

COVID-19 VACCINATION UPTAKE BEHAVIORAL SCIENCE TASK FORCE:

FINAL REPORT – FEBRUARY 23, 2021

PRESENTED TO LEE A. FLEISHER, M.D., CMS CHIEF MEDICAL OFFICER AND DIRECTOR OF THE CENTER FOR CLINICAL STANDARDS AND QUALITY, FOR DISTRIBUTION TO COLLEAGUES AT THE DEPARTMENT OF HEALTH & HUMAN SERVICES (“HHS”).

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Submitted By:

- Dr. Sigal Barsade University of Pennsylvania, Task Force Co-Chair
- Dr. Jenny Chatman University of California, Berkeley, Task Force Co-Chair
- Dr. Angela Duckworth University of Pennsylvania, Task Force Co-Chair
- Jonathan Barsade Exactor, Former CEO
- Dr. Alison Buttenheim University of Pennsylvania
- Dr. Gretchen Chapman Carnegie Mellon
- Dr. Robert Cialdini Arizona State Univ (Emeritus)
- Dr. Lindsay Dhanini Ohio University
- Dr. Berkeley Franz Ohio University
- Dr. Terry Fulmer The John A. Hartford Foundation
- Dr. Tom Gilovich Cornell University
- Dr. Adam Grant University of Pennsylvania
- Dr. Neil Lewis Cornell University
- Dr. Scott Ratzan CUNY Graduate School of Public Health
- David Sable Young & Rubicon, Former CEO
- Dr. Barry Staw University of California, Berkeley

Final Report Drafted By:

- Sivahn Barli University of Toronto
- Marissa Thiel Cleveland Clinic

Research Report & Meta Analysis, Authored By:

- Dr. Lindsay Dhanini Ohio University
- Dr. Berkeley Franz Ohio University

For questions regarding this report please contact Professor Sigal Barsade, barsade@wharton.upenn.edu.





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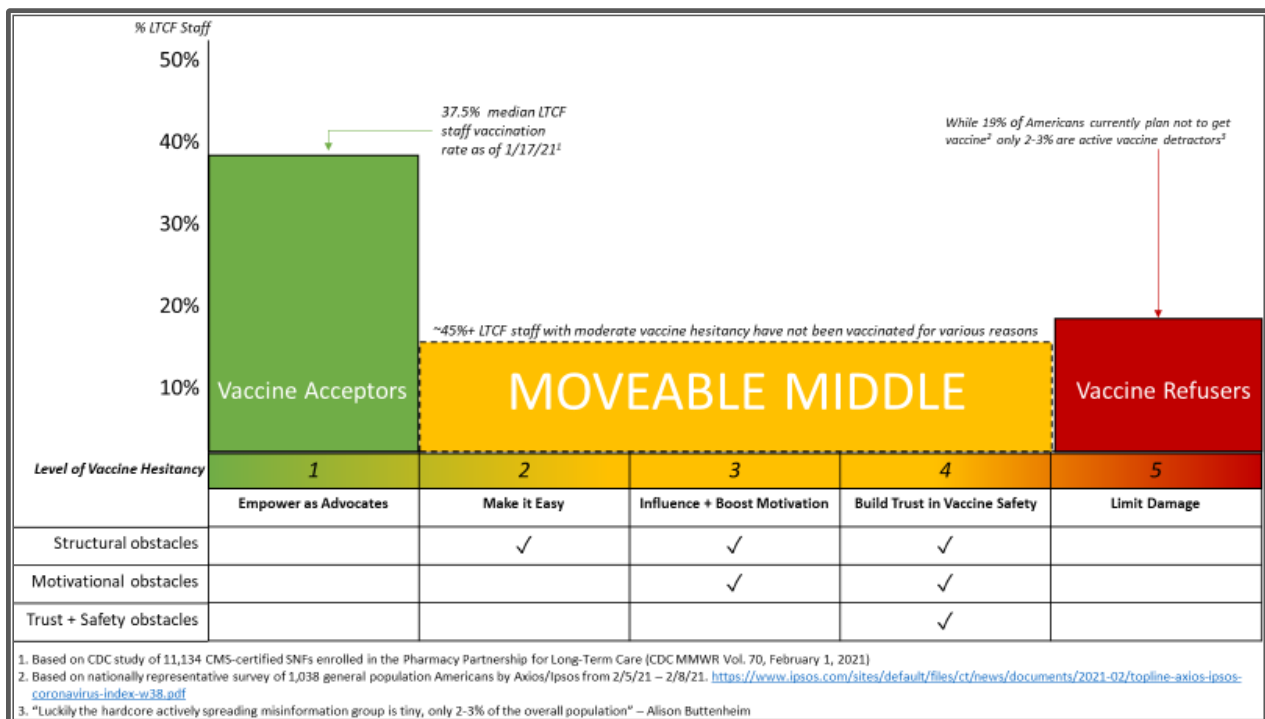


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EXECUTIVE SUMMARY

In this COVID-19 Vaccination Uptake Behavioral Science Task Force Final Report we integrate insights and concrete/practical recommendations from a high-level team of behavioral science experts regarding a specific question – how can we increase COVID-19 vaccine uptake among employees of long-term care facilities? This report consists of the following components:

- 1) An initial review of research findings about factors correlated with vaccine uptake and meta-analysis of predictors of COVID-19 vaccine uptake specifically, written for this task force report by Professors Lindsay Dhanini & Berkeley Franz. The full review & meta-analysis can be found in [Attachment V, page 29](#).
- 2) Specific suggestions to improve vaccine uptake among Long Term Care Facility staff from each task force member, based on their research expertise (please [see Attachment I, page 10](#)). These suggestions, and Dhanini & Franz’s research review and metal-analysis served as the basis for our “**COVID-19 Vaccination Uptake Behavioral Science Task Force Model**” – consisting of the following 5 subgroups (see page 4-8 for the full description of the model). We also identified key ‘big picture’ challenges related to influencing each group. Commentary on how to overcome those challenges can be found in [Attachment II, Vaccine Uptake Challenges, page 17](#)



- 3) On February 11, 2021, the members of the task force met for two hours with approximately 90 invited government guests from CMS/CCSQ, CDC and HHS to discuss the preliminary model, specific suggestions, and research review. In addition, task force members also responded to operational and practical attendee questions in chat via email following the meeting, which is in [Attachment III](#)

- 4) While this behavioral science focused report is aimed to understand and encourage vaccine uptake among LTCF employees, it may well have applicability to a broader segment of the population, including Medicaid recipients.

INTRODUCTION AND PROBLEM STATEMENT

In December, the CDC launched the Pharmacy Partnership for Long-term Care Program to facilitate on-site vaccinations at Long Term Care Facilities (“LTCF”). Initial vaccine uptake was relatively successful among residents, with a median of 77.8%¹ receiving at least 1 dose of the vaccine, however uptake has been much lower among staff, with only a median of 37.5% receiving a dose (Gharpure et al., 2021). Although there is some chance that staff were vaccinated through other programs not captured in the uptake analysis, clearly, there remains a significant barrier to achieving vaccination rates that are needed for herd immunity among the Long-Term Care Facility staff.

We convened a group of leading behavioral science experts from top institutions with expertise across organizational behavior, psychology, healthcare communication, and policy and marketing to identify opportunities for improving COVID-19 vaccine uptake among the LTCF staff population. Our Task Force has focused on interventions that may boost vaccination uptake levels among LTCF staff specifically. Of course, there may be solutions that are outside of the scope of the behaviorally-based, influence-oriented attitudinal and motivational interventions that we offer in this report, they have not been the focus of our work. In the following pages, we outline the key findings and recommendations from the group. It should be noted that any recommendations would benefit from ongoing study after implementation to ensure that programs can be refined to optimize vaccination uptake. A number of our task force members are eager to help conduct this research should LTCFs or other relevant organizations or agencies be interested in doing so.

PRELIMINARY RECOMMENDATIONS

Our working assumptions are that:

- Long Term Care Facility staff can be divided into three primary groups:
 - Those who have already been vaccinated and are the most powerful **Advocates**.
 - Undecided and hesitant, which are referred to as the **Movable Middle**. We have classified this group into three permeable subgroups with cumulative suggestions and recommendations for vaccine uptake for each.
 - Vaccine Refusers, or **Detractors** who may be more or less vocal about their concerns.
- Vaccine hesitancy is an attitude, not a behavior:

“WHO definition notwithstanding, I would encourage us to think about and talk about “hesitancy” as an attitudinal or motivational state, and not a behavior. Vaccine acceptance or refusal (or delay) are behaviors; hesitancy is not.” – Alison Buttenheim
- Information is not sufficient to change behavior. The meta-analysis indicated that passive interventions alone, such as infographics, have weak effects. In addition, there is a large social science literature showing that “sharing the facts” with a person doesn’t necessarily change their behavior:

1 Interquartile range [IQR] = 61.3%- 93.1%

“Stated reasons [of vaccine hesitancy] do not necessarily equate to levers that can be used to change behavior. For example, someone may say that they don't want to vaccinate because of concerns about infertility, but that does not mean that a message that the vaccine carries no fertility risks will change beliefs or that changed beliefs will result in changed behavior.” – Gretchen Chapman

“Of course, having good information is critical and it's one of our levers in the model. However It is not enough to have it alone. Good information – a great website, an eye-catching infographic– these passive interventions were not as effective on their own. They needed to be partnered with active psychosocial interventions as well.”– Sigal Barsade

- Internal organizational culture will differ between facilities, as will supervisor-employee relationships, which will have an influence on availability and choice of vaccine update strategies.

