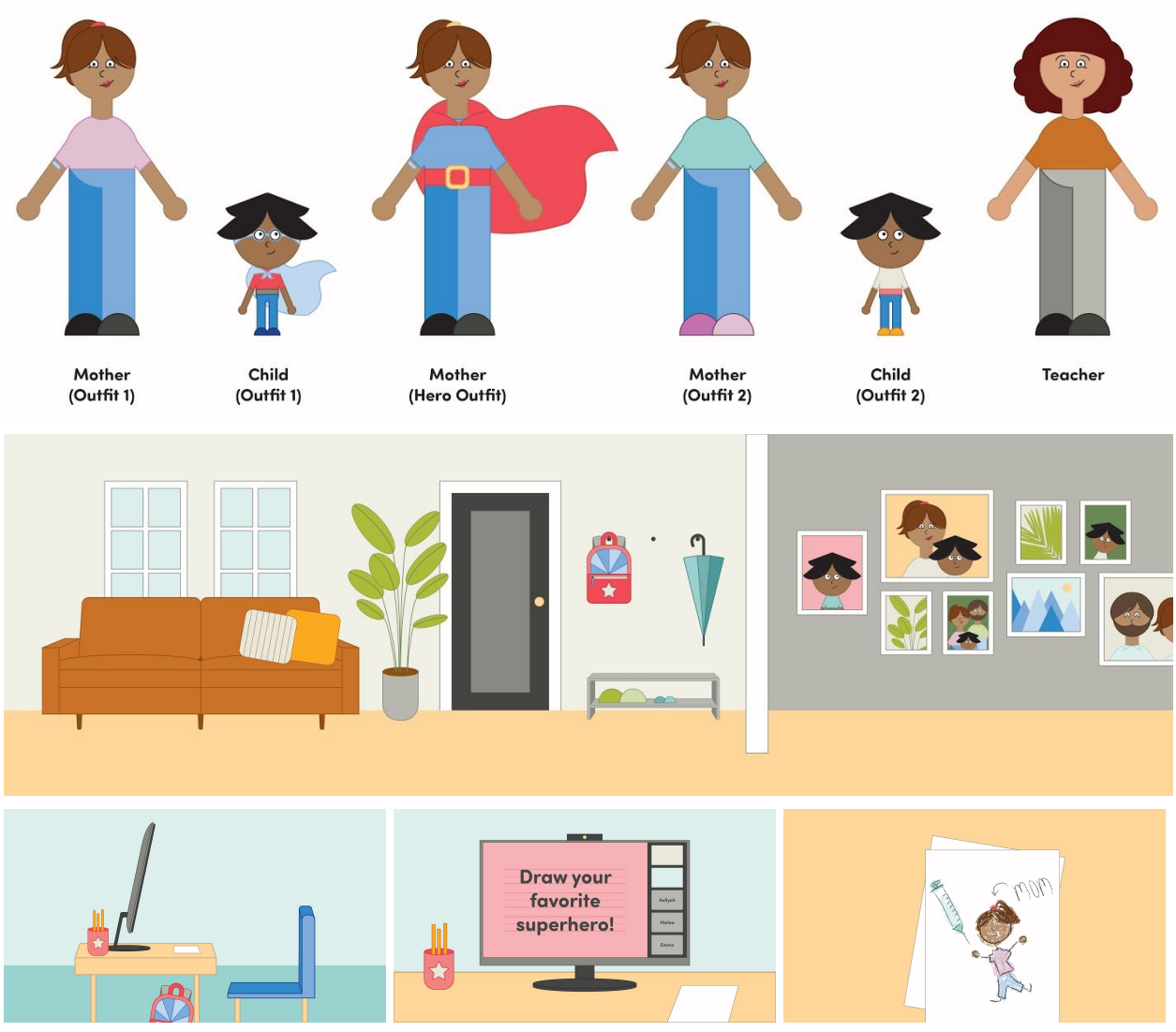


Vaccination Promotional Items

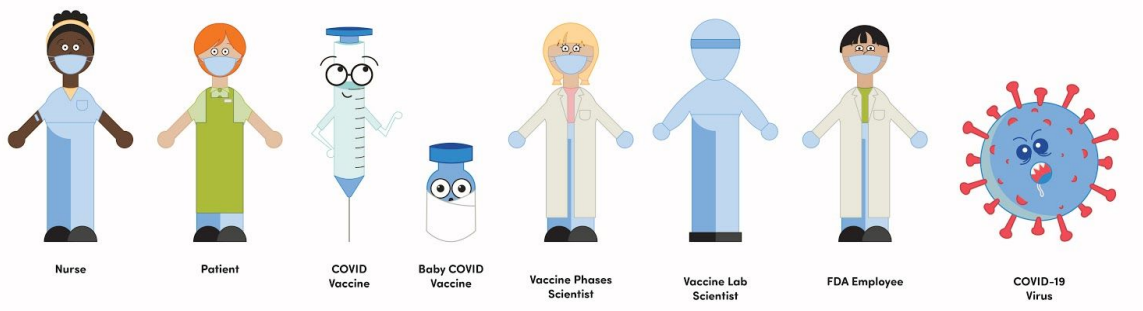
Halfway through the project, the NC State Design team won a grant offered by UNC to support this existing project, based on the collaborative efforts of unifying behavioral science with human-centered design.

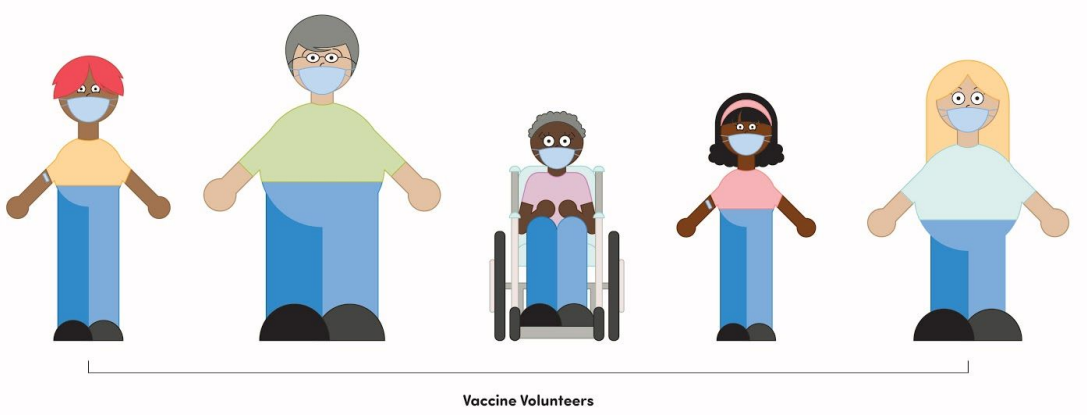
With the ongoing support and iterative feedback from the counties, we developed a plan for the design, production, and distribution of various promotional materials including professionally produced videos, as well as buttons, stickers, and masks with vaccination messaging.

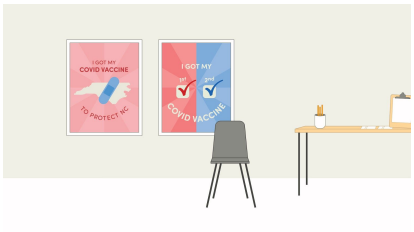
Video 1: COVID-19 Vaccines: Be a Hero (Spanish Version) → When you get vaccinated, you're protecting yourself and your loved ones—and you're showing your community what it means to be a real-life superhero.