“A LTCF's culture, particularly the extent to which it has emphasized norms such as pulling together for the greater good and inclusiveness and respect among staff and between staff and management, will influence how much effort the organization will need to exert to increase vaccine uptake among staff.” – Jennifer Chatman

Given these assumptions, it is clear that there is no one size fits all solution for addressing the issue of vaccine hesitancy. Rather, interventions must be multiple, layered and deployed at a local level, taking into consideration the context of the organization and its employees.

The behavioral task force's preliminary recommendations are as follows:

- Rather than target all staff with a uniform intervention, we recommend that LTCFs focus interventions on the three subgroups in the **movable middle** (i.e., individuals who express some vaccine hesitancy but are responsive to changing their minds). There are three cumulative sets of behavioral strategies upon which we elaborate later in this memo:
 - Make it easy.
 - Influence and boost motivation.
 - Build trust in vaccine safety.
- For **vaccine adopters**, who need no convincing, we suggest ways in which their influence can be leveraged to motivate and build trust within the movable middle.
- For **vaccine detractors**, on the other hand, the strategy is to minimize the negative impact they may have on the vaccine uptake of their coworkers.
- Overall, we recommend applying a cumulative, layered approach with different intervention options available to LTCFs from which to select, based upon their understanding of their needs and population and their culture and relationships. We believe that this approach will enable the LTCF's them to customize, and thus optimize, their respective solutions.

TASK FORCE PROCESS

Phase 1 involved two of our committee members, Professors Lindsay Dhanani and Berkeley Franz, conducting a literature review on vaccine uptake and hesitancy on historical data as well as a meta-

analysis² of the Covid-19 pandemic vaccine uptake specifically. The results of this report are summarized below, and attached separately.

Phase 2 involved asking all academic committee members for recommendations to increase vaccine acceptance among Long Term Care Staff – [please see Attachment I](#) below for the complete list of recommendations, categorized by vaccine hesitancy subgroup. We used these recommendations and literature review to create the model we describe below. Phase 2 continued with a meeting among the task force members and approximately 90 government guests from CMS/CCSQ, CDC & HHS to discuss the COVID-19 Vaccination Uptake Behavioral Science Task Force Recommendations, and ask additional questions.

Phase 3 (TBD) will involve empirical tracking and vaccine uptake testing and attitudes of the LTCF staff population, and adjusting recommendations accordingly. A number of panelists are interested and available to collaborate on this research.

LITERATURE REVIEW & META ANALYSIS EXECUTIVE SUMMARY

Phase I Literature Review and Meta Analysis Executive Summary (Dhanani & Franz, 2021).

Findings regarding vaccine uptake in general:

- Vaccine uptake and hesitancy are predicted by sociocultural characteristics, trust in science and medicine, past experiences with vaccines and the health care system, receiving a recommendation from a health care provider, and exposure to media.
- Older adults have high rates of vaccination, but uptake is lower among low-income and rural older adults. Educational interventions and those that include action plans have effectively increased vaccine uptake among older adults.
- Long-term care staff and residents have relatively low vaccine uptake rates and this may be due to misinformation, high burnout, and other demographic characteristics. Uptake rates can be improved with local, targeted interventions.
- Racial/ethnic minorities are significantly less likely to be vaccinated than Whites and experiences with and trust in health care providers are important determinants of uptake. Intervention evidence has been mixed.
- Other effective interventions include those that target specific unvaccinated populations, increase vaccine knowledge, improve access and convenience, mandate vaccinations, engage religious and community leaders, and are community based.

Findings regarding COVID-19 vaccine uptake specifically:

- Meta-analytic study on COVID-19 suggests that women, Republicans, low-income, and Black respondents are more likely to refuse the vaccine. Older adults are less likely to refuse.
- Perceptions of risk and vulnerability, exposure to misinformation, and access to health care also predict COVID-19 vaccination intentions.
- Messages that emphasize vaccine efficacy and mitigate fears of side effects reduce COVID-19 vaccination hesitancy. COVID-19 vaccine mandates in particular are seen unfavorably.
- The research literature indicates that there is no “one size fits all” solution.

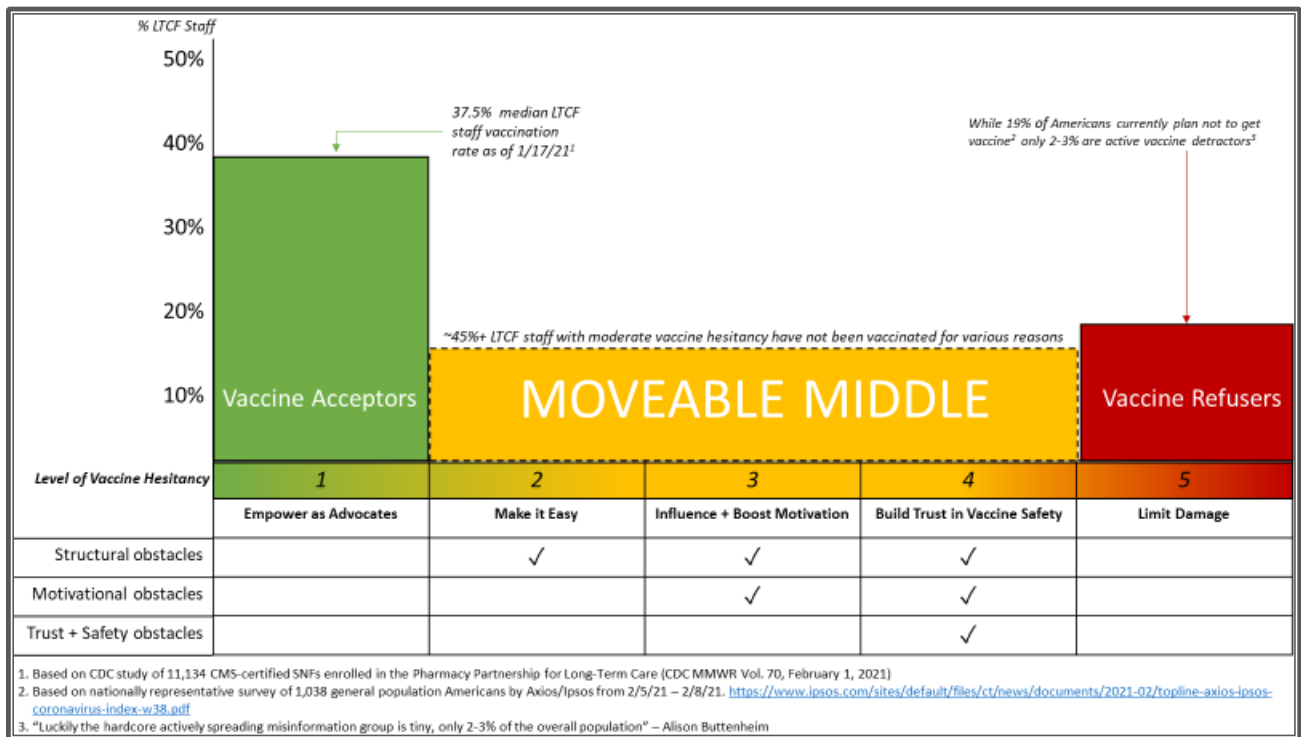
² The meta analysis was commissioned by this task force. Please see the Attachment IV (p.28-58) for the complete study.

COVID-19 VACCINATION UPDATE BEHAVIORAL SCIENCE TASK FORCE MODEL:

We suggest different Interventions across the vaccine hesitancy spectrum

The diagram below provides a model for thinking about vaccine hesitancy among the Long-Term Care Staff. There are 37.5% of staff enrolled in the Pharmacy Partnership for Long-Term Care (CDC MMWR Vol 70, February 1, 2021) who have already received the vaccine and are Vaccine Acceptors. On the opposite end of the spectrum, there are about 19% of Americans (not long-term care staff specifically) who report not planning to get the vaccine (although people who are very strongly against the vaccine have been estimated to be only 2-3% of the population). These numbers of detractors have stayed relatively consistent since the summer of 2020, despite meaningful shifts in views across the rest of the population. Rather than target all staff with a uniform intervention, we recommend that LTCFs focus interventions on the movable middle -- individuals who express some vaccine hesitancy but are likely to change their minds. Our recommendations focus on leveraging the early adopters to motivate and build trust within the movable middle, as well as attitudinal, motivational and behavioral strategies to “Make it Easy” “Influence and Boost Motivation” and “Build Trust in Vaccine Safety.” For vaccine detractors, our goal would be to minimize the negative influence they may have on the vaccine uptake of their coworkers.

Below, we present our model summarizing the practices we recommend using for each of the three groups we identified on a continuum of vaccine hesitancy. Then, we present our primary recommended strategy for each of the segments of the LTCF staff and offer some examples. [Please see full list of recommendations in Attachment I.](#)



Group 1: Vaccine Acceptors - Empower as Advocates.

- **Strategy:** Identify LTCF staff who have taken the vaccine and provide training so they can inform and encourage their more vaccine-hesitant coworkers to accept the vaccine. This is based on the concept that coworkers, particularly of similar background and seniority, may be the most effective and influential vaccine advocates.

Example Recommendations from Task Force Committee ([Please see full list in Attachment I](#))

"We know that people trust more in those whom they see as similar to themselves. Thus similar Coworkers that have undergone vaccination will have stronger sway over their fellow coworkers who have questions and doubts." – Sigal Barsade

"Convert communicators—individuals who (1) are members of the reluctant group and (2) formerly acted counter to the requested action but have since changed—can be highly effective messengers.³ The effect appears to derive from the reduced ability of group members to characterize the messenger as an "other" who doesn't understand "our circumstances."— Robert Cialdini

"Use a peer-to-peer influence strategy. Get some of those who were vaccinated to talk to those who are still resisting. A good way to do this may involve sharing their own side-effects of the vaccination as well as reduced fear of ending up in an ICU on life support." – Barry Staw

- **Challenges:** Given the current stress and burnout on LTCF staff already – particularly given burnout, how should organizations motivate or provide incentives to workers who have been vaccinated to take on more responsibility as an advocate or "convert communicator"?

[Please see Attachment II for Task Force Committee responses from panel discussion](#)

Group 2: Moveable Middle - Make it Easy.

- **Strategy:** Mitigate logistical and access barriers for LTCF staff, who are already burdened by difficult work conditions that have been intensified by COVID-19.

Example Recommendations from Task Force Committee ([Please see full list in Attachment I](#))

"We should be careful not to describe everyone who hasn't yet been vaccinated as hesitant. It's clear that many HCWs and hospital staff who have not been vaccinated are facing access barriers, which can range from not getting or reading emails from their employer to not knowing about policies for, e.g., PTO during or following vaccination." – Alison Buttenheim

"Provide follow-up vaccination clinics in long-term care settings for staff that declined vaccination in the early phases of the vaccination campaign." – Berkley Franz

"Offer paid time off 1-2 days after each dose recover from vaccine side effects. We have to remove the logistical hurdles that might make people reluctant to get it 'in case something goes wrong.'" – Neil Lewis

- **Challenges:** How to enact a peer-to-peer campaign as compared to a top-down, information-heavy campaign?

[Please see Attachment II for Task Force Committee responses from panel discussion](#)

3 Levine & Valle, 1975; Rich & Tormalla, 2013

Group 3: Moveable Middle - Use Social Influence and Boost Motivation.

- **Strategy:** Leverage social influence, communicators and motivational/framing forces to motivate LTCF staff.

Example Recommendations from Task Force Committee ([Please see full list in Attachment I](#))

“Emotions influence people – not just cognition. The research literature shows that emotional influence and emotional contagion can have a tremendous impact not only on employees’ emotions but their decision making and behaviors – so need to be considered.” – Sigal Barsade

“This is the group that is not pushing to sign up, but may be responsive to light-touch messaging that invokes things like social norms, community, identity, altruism... and benefits (e.g., return to normal).” – Alison Buttenheim

“For racial/ethnic minority communities, use social justice framing to emphasize the need for communities of color to get vaccinated.” – Lindsay Dhanani

“Change the face of who’s recommending, receiving, or delivering the vaccine... Nurses are trusted more than doctors, so they should be used as advocates or role models over doctors. And whatever group is used—athletes, nurses, doctors—match the demographics (race, age) of the long-term care workers.” – Tom Gilovich

“Advance a 2021 Challenge for nursing home and care facilities to get a “Gold Star” for attaining goals of vaccination and protection of staff, workers, residents and visitors.” – Scott Ratzan

“When thinking who should give the message – it should be someone who speaks to staff in greatest way – focusing on messaging of protecting the elderly they work with (Beyonce, Cardi B, J Lo – should be a woman). Post the clips all over social media.” – David Sable

- **Challenges:** Who would be the most effective messenger for these motivational interventions? Consider levels of trust and esteem among LTCF staff as well as organizational capacity/resources, expertise, and empathy of messengers.
- **Challenges:** What does effective social justice messaging look like? Should social justice messaging address mistrust of the medical system? What role, if any, should the CDC or LTCF administrators play in creating and disseminating social justice focused content?

[Please see Attachment II for Task Force Committee responses from panel discussion](#)

Group 4: Moveable Middle - Build Trust in Vaccine Safety.

- **Strategy:** Supplement information-based campaigns with peer-to-peer conversations. While this approach is quite time-intensive, given the prevalent mistrust of vaccine safety, the solution will be much more effective if based on authentic conversations with trusted messengers rather than scripted materials.

Example Recommendations from Task Force Committee ([Please see full list in Attachment I](#))

“A concrete recommendation from the findings of the literature search is to craft messaging which emphasizes the efficacy of the vaccine, the rigorous testing it underwent (e.g. it was developed through X number of clinical trials or was tested on X number of people).” – Lindsay Dhanani

“Convince a central member of the workgroup to be vaccinated first, which would offer an influential role model that others in the workgroup could follow. Network centrality = trusted role model.” – Jenny Chatman

“We keep repeating the efficacy rates, but people are skeptical about the process that led to those outcomes. Things that move at ‘warp speed’ are not things we think of as safe.” – Neil Lewis

- **Challenges:** How might organizational culture at LTCFs support or impede the trust between LTCF staff and administrators as well as influence the effectiveness top-down initiatives? The role of specific supervisors is critical. If there is too much mistrust in the short term, how might we decouple the employer from the vaccine campaign? How can we balance the tradeoffs between convenience of an LTCF vaccine program in shifting to a non-LTCF based vaccine campaign?
- **Challenges:** As more vaccine options become available (e.g., from different manufacturers with different systems) how should messaging address the relevant differences while not eroding trust in any of the options?

[Please see Attachment II for Task Force Committee responses from panel discussion](#)

Group 5: Limit Damage of Vaccine Detractors.

- **Recommendation.** Avoid amplifying unfounded concerns by engaging with highly hesitant individuals one-on-one.

Example Recommendations from Task Force Committee ([Please see full list in Attachment I](#))

“Have managers engage in motivational interviewing with employees, focusing on: freedom of choice, change talk, sustain talk - ask them about what would lead them to consider vaccinating, engage in reflective listening, and potentially inquire about what plans they have” – Adam Grant

“Misinformation has to be handled delicately. We don’t want to amplify it when it is a fringe minority, but we also can’t just be outright dismissive. There are some techniques to debunk the misinformation but they take more effort than just not spreading/amplifying it in the first place” – Neil Lewis

- **Challenges:** How can we minimize the impact of vaccine detractors in the workplace? How should LTCF administrators respond to staff who are opposing or interfering with vaccine uptake?

[Please see Attachment II for Task Force Committee responses from panel discussion](#)

ORGANIZATIONAL FACTORS IMPACTING VACCINE UPTAKE

Beyond considering the individual viewpoints, any vaccine uptake plan must also consider the organizational context. If LTCF employees do not trust their organization or feel respected this can influence outcomes.

“As an essential worker, I am highly disappointed...The fact that this organization didn’t give us hazard pay, comp time, or paid time off...is a slap in the face to everyone who came to work, day in and day out, in what they deemed an extremely dangerous time...Instead, we got a soda cozy with some mints and hand sanitizer in it, and a thank you.” – Municipality Essential Worker (Betz, Ozelick & Barsade, 2021)

“LTC employees, as relatively low wage and low status organizational members, can feel exploited by their employers and, as such, may not trust them. [If that is the case] my suggestions attempt to decouple the employer from the vaccine” – Jenny Chatman

Thus, in organizations with low trust (or even animosity) between the employer and employees, employer recommendations may not move the needle for employee uptake. Conversely, in a culture of companionate love (that is where employees have strong values and norms about the importance of



expressing affection, caring, compassion towards each other), Barsade & O’Neill, 2014) within the workplace, the employer and specific supervisors can help overcome barriers of hesitancy or mistrust.

Given these nuances, it is clear that there need to be multiple and additive solutions for addressing the issue of vaccine hesitancy. Interventions should be deployed at a local level, taking into consideration the context of the specific organization and its employees.

See Attachment I for detailed table of the full set of proposed recommendations and intervention suggestions from each task force member.

ATTACHMENT I: TASK FORCE MEMBERS’ KEY RECOMMENDATIONS AND THEIR TARGET MECHANISMS

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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1. Create opportunities for individuals to signal vaccination status (e.g., silicone bracelets)

“Issue vaccinators a two-part silicone bracelet. The first part is received with the first dose and serves as a reminder to get the second dose. The second part is received with the second dose and serves as a social signal to demonstrate fully vaccinated status to co-workers.” - Gretchen Chapman

“Like the idea of a symbol (such as the silicon bracelet) – which allows public recognition of what the person has done – and get a well-known designer contribute his/her time for the best symbol design.” – David Sable

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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2. Have co-workers administer vaccines to each other

“To combat employee mistrust of employers (and health officials), have co-workers administer vaccines to one another (assuming some are qualified to do so) keeping employee level as similar as possible between vaccine administrator and vaccine target. The employees administering vaccines should have, of course, taken the vaccine themselves. Similarity = trust.” - Jenny Chatman

3. Train employees to distribute and administer vaccines

“Our emphasis had to be on a workforce capable of distributing and administering the vaccines. They will need to be educated with the language you described in order to ensure that they are ready to provide the behavioral encouragement for people to accept the vaccine.” - Terry Fulmer

4. Involve community leaders in vaccine campaign

“A concrete example is in Philadelphia where we had an amazing public-private partnership called Philly counts around the census completion. They had this incredible matrix organization based on geographic and identity group grids and community-based organizations across the whole city that did door-to-door knocking and did the COVID safe version of that to get the census completed. We’re going to reactivate that and ask the city if they could be vaccine champions and vaccine validators. It’s an incredible network. They’re in 17 languages. Everybody in Philadelphia can be reached by someone part of that existing network” – Alison Buttenheim (Panel Discussion)