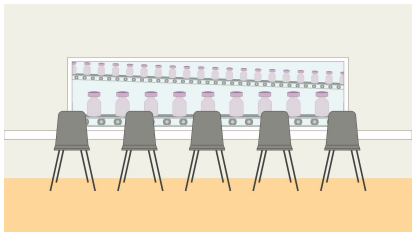


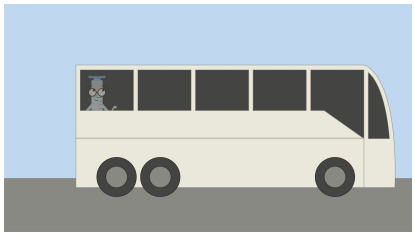
Video 2: COVID-19 Vaccines: Inside the Process (Spanish Version) → COVID-19 vaccines are safe and effective. How do we know? Because they've undergone a thorough testing and approval process before arriving in your community. This video gives you a peek inside that process.









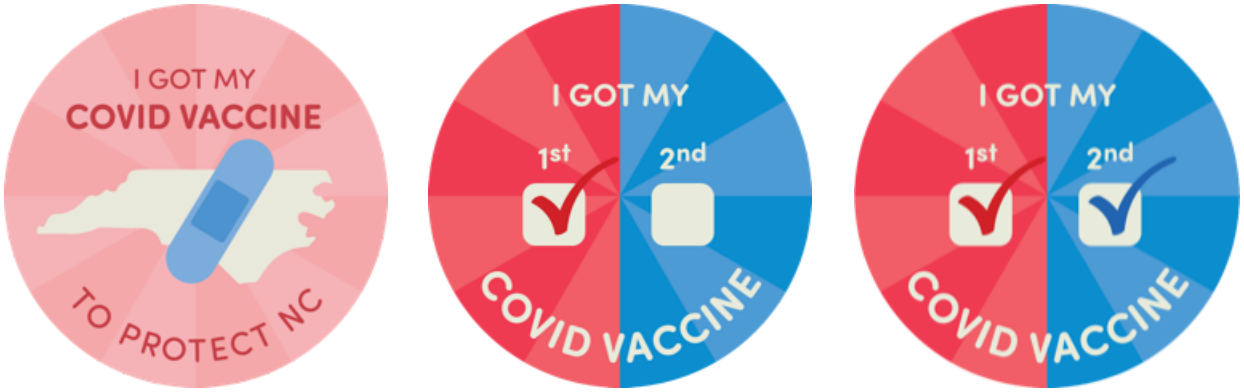


Video 3: COVID-19 Vaccines: The Next Step Forward (Spanish Version) → The pandemic may have kept us apart, but we've still found ways to connect like never before. Now it's time to take the next step forward—and get back to the people and places we love.

In addition to county distribution of these videos, we purchased ads that will appear in both English and Spanish across Facebook and Google's ad network. They will be geotargeted to only show within the five counties and will run from the beginning of March to mid-April. Additional targeting details will be added so that the ads appear to people our research found to be most hesitant to receive the vaccine (e.g., conservatives, women, and people of color).

In addition to the videos, each county received 1,000 custom masks, as well as almost 25,000 buttons, designed to highlight the social desirability of receiving a COVID-19 vaccination. All counties were also provided with the graphic files necessary to produce their own stickers.

Button Design and Double Sticker Designs:



Mask Design:

All promotional items underwent extensive prototyping and were designed to appeal to the target populations identified as vaccine-hesitant in previous research. They were designed with a similar style and cohesive messaging to maximize impact.

VI. Conclusion

Challenges

As can be seen from the majority of this report, this project accomplished quite a bit. However, it was not without its challenges. These challenges can mostly be attributed to one of two factors: the rapidly changing COVID-19 environment and the novelty of this collaborative structure (and of course the interaction between the two).