“For racial/ethnic minority communities, partner with community-based organizations (e.g., churches) and change leaders (e.g., local activists, religious leaders) to coordinate the vaccine campaign and vaccine distribution.” - Lindsay Dhanani

“Community organizations can be a sort of intermediary between the community and other experts. One model we’ve been working with in New York are these weekly meetings with community health workers,

who are coming with questions from individuals they're working with or encounter. Then we have the community health workers sort of grill the experts from the medical schools and take those answers back. That way we can get those questions answered because the community health workers are trusted and expert within the community. But the health workers themselves are not always comfortable answering those questions unless they've talked with a medical professional first. This way we get two important lines of communication open" – Neil Lewis (Panel Discussion)

"The religious sites, the community centers, sororities...those groups have strong voices in the community and are trusted in many cases. It's important though that those groups be convinced because if there's hesitation among the minister or the community leader, then the community members grab that same hesitancy. Overall, I have been extremely impressed by the work that community-based organizations are doing and I do believe they are making a significant difference" – Jean Moody-Williams, Deputy Director, CMS (Panel Discussion Guest)

5. Utilize "Convert Communicators"

"Recruit and give voice to 'convert communicators.' Convert communicators—individuals who (1) are members of the reluctant group and (2) formerly acted counter to the requested action but have since changed—can be highly effective messengers (Levine & Valle, 1975; Rich & Tormalla, 2013). The effect appears to derive from the reduced ability of group members to characterize the messenger as an 'other' who doesn't understand "our circumstances." - Robert Cialdini

"Use a peer-to-peer influence strategy. Get some of those who were vaccinated to talk to those who are still resisting. A good way to do this may involve sharing their own side-effects of the vaccination (sore arm, headache, etc.) as well as reduced fear of ending up in an ICU on life support." - Barry Staw

6. Utilize one-on-one educational conversations through trusted messengers

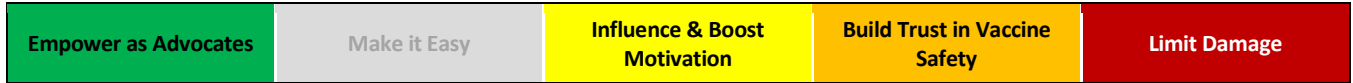
"I think there's a growing realization that for this vaccine in particular, and for particular groups, the solution is time-intensive and has to rely on trusted messengers. I've been riveted recently by Dr. Kim Manning's tweet threads about the one-on-one vaccine conversations she's had with folks she encounters going about her day, many of which result in increased motivation & intention. Anecdotal? For sure, but these tweets are powerful templates for the kind of intensive, repeated conversations that might be necessary for large chunks of the LTC workforce. Bad news: This approach is not 100% scalable. But could it be a little scalable? Can we think about how to train folks in having these conversations, and also resource them to do so?" - Alison Bутtenheim

7. Ensure advocates are held in high esteem among LTCF staff and match demographics of staff

"The research indicating that having politicians get the vaccine has no effect on uptake rates is not surprising given the low esteem with which politicians are held. But individuals who are held in higher esteem may have a very positive impact. A high percentage of professional athletes do community service work and it wouldn't be hard to get them to make appearances at long-term care facilities to motivate compliance. Nurses are trusted more than doctors, so they should be used as advocates or role models over doctors. And whatever group is used—athletes, nurses, doctors—they can be chosen to match the demographics (race, age) of the long-term care workers." - Tom Gilovich

8. Highlight vaccination of trusted employee

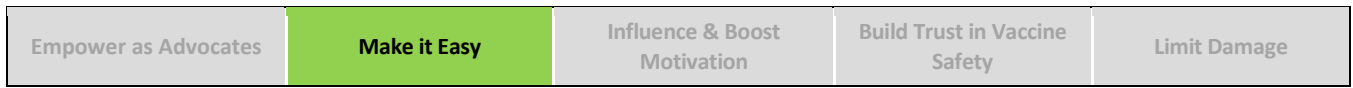
“Convince a central member of the workgroup to be vaccinated first, which would offer an influential role model that others in the workgroup could follow. [network centrality=trusted role model]” - Jenny Chatman



9. Involve employees across all levels in the organization in building the vaccination plans & policies

“Another way to build employees feelings of respect within a long-term care facility is involving all level of staff, including the CNAs, in problem solving, actively listening to their ideas, and valuing their different cultural perspectives. Management and supervisors need to really listen and consider what the staff is saying – not just top-down mandates – but participation among everyone (Ramarajan, Barsade & Burack, 2008).” - Sigal Barsade

“Emotions influence people – not just cognition. The research literature shows that emotional influence and emotional contagion can have a tremendous impact not only on employees’ emotions but their decision making and behaviors – so need to be considered.” – Sigal Barsade

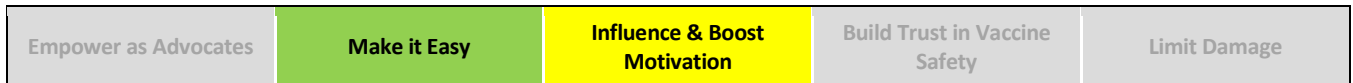


10. Concierge vaccination services

“Concierge vaccination service that meets the individual needs of each person who delays vaccination.” - Gretchen Chapman

11. Follow-up vaccination clinics

“Provide follow-up vaccination clinics in long-term care settings for staff that declined vaccination in the early phases of the vaccination campaign.” - Berkley Franz



12. Include LTCF staff in Pharmacy Partnership for Long-Term Care Program promotion

“Build on the effective Pharmacy Partnership for Long-term Care Program by having pharmacy personnel go the long-term care facilities to administer the vaccine. The difference between hesitancy and outright refusal rates suggests that this should be effective and it could be made more effective by having one or more respected staff members at each facility get the vaccine in a very public manner” – Tom Gilovich

13. Specific language for appointment reminders

“[Appointment] reminders should use the ‘*reserved for you*’ language that may trigger endowment and reciprocity processes.” - Gretchen Chapman

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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14. Do it for the Residents

"Highlight how vaccine adoption will benefit vulnerable populations." - Adam Grant

“Main messaging to the staff is an appreciation message related to mission/meaning – focus on their identity and pride in their work – leading them to be feel empowered to take even better care of the patients and have pride in their work. The messaging should be “You are adding a layer of protection to the protection you are already giving.” They are already doing a good job – this will allow them to even better.” – David Sable

15. Include comparisons in messaging

“Recent research on nudges (coming from the White House office dealing with social research under Obama) showed that reminders about getting one's income taxes filed were more effective when also providing information on how many neighbors had already filed their taxes. Modeling does work.” - Barry Staw

16. Highlight trend toward increasing rates of vaccination

“Highlight trends. In communications, emphasize the trend among long-term care facility workers toward becoming vaccinated. Research indicates that such trend lines are especially effective in bringing about compliance with requests for socially desirable actions (e.g., water conservation, eating meatless meals, reducing sugar consumption).” - Robert Cialdini

17. Avoid use of explicit financial incentives

“There is a reasonably strong literature on blood donations that may apply in this case. That literature shows that extrinsic rewards are not particularly useful and not better than appeals to altruism and logistics (specific instructions of where to go and what to do).” - Barry Staw

18. Consider using rivalry to increase motivation

“Motivation appeals seem to be strongest when they are posed as a group goal against a rival... Thus, appeals for one's long-term care facility to be ahead of others in the geographical area may have some potency. So too may rewards if they carry some symbolic value and are shared by the group. Thus, if a facility receives some benefit (e.g., free dinner catered by a good restaurant.) shared by all, then social pressure might be mustered to push reluctant staff members to get vaccinated ...For example, in the Bay Area, the Warriors might help by sending a prominent player out to a few long-term facilities.” - Barry Staw



19. Partner with other organizations such as CONVINCe to fund and promote a “Challenge”

“Advance a 2021 Challenge for nursing home and care facilities to get a “Gold Star” for attaining goals of vaccination and protection of staff, workers, residents and visitors. This includes adoption of workplace policies and related communication.” - Scott Ratzan

20. Offer paid time off for vaccination

“It is very important to recognize their efforts both intrinsically, but also extrinsically. One of the most practical ideas is to give one or two days paid time off after the 2nd vaccine. It is fair because the 2nd vaccine may well lead them to not be able to do their jobs immediately after, and doesn’t put the burden only on the employee. If they feel well, then they can benefit from the PTO, and from feeling good about the organization. This approach has also been seen as effective in Desveaux et al’s (in press) study in Canada of vaccine uptake of long term care facility employees” – Sigal Barsade

“Offer paid time off 1-2 days after each dose recover from vaccine side effects. We have to remove the logistical hurdles that might make people reluctant to get it 'in case something goes wrong.'” - Neil Lewis

“Employers could provide an incentive to get vaccinated - 3 paid days off - that can be used at any time (so that people don't presume that they will need days off after the vaccine injections).” - Jenny Chatman

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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21. Emphasize that LTCF staff have the freedom to decline the vaccine

“Emphasize request recipients’ freedom to decline. The “But you are free” technique operates by emphasizing a request recipient’s freedom to say no. In a set of 42 separate experiments (Carpenter, 2013), adding to a request the words “But you are free to decline/refuse/say no” or a similar phrase such as “Of course, do as you wish” significantly increased compliance. Moreover, this was the case for a wide variety of requests. Finally, the impact of the freedom-reestablishing wording was considerable, often more than doubling the success of a standard request that didn’t include the crucial phrase.” - Robert Cialdini

22. Administer vaccine away from worksite

“To address employer mistrust, ask employee leaders to suggest a trusted site - community center, church, or another accessible space - in which the vaccines can be administered so that employees will decouple the vaccine from employers. Offer food and schedule employees to go together in groups in which people know one another to increase social proof and normative pressure. [Decouple vaccination from mistrusted employers; normative social influence]...You could even have mobile vaccination vans that would come around from a trusted agency and people would literally leave the workplace and get the vaccine in the van rather than at their worksite. That way you could maintain the convenience factors but minimize the mistrust factor.” - Jenny Chatman

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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23. Partner with physicians who serve patients with Medicaid coverage

“Given evidence that this population is likely to have a patient-centered medical home and that messages from health care professionals are effective for reducing vaccine hesitance, this strategy may be an important supplement [to LTCF focused approach.” - Berkley Franz

24. Acknowledge lack of trust in racial/ethnic communities. Utilize social justice framing to encourage vaccination

“For racial/ethnic minority communities, use social justice framing to emphasize the need for communities of color to get vaccinated.” - Lindsay Dhanani

“For groups that have been marginalized and mistreated, acknowledge past mistakes and discuss vaccine prioritization as one way of righting those wrongs. We can't just say "trust us, it's safe" to communities that have good reason not to trust the medical system; and it's not enough to just say here's a Black doctor who trusts us. There will need to be deeper acknowledgement/tailoring of messaging.” - Neil Lewis

Empower as Advocates	Make it Easy	Influence & Boost Motivation	Build Trust in Vaccine Safety	Limit Damage
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25. Combat distrust of vaccine development process

“Concerns about the speed with which the vaccines were developed and tested can be overcome by stressing that none of the usual steps in the approval process were skipped and that the speeded-up approval was due to the high level of resources that were thrown at this problem. To the extent that vaccine hesitancy is greater among groups with favorable views of the Trump administration (conservatives, conspiracists) accentuating the role of the administration’s Operation Warp Speed (without using the term itself) may further erode hesitancy.” – Tom Gilovich

“Explain the process by which the vaccines were developed. There is a lot of distrust in the process due to how fast the vaccines were developed (and frankly, due to the politicization of the development process by the previous administration). We went from telling people in April that 18 months was an aggressive timeline to develop a new vaccine to telling them that we had two ready to go in December. There's a gaping hole between those two stories, and when you live a hole like that in the narrative people will fill it in with things that are not necessarily helpful; this is part of why the misinformation machine is doing so well right now - we left a giant hole in the story. We keep repeating the efficacy rates, but people are skeptical about the process that led to those outcomes. Things that move at 'warp speed' are not things we think of as safe.” - Neil Lewis

26. Build information bureau for LTCFs to advance vaccine literacy

“Create a COVID-19 vaccine information bureau—for the “learned intermediary” for licensed and other care facilities to get content and data tools (a dashboard for progress on site vaccination, community immunity, prevalence, incidence etc.) advancing vaccine literacy, message dissemination, and vaccine uptake... Implement demonstration projects with CONVINCe-summit, communication and/or webinars in development. Advance a framing of vaccine literacy for caregivers, facilities and with toolkits and guidance including weekly briefings, webinars, updates etc.” – Scott Ratzan

27. Offer vaccine choice (where available)

“Offer multiple vaccines when needed. For example, concerned that the mRNA technology will change your DNA? No problem, we have the J&J adenovirus vaccine here just for you.” - Gretchen Chapman

28. Have manager engage in motivational interviewing

“Have managers engage in motivational interviewing with employees, focusing on: . freedom of choice, change talk, sustain talk - ask them about what would lead them to consider vaccinating, engage in reflective listening, and potentially inquire about what plans they have.” - Adam Grant

ATTACHMENT II: VACCINE UPTAKE CHALLENGES FOR GROUPS 1 – 5 – EXPERT RESPONSES

Group 1: Vaccine Acceptors - Empower as Advocates.

- Given the current stress and burnout on LTCF staff already – particularly given burnout, how should organizations motivate or incentivize workers who have been vaccinated to take on more responsibility as an advocate or “convert communicator”?
 - *Sigal Barsade*: Overall increase essential employees’ feelings of esteem and respect from the organization by involving them in decision making.
 - *Jenny Chatman*: This is a case where being penny-wise and pound-foolish is a bad idea. I understand that LTCF’s are stretched very thin financially and staff-wise right now. But, to survive, they need to invest in vaccine compliance. As such, offering acceptors/influencers incentives (or gifts of gratitude) will be highly worthwhile now, and, given the prospect of more pandemics, into the future. This could include 1-3 days off, a \$25 Amazon certificate, a recognition award, or some other form of explicit recognition. It does not need to be expensive. People intrinsically value their work (mostly), and, if they feel strongly about the importance of vaccines, they will feel good about helping others get to the same point. Recognizing this effort will be important, but not profoundly expensive. It would be worth asking staff what they would like (e.g., cash, days off).
 - *Robert Cialdini*: During team meetings, supervisors should ask well-liked, already-vaccinated staff members to describe why they decided to get vaccinated.
 - *Berkeley Franz*: Having change leaders among LTC staff seems like a promising approach but it may be complicated by burnout among employees. Organizations should acknowledge the stress placed on staff during the pandemic and provide incentives and/or adjust workload if individuals are willing to act as vaccine communicators.
 - *Terry Fulmer*: Naming someone a champion in giving them special attention can be a powerful incentive. Sometimes providing them with a subway card or a convenient parking space is another nice way to recognize their effort also free lunch cards etc.
 - *Neil A. Lewis*: Reduce some of their other responsibilities to give them the time to do this. I know that’s an unpopular think to say since facilities are already short-staffed, but we can’t keep asking people to do more and more without them burning out.
 - *Barry Staw*: They might be able to emphasize how vaccination helps with burnout, that it reduces some of the psychological stress of working in LTCFs.

Group 2: Moveable Middle - Make it Easy.

- How can an LTCF enact a peer-to-peer campaign as compared to a top-down, information-heavy campaign?
 - *Jenny Chatman*: It would be useful to identify influential informal leaders who already have influence over their peers and are already acceptors or can be influenced to advocate for vaccines (and take one themselves). These people can be coached and trained to inspire others to get vaccinated too. A number of the other panelists have specific ideas about the content of the conversations they can have, but I wanted to add two ideas about the format of these conversations and the structure of the role:
 - Format: I am conducting an experiment currently in which we vary the messages people get and then track their mask wearing compliance. While mask wearing is not identical to vaccine uptake, there may be important parallels and so I believe that these findings would apply in the case of vaccine uptake as well. Specifically, we found that messages that were framed as collectivistic – emphasizing that the effort is something staff are doing together and in support of a greater objective – are much more persuasive than control messages that simply contain information about how to wear a mask and why it is important. I have sample scripts if those might be helpful. [As a side note, the only people the collectivistic appeals don't work on are narcissistic people, who prefer instead what we call "visionary" messages, which are meant to inspire a person as an individual to maximize their own potential].
 - Structure of the role: I would suggest that LTCFs make a big deal about these "ambassador" roles and give the few who are chosen visible praise and status. This would include asking them to temporarily serve in the ambassador role and that this role would either completely or significantly displace their day-to-day duties for some time period.
 - *Barry Staw*: Consider putting up a bulletin board display in the lobby on "Doing our part to eliminate COVID." Then provide names and pictures of those staff who have gotten vaccinated, and maybe even those scheduled for vaccination. Finally, a few "grateful testimonials" might help. Create some milestones for vaccination. This will provide a rationale for celebrating progress (like reaching "majority of staff vaccinated" where there can be a small event (cake and drinks) along with a few people asked to speak about how relieved they were about getting vaccinated and how the side-effects were generally minimal.

Group 3: Moveable Middle - Use Social Influence and Boost Motivation.

- Who would be the most effective messenger for these motivational interventions? Consider levels of trust and esteem among LTCF staff as well as organizational capacity/resources, expertise, and empathy of messengers.
 - *Sigal Barsade*: Peers as influence is one of the core pieces to changing people's minds.
 - *Jenny Chatman*: Quite simply, staff who are already trusted, which can be identified by asking people, "Who do you go to for advice and support?"

- *Robert Cialdini*: Convert communicators, who initially resisted vaccination but have changed their minds, would be one such effective messenger type.
 - *Terry Fulmer*: This becomes about the culture of the organization and the trusted advisors within the organization. By doing a quick survey, it becomes very clear who the most trusted individuals are in an organization which might be a minister, a social worker, an administrator, etc.
 - *Neil A. Lewis*: Whoever is the person people already turn to. My sense from when my mother worked in nursing homes was that there were always de facto shift leaders that people relied on to guide the shift. Everyone on the staff knows who those people are – they are the ones to turn to now.
- What does effective social justice messaging look like? Should social justice messaging address mistrust of the medical system? What role, if any, should the CDC or LTCF administrators play in creating and disseminating social justice focused content?
- *Berkeley Franz* No studies currently exist assessing the effectiveness of social justice messaging, but acknowledging the long history of medical experimentation and mistreatment may help build trust in organizations and/or public health leadership.
 - *Neil A. Lewis* Social justice messaging will have to be deeper-diving conversations, not posters or anything like that. There has to be sincere acknowledgment of past wrongs and discussions of how future plans will make marginalized people a priority.

How might organizational culture at LTCFs support or impede be an asset or an impediment to vaccine uptake, and how will the trust between LTCF staff and administrators influence the effectiveness top-down initiatives? The role of specific supervisors is critical. If there is too much mistrust in the short term, how might we decouple the employer from the vaccine campaign? How can we balance the tradeoffs between convenience of an LTCF vaccine program in shifting to a non-LTCF based vaccine campaign?