By now, everyone is well aware of the countless disruptions brought about by COVID-19. These constant disruptions made it difficult to thoroughly plan the entire six-month engagement from the start. The uncertainty also forced us into hedging our bets by focusing on more "certain" target behaviors. For example, some schools were fully open while some schools opted for a hybrid learning approach, and there was no guarantee that these decisions would remain steady throughout the year with the volatility of COVID-19 cases. So, rather than focus on remote learning, something we initially determined to be a very high-yield problem, we decided to focus (at least partially) on maintaining distancing and mask compliance–target behaviors which we thought would have a lower impact than remote learning, but knew they would be required for the foreseeable future.

Another example was our decision to not focus primarily on vaccinations. Focusing on a single behavior would have enabled more depth and rigor. However, when crafting the structure of the project in August, we had no way of knowing that the COVID-19 vaccines would start rolling out as early as December. Had we known (with Advanced Hindsight), we would have focused the entirety of our efforts on vaccines - testing interventions with flu shots from August-October with the hopes of having COVID-19 vaccination interventions ready to test in December. But it is important to also consider the counterfactual. Had we dedicated all of our resources to vaccination and the COVID-19 vaccine was not authorized for rollout until mid-2021, we would have missed out on providing any immediate benefit to the counties– not to mention, our exploratory work may not have held up, as we know how quickly beliefs and perceptions can change.

Further, we underestimated the time it would take to launch some of our testing. Five counties had five different populations with varying beliefs, attitudes, and perceptions. There was certainly some overlap, but it was important for us to be thorough throughout the exploratory phase. Aside from the need to obtain appropriate approvals from counties when distributing surveys through county channels, the emphasis on collaboration created a back and forth that, although productive and insightful, was not very efficient.

All in all, this "experimental" project was encouraging. Not only were we able to help North Carolina counties improve their COVID-19 response efforts, we laid the groundwork for future collaborative efforts that would hopefully be less constrained. Here's what we learned along the way:

Start Small → Rather than using a "divide and conquer" approach, focus on one specific target behavior. Counterintuitively, having a large group of researchers, designers, and county stakeholders does not allow you to achieve more if they are all pulling at different threads.

Identify Point People → Rather than involving every person on every meeting and email thread, identify 2-3 people (internal champions) from each county who a) have been engaged throughout the process and b) have the bandwidth. Ideally, the point people would relay relevant messages to the appropriate folks within their county. This allows for more efficient communications.

Maintain Consistent Communication Cadences → Communications work best when they follow a regular pattern. Rather than send emails every time you have an update, select a day or two in which all updates and calls to action will be delivered. As the project evolved, two emails were sent out every week (as well as posted to the project Slack channel)–one was sent every Monday to highlight the week ahead and one was sent every Friday to summarize the current week. Most of our meetings took place on Wednesday's, so any additional updates could be shared at that time. If urgent updates needed to be sent throughout the week, they were only sent to the relevant stakeholders.

Don't Start from Scratch → So many amazing behavioral scientists from around the world have done such great work before and during COVID-19. Rather than duplicate efforts, learn from successful (and failed) interventions. Conduct comprehensive literature reviews and combine behavioral science best practices with your exploratory work to develop thoughtful interventions that expand the current knowledge. Our team did this reasonably well, which allowed us to accomplish as much as we did in a relatively short amount of time.

Prioritize Strong Field Experimentation → Exploratory work and lab experiments provide valuable insights and are necessary components of the research process. This allowed us to propose evidence-based recommendations to the counties regarding groups of interest, effective messaging, and more. With that being said, it is essential to test how these interventions work in the field. Field experimentation generally requires more time and resources, so it can often fall by the wayside in limited settings. Make this a non-negotiable and lock field experimentation into your project plan ahead of time.

Next Steps and Future Directions

Although it's certainly under better control than previously, COVID-19 is still an ongoing crisis. We hope that our work here has left our partner counties in a better position than when we started. Looking to the future, we hope to be lucky enough to work with these partners on future projects in other domains, modeled after this collaborative approach. There are countless behavioral problems out there that can often seem overwhelming, but it's amazing what we can accomplish when we're all pulling in the same direction.