- *Sigal Barsade*: My study with Hakan Ozcelik and Arianna Ulloa has shown that supervisor displays of companionate love (affection, caring, compassion and tenderness) to the team, and supervisor support is related to more positive feelings of feeling esteemed by the organization, which then has numerous significant relationships with positive employee outcomes.
- *Jenny Chatman* : The culture the LTCF has already developed will be consequential. If the culture is characterized by staff mistrusting managers, then managers cannot be the messengers and the vaccine effort should be as decoupled from the organization as possible (see my suggestions above on decoupling vaccination from employers). If the culture is characterized by individualism, then the collectivistic messages will be less effective in the short run – they will sound like inauthentic messages of convenience. In this case, using a visionary message that appeals to individuals might work better (like the narcissism findings I cited above). Again, I have scripts/videos for both types in the mask wearing compliance case if helpful.
- *Terry Fulmer*: Again, each nursing home has its own culture and sometimes it's the union representative who can be most helpful.

Group 4: Moveable Middle - Build Trust in Vaccine Safety.

- As more vaccine options become available (i.e. from different manufacturers with different systems) how should messaging address the relevant differences while not eroding trust in any of the options?
 - *Robert Cialdini*: State honestly that all options have had to pass a rigorous testing process.
 - *Berkeley Franz*: When more vaccines are available this spring and summer, it may be important to explain that there are differences in how the vaccines work but that they are all demonstrated to be effective using the same testing process. As long as vaccine shortages exist, it will also be necessary to convince people that taking any vaccine is better than none. Although the public efficacy rates seem to vary among the vaccines and it may be tempting to hold out for a more effective vaccine, it is difficult to compare efficacy since the vaccines were tested at different times in the pandemic when cases and the presence of variants varied. All vaccines have demonstrated efficacy and the risks of waiting for a more effective vaccine are probably greater than accepting whichever vaccine is offered.
 - *Terry Fulmer* Simple charts that provide information about where the vaccine was made, symptoms that can be expected, and a place to list questions usually work.
 - *Neil A. Lewis* I think it's fine to acknowledge that there are differences but to remember the bigger picture: these are not magic bullets, but they're better than getting COVID-19. All of the vaccines reduce the odds of getting it, and of getting severely ill if you do get it.

Group 5: Limit Damage of Vaccine Detractors.

- How can we minimize the impact of vaccine detractors in the workplace? How should LTCF administrators respond to staff who are opposing vaccine uptake?
 - *Jenny Chatman* : Making a deal for them to not undermine your efforts at promoting vaccine uptake will be crucial. That said, I am guessing that the true number of unequivocal detractors – perhaps those who identify as anti-vaxxers – probably are not a good fit for the health care environment. The bigger question is how to determine who is slightly open (rather than a complete detractor) and how much energy do you want to devote to influencing them? As said in the meeting, it will be more effective to focus on those who are more open rather than those whose views are negative and already fairly locked in.
 - *Terry Fulmer*: Acknowledge that some people will choose not to be vaccinated, continued to try to provide incentives and persuasion and at the same time spread the message wear a mask social distance wash your hands.
 - *Barry Staw*: Detractors will probably skip celebratory events and bulletin boards. However, leaders should be prepared to deal with negative comments in a non-threatening manner. Objective evidence can be cited, but make sure to emphasize that the distractor has just exercised his/her own personal choice.

ATTACHMENT III: MEETING AUDIENCE QUESTIONS – TASK FORCE RESPONSES

Messaging

1. To what degree did people telegraph their behavior in the sense that many people didn't want to be the "first ones" (or perhaps more correctly) early takers? And in that sense should we somehow incorporate more patience to the approach?

- *Berkeley Franz:* Interviews with LTC Union reps suggest that hesitance relates to being the first to take the vaccine since these individuals were in Phase 1a in most states. Leaders suggested that uptake was beginning to increase as LTC staff observed others taking the vaccine without complications. Messaging campaigns could emphasize the growing number of Americans who have been vaccinated without major complications.
- *Barry Staw:* I do think that one might be to get a sizeable group of hesitant people to agree to take the vaccine "sometime in the future" or "in a few months." Then, this hesitant group can later be approached with a specific date of vaccination.

2. What is the role of community-based organizations in addressing vaccine hesitancy and in transparency when communicating with underrepresented communities. And how should LTCF approach these groups who many not have connections to community-based organizations?

- *Berkeley Franz:* Evidence suggests that vaccine messaging is more effective in underrepresented communities when it comes from trusted community leaders as opposed to government officials or other outside individuals. If LTCF do not have connections to CBOs or leaders, messages could come from other individuals in their social networks, such as trusted colleagues at work.
- *Terry Fulmer:* Community based organizations are at the heart of getting people vaccinated. Information from people who live where you live and look like you look matters and should be used to their fullest.
- *Neil A. Lewis:* Community based organizations can be liaisons between expert health sources and underrepresented communities. They can bring questions from the communities, ask the experts and practice answers with the experts so that when they go back to communities, they are accurate but also sound authentic to the communities.

3. Thoughts on whether educational materials to the public should shift to ending the pandemic (not the drive of safety in vaccines). I see marketing materials showing a return to the life we "miss", let's see what our vaccinated communities look like to inspire our communities to vaccinate.

- *Neil A. Lewis:* I think materials should focus on concrete, desirable things: getting to see you family that you haven't seen in months or a year, hanging out with your friends, sitting inside a restaurant enjoying a good meal. We're doing this to be able to get back to the everyday things that make life enjoyable.
- *Barry Staw:* I do favor an emphasis on altruistic motivation such as "helping us end the pandemic" or "let's all do our part to end the pandemic." I think it should be approached like volunteering in a war-time effort. In this way, the small risk for vaccination may be better tolerated. Continuing to focus on only the individualistic benefits of vaccination may also unintendedly bring forward individualistic costs or perceived risks.

4. If somebody appropriately decides they don't want to take it, how do we minimize that effect? That they certainly have the choice, but we don't want that to affect the rest of this community.

- *Jenny Chatman*: Have an explicit conversation in which you relay that you respect their decision but then that you expect them to not in any way seek to influence or interfere with others' decisions.
- *Robert Cialdini*: We should state, honestly, that such individuals are part of a dwindling minority. I saw a recent Associated Press article headline, "Poll: A third in US lean against virus vaccine." We should assert that the percentage has been dropping each month (e.g., It was x in December, down to x in January, and now down to 33%).
- *Terry Fulmer*: For those who don't get vaccinated the message is wear a mask, keep socially distant, and wash your hands just as you did prior in order to protect those around you.
- *Neil A. Lewis*: People certainly have the choice to not take the vaccine, but it is important to remember that freedom is not without consequences. One can choose not to take a vaccine, but if that is the choice they make then they have a responsibility to stay away from others in order to respect their choices to minimize their health risks.

5. How do you address their issues without trying to change their minds?

- *Robert Cialdini*: One way would be to simply focus on changing their behavior. That is, people who are concerned with side effects can be moved by emphasizing the role of vaccination in protecting those around them, without changing their minds regarding side effects.
- *Terry Fulmer*: Use language like "since you have decided not to get the vaccine, please protect yourself and others by wearing a mask, keeping socially distant and washing your hands diligently."
- *Neil A. Lewis*: Make it clear what the implications are of not getting a vaccine: there will be increasingly limited opportunities to interact with the rest of the world that will soon require proof of vaccination. Some are willing to accept that, which is fine. Perhaps over time they may come to feel it is too inconvenient and that experience of inconvenience will lead them to change their own minds.
- *Barry Staw*: At this point, getting vaccinated is voluntary. However, as more and more data come in (as millions are vaccinated), the risks of vaccination should "objectively" be mitigated. Personally, I think vaccination should be a requirement for certain jobs and settings. I recently read some commentary from Israel where it was argued that, if one wants to work in healthcare, then a vaccination should be a requirement. We would not tolerate a doctor/nurse smoking in hospital settings where people are immune compromised, so the same logic should apply to Covid vaccination in long-term care facilities.

Whom to Trust

6. Any clarity on whether doctors are trustworthy to educate about vaccine given mixed evidence in literature

- *Neil A. Lewis*: Doctors are trustworthy...to people who have regular doctors; so this is another place where structural issues and inequities in our health system comes back to bite us again.

- *Berkeley Franz*: The literature is pretty clear that physicians are among the best, if not the best, individuals to deliver vaccine information to reduce hesitancy.
- *Terry Fulmer*: From my reading most people trust their primary care provider but if you're meeting a new PCP for the first time trust has not been built and it becomes more challenging. In my view Telehealth visits help. There is actually better eye to eye contact than sometimes happens in an office. Further the sheer convenience puts people in a better state of mind.

7. Was there any discussion about leveraging Primary Care clinicians in the LTC space (and elsewhere) as trusted messengers? I'm hearing a lot about patients wanting to talk to their PCP about vaccination but since the PCPs are having difficulty getting vaccine to provide to folks, the PCPs are feeling marginalized by the existing distribution structure.

- *Robert Cialdini*: PCPs are usually a highly trusted source of information. Consequently, they should be incorporated more fully into the information distribution process.
- *Berkeley Franz*: Because there is considerable overlap among LTC staff and Medicaid recipients, this group may have access to a primary care medical home. This seems like an ideal space to provide vaccine information in the context of patient visits or through direct outreach to patients. Even if PCPs are not currently prioritized to distribute vaccines, these providers have a profound potential to provide information to patients and answer questions about vaccine safety.
- *Neil A. Lewis*: People would probably prefer getting it from their PCPs who they trust, so this is a problem that hopefully gets resolved with broader distribution.
- *Barry Staw*: I would try to provide PCPs with the latest on distribution, so they can play a role in distributing this information to their patients, along with a recommendation to get vaccinated.

8. Is there any data to say whether or not the CDC will be effective at changing people's minds? Interested to know if people think Dr. Fauci is a trusted source?

- *Jenny Chatman*: Dr. Fauci is definitely a trusted source by Democrats, but he became a political lightning rod during the prior administration (much to his regret and not by his own doing). People on the Trump side seem to challenge his authority more because Trump did, unfortunately.
- *Terry Fulmer*: I have complete faith that the CDC will regain its rightful voice in the Biden administration.
- *Neil A. Lewis*: Trust in Fauci is generally high, though Republicans trust him less than Democrats. CDC is also trusted (even more than Fauci) but abstract agencies/institutions are less persuasive than a person, so Fauci and other medical experts should continue to speak up.

Vaccine Safety

9. Is there any advice from this group to explain to somebody why this was not too fast? Is it enough to say 'we tested 30,000 people and we didn't skip any of the steps? Is it that simple?

- *Jenny Chatman*: You could also point out that the vaccine development speed was because:
 - The virus was so rampant in the population that it enabled scientists to observe the vaccine efficacy more quickly.

- That the labs have already been working on the RNA approach for almost a decade and so the science only needed to identify the way to plug the appropriate compound in to fight COVID-19 rather than develop a whole new approach to vaccination.
- *Robert Cialdini*: It can be reported, as well, that there have now been millions vaccinated with virtually no safety problems.
- *Neil A. Lewis* It's not that simple. Here is a good model of explaining it:
<https://www.cnn.com/2020/12/14/opinions/reasons-to-trust-covid-vaccine-ranney-choo/index.html>
- *Barry Staw* Again, I would emphasize how data on side-effects are being continuously collected. As tens of millions of the population are vaccinated, the overall risk is better known and substantially reduced. It is the “real-world” test of vaccine effectiveness.

10. How do we address concerns about the speed and potential errors of vaccine distribution? People view it like it's either quantity or quality.

- *Terry Fulmer*: It's important to say that no steps were skipped but also to remind people of how accelerated scientific technique has become since the last virus outbreak . Which each new virus we become more facile and readily able to create vaccines because we have the knowledge of how to do so and the equipment and staff scientists to get the work done.

11. What are the best arguments/approaches to encouraging vaccination for COVID-19 relative to the emergent variants? Will current vaccines mitigate severity of effects of new variants?

- *Jenny Chatman*: The efficacy is still high for the known variants. Waiting is not a good strategy since: (1) the population needs to get to herd immunity soon to prevent further mutations from evolving; (2) the likely strategy for combating the mutations will be boosters rather than additional vaccines.
- *Robert Cialdini*: We can say that the evidence, as provided by health experts, indicates that the existing vaccines greatly reduce the severity of the infection.
- *Berkeley Franz*: Because variants are still not well understood, studies have not assessed the impact of different types of messaging around mutations. Important information to communicate would be that variants may reduce the efficacy of the vaccines but that they will not likely render them useless. At the very least, current vaccines will greatly reduce the risk of severe symptoms, hospitalization, and death.
- *Neil A. Lewis*: This thread by virologist Angela Rasmussen is helpful for explaining this:
https://twitter.com/angie_rasmussen/status/1361401217432252416?s=20.
- *Barry Staw*: I would be very open about future risk of variants and stress that a booster may be needed each year, like a typical flu shot.

12. How can we address concerns of pregnant staff are especially fearful?

- *Robert Cialdini*: We can give the statistics of current pregnant women who have taken this with no significant adverse effects.
- *Berkeley Franz*: A lot of misinformation has been targeted towards women, especially regarding infertility. One way to communicate with pregnant staff would be to acknowledge the difficult decisions facing pregnant individuals amidst the pandemic. Then it may be helpful to present

evidence that pregnant individuals are at higher risk of severe illness from COVID-19 and that there is no evidence of safety concerns among the thousands of pregnant individuals who have already received the vaccine. Major medical organizations in the United States recommend that pregnant individuals take the vaccine and do not wait until after their child is born.

- *Terry Fulmer*: As discussed prior it's important to give people strategies if they choose not to get vaccinated.
- Neil A. Lewis: Not sure if this alone will be enough, but about 10,000 pregnant women have taken COVID-19 vaccines and have been fine:
<https://www.usatoday.com/story/news/health/2021/02/01/covid-vaccine-pregnant-women-dr-fauci-says-no-red-flags-so-far/4335747001/>

13. [How to respond to following comment] It isn't always just mistrust of the health care system. As an educated person in the health care field, I do not feel comfortable taking an EUA Vaccine that has not examined the impact on someone with my underlying conditions. I am not unique, many of my peers feel the same. I rather take my chances fighting the disease, if I am exposed, than facing a debilitating response to a vaccine that has not been properly vetted. And I hope that I won't be forced to take a vaccine that is under EUA.

- *Jenny Chatman*: This is very strange logic since we know the consequences of the vaccine and the consequences of the virus. Getting the virus is much, much worse. The epidemiologists can show people the incidence of serious outcomes and death from COVID-19 and compare it to the known consequences of the vaccine.
- *Terry Fulmer*: No one is being forced to get vaccinated and it is appropriate to decide which vaccination is right for you and continue your safety measures in the meantime.
- *Neil A. Lewis*: Not sure how to respond per se, but this is not entirely surprising. Health care workers are more knowledgeable about these processes—for example the difference between EUA and authorization, and people with more knowledge have more polarized views about scientific topics.

COVID Fatigue & Vaccine Hesitancy

14. What is the relationship between COVID fatigue and vaccine hesitancy?

- *Barry Staw*: There could be some relationship between not contracting COVID and vaccine hesitancy. For example, one might think, “so far, I have avoided infection, so why do I need a vaccine? A neighbor of mine just voiced this argument, saying “my doctor says I will live to 100 and I am healthy as a horse. I don't need that vaccine.”

15. Beyond vaccination being the silver bullet, what's the message about "What's next?" continuing mitigation measures, for how long, listening to whom about variants and mutations?

- *Robert Cialdini*: The message should be that trustworthy experts advocate continuing mitigation efforts until they determine that such measures are no longer necessary.
- *Terry Fulmer*: I feel strongly that it's important to remind people that the Center for Disease Control and the Biden administration have dramatically accelerated measures to contain the virus and get people vaccinated. Remind people that the curve is coming down and that there is reason to feel cautiously optimistic while remaining safe.

Mandates

16. There has been thought in LTC where residents are now asking/demanding on having only those staff who have been vaccinated to care for them. Does this go with peer pressure to help with those who are hesitant receive the vaccine?

- *Terry Fulmer:* I support resident rights to demand vaccinated staff. All incentives possible better reasonable should be used to get staff vaccinated and there needs to be assurance that there's no backlash on residents who take this position. Elder abuse could ensue.
- *Barry Staw:* This may pose a rationale for telling staff that vaccination may become a requirement sometime later in the year, especially if the rate of contagion does not continue dropping substantially.

17. Should LTCFs consider vaccine mandates given potential severe pushback?

- *Jenny Chatman:* At some point, it may be a job requirement to take available precautions of many sorts when working with this vulnerable LTCF population. I would not rule out the possibility of mandates that are solidly linked to job requirements and are legally defensible.
- *Terry Fulmer:* Governors should be responsible for this decision not CEOs of long-term care facilities.

ATTACHMENT IV: COVID-19 VACCINATION UPTAKE BEHAVIORAL SCIENCE TASK FORCE MEMBERS



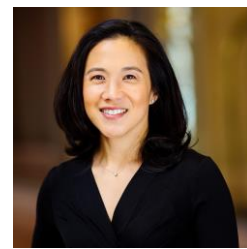
**Sigal Barsade,
Co-Chair**

University of
Pennsylvania
Organizational
Behavior



**Jenny Chatman,
Co-Chair**

University of
California,
Berkeley
Organizational
Behavior



**Angela
Duckworth, Co-
Chair**

University of
Pennsylvania
Psychology



**Alison
Buttenheim**

University of
Pennsylvania
Behavioral
Science



**Gretchen
Chapman**

Carnegie Mellon
University
Health
Psychology



Robert Cialdini

Arizona State
University
(Emeritus)
Psychology



Lindsay Dhanani

Ohio University
Industrial and
Organizational
Psychology



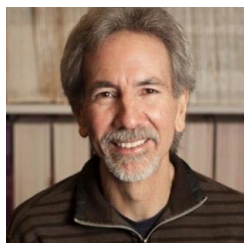
Berkeley Franz

Ohio University
Medical
Sociology



Terry Fulmer

The John A.
Hartford
Foundation
Practice
Orientation



Tom Gilovich

Cornell
University
Social
Psychology



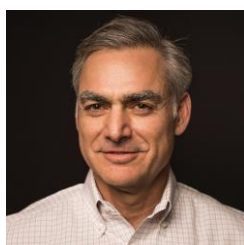
Adam Grant

University of
Pennsylvania
Organizational
Behavior



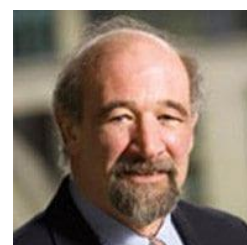
Neil Lewis

Cornell
University
Communications



Scott Ratzan

CUNY Graduate
School of Public
Health
Public Health



Barry Staw

University of
California,
Berkeley
Organizational
Behavior

Practitioners



Jonathan Barsade
CEO (Former),
Exactor, Inc.



David Sable
Young &
Rubicam, CEO
(former)
Marketing

COVID-19 Behavioral Science Task Force Associates



Sivahn Barli
University of
Toronto
Organizational
Behavior



Marissa Thiel
Cleveland Clinic
Health Advisory

ATTACHMENT V: RESEARCH REPORT & META ANALYSIS -- A REVIEW OF VACCINE UPTAKE AND HESITANCY: EVIDENCE-BASED GUIDANCE FOR THE COVID-19 VACCINATION CAMPAIGN

Prepared by Lindsay Y. Dhanani¹ and Berkeley Franz²

¹Psychology Department, Ohio University

²Heritage College of Osteopathic Medicine, Ohio University

EXECUTIVE SUMMARY

- Vaccine uptake and hesitancy are predicted by sociocultural characteristics, trust in science and medicine, past experiences with vaccines and the health care system, receiving a recommendation from a health care provider, and exposure to media.
- Older adults have high rates of vaccination, but uptake is lower among low-income and rural older adults. Educational interventions and those that include action plans have effectively increased vaccine uptake among older adults.
- Long-term care staff and residents have relatively low vaccine uptake rates and this may be due to misinformation, high burnout, and other demographic characteristics. Uptake rates can be improved with local, targeted interventions.
- Racial/ethnic minorities are significantly less likely to be vaccinated than Whites and experiences with and trust in health care providers are important determinants of uptake. Intervention evidence has been mixed.
- Other effective interventions include those that target specific unvaccinated populations, increase vaccine knowledge, improve access and convenience, mandate vaccinations, engage religious and community leaders, and are community based.
- Studies on COVID-19 suggest that women, republicans, low-income, and Black respondents are more likely to refuse the vaccine. Older adults are less likely to refuse.
- Perceptions of risk and vulnerability, exposure to misinformation, and access to health care also predict COVID-19 vaccination intentions.
- Messages that emphasize vaccine efficacy and mitigate fears of side effects reduce COVID-19 vaccination hesitancy. Vaccine mandates are seen unfavorably.

INTRODUCTION

The goal of this report is to identify evidence-based recommendations for increasing vaccination uptake with an emphasis on older adults, staff and residents of nursing homes and long-term care facilities, and other Medicaid recipients. This report first reviews the predictors of vaccine acceptance and vaccine attitudes within these populations to identify potential barriers to vaccine uptake that may be the target of successful interventions. We then consider the most effective public health messaging strategies for increasing vaccine uptake (e.g., the influenza vaccine) and conclude with an overview of current knowledge on COVID-19 vaccine acceptance.

GENERAL PREDICTORS OF VACCINE ACCEPTANCE

Although only a small minority of people regularly refuse vaccines, a growing number express vaccine hesitancy, defined by the World Health Organization as “a delay in acceptance or refusal of vaccines despite availability of vaccination services” (MacDonald & SAGE Working Group on Vaccine Hesitancy, 2015). Vaccine hesitant individuals may accept some vaccines but refuse others and cite a variety of

reasons for doing so (Kestenbaum & Feemster, 2015). Most research to date has focused on parents in the context of routine childhood vaccinations. A number of sociocultural factors predict vaccine hesitancy, including social norms, high religiosity, low trust in science and medicine, low perceived risk of infection, and previous negative experiences with vaccines (Dube et al., 2013). Other factors are also important in shaping vaccine hesitancy including a lack of knowledge and access to health care services (Chando, Tiro, Harris, Kobrin, & Breen, 2013). Evidence suggests that recommendations from health care providers and policies positively shape vaccine uptake (Dube, Gagnon, Nickels, Jeram, & Schuster, 2014). Although social networks have always shaped knowledge and values related to vaccine acceptance, electronic and social media sources have helped disseminate misinformation about vaccines and bolster vaccine hesitancy (Puri, Coomes, Haghbayan, & Gunaratne, 2020; Wilson & Wiysonge, 2020).

A CONSIDERATION OF CRITICAL POPULATIONS

The studies reviewed in the following section are summarized in Table 1.

Older Adults

Older adults are at an elevated risk for developing severe complications from infectious diseases, including COVID-19 (Centers for Disease Control, 2020a), which makes understanding vaccine uptake in this population important. Past research suggests that older adults receive the influenza vaccine at a higher rate than the general population (Centers for Disease Control, 2020b). However, barriers exist that reduce the likelihood of older adults getting vaccinated and these barriers are particularly pronounced among low-income older adults (Mahmood, Kim, Kabir, Kedia, & Ray, 2020; Mangtani et al., 2005; Okoli et al., 2019) as well as those living in rural areas (Gatwood et al., 2020; Jain, van Hoek, Boccia, & Thomas, 2017). Barriers include living in regions with low health literacy (Gatwood et al., 2020), a lack of access to health care (Kaljee et al., 2017), and low trust in and poor communication with health care providers (Kaljee et al., 2017).

Several interventions for increasing vaccine acceptance and uptake have been tested with older adults. Evidence from these interventions suggests that several informational and educational campaigns have been successful at increasing vaccine uptake among older adults (Ho et al., 2019; Leung et al., 2017; Worassathit et al., 2015). McCaul, Johnson, and Rothman (2002) found that action-focused messaging (i.e., sending a letter which stated “now is the time to make arrangements to get your flu shot” alongside information for days and times when vaccines were available) increased vaccine uptake. Involving pharmacists in the vaccination process, such as having pharmacists deliver and provide information about the vaccine, also increased vaccine coverage for older adults (Beal, Kadakia, Reed, & Plake, 2020). However, studies comparing gain- and loss-framed messages found no effect on vaccine uptake (Nan, Xie, & Madden, 2012) as did a study comparing didactic and narrative messaging (Prati, Pietrantoni, & Zani, 2012). Finally, one study examined older Black adults and found that a vaccine safety message intervention improved vaccine beliefs in comparison to the control group (Wray et al., 2009; the stimulus is available in Appendix B and can be accessed at the following link: <https://drive.google.com/file/d/1x5uTFXrwG-uam6N8eMqzQAD0HJFEburr/view?usp=sharing>).

Long-Term Care Staff and Residents

Long-term residents and staff are among the most susceptible to infectious diseases such as COVID-19 (Utsumi, Makimoto, Quroshi, & Ashida, 2010); nationwide more than a third of deaths due to

COVID-19 have occurred in the long-term setting (Chidambaram, Garfield, & Neuman, 2020). Although residents of these facilities tend to take the flu vaccine at high rates and have been prioritized for universal COVID-19 vaccination, health care workers in these facilities accept the influenza vaccine at the lowest rate of all health care professionals (Jaklevic, 2020a; Centers for Disease Control, 2018). Early reports from the COVID-19 vaccination campaign in long-term facilities suggest that COVID-19 vaccine acceptance is even lower than that of the flu vaccine among long-term care facility staff (Jaklevic, 2020b). States reporting data, including North Carolina, Ohio, Maryland, and D.C., report that between 30-50% of staff accepted the COVID-19 vaccine when it was first offered (Chason, Tan, Portnoy, & Cox, 2021). Union representatives state that refusal stems from exposure to misinformation and medical mistrust. Reports from individual facilities suggest that acceptance has grown in the second round of vaccinations after staff have seen others receive it. Some facilities have identified change leaders from within the organization to have one-on-one conversations with staff. Considerable barriers remain, however, to increasing uptake. According to an analysis by the Kaiser Family Foundation, the majority of employees are aides or nurses and have lower educational attainment (True et al., 2020). Further, many of these employees are at or near the federal poverty line, have high levels of burnout, and are likely to feel unsupported in their work (Costello, Walsh, Cooper, & Livingston, 2019). This stress is likely to have been exacerbated during the COVID-19 pandemic and may limit trust in health care institutions and medicine, which are both key predictors of vaccine hesitancy (Dube et al., 2013). Finally, African Americans are overrepresented among long-term care staff (True et al., 2020) and we explore factors related to vaccine hesitancy among this and other minority populations below.

Research also demonstrates that staff play an important role in vaccine decisions among residents of long-term care facilities. More specifically, when staff members are less informed about vaccines, they are less likely to encourage residents to receive them which results in lower uptake rates (Chan et al., 2013). Further, long-term care facility residents are also more likely to receive vaccinations when the facility has an explicit vaccination policy (Shroufi, Copping, Vivancos, & Slack, 2008).

We identified two studies that conducted interventions among nursing home staff. The first conducted an outreach-based intervention that included visiting the nursing home, providing two hour-long informational meetings about vaccines, and identifying a local coordinator to organize and promote vaccination within the facility. The intervention resulted in a 9% increase in vaccination rates (Looijmans-van den Akker et al., 2010). In the second intervention, nursing home staff were each sent a personalized letter which emphasized their professional responsibility to get vaccinated to protect their residents and the difficulties that would arise if their coworkers were to become ill and miss work. Vaccine intentions were higher among the intervention than the control group (Lorini et al., 2020).

Racial/Ethnic Minorities

Black and Hispanic Americans demonstrate lower vaccine uptake rates in comparison to non-Hispanic White Americans across a number of different types of vaccines, including the influenza (Centers for Disease Control, 2020b; Hall et al., 2020), H1N1 (Burger, Reither, Mamelund, & Lim, 2021), HPV (Kessels et al., 2012), and pneumonia (Winston, Pascale, & Lees, 2005) vaccines. Racial/ethnic disparities in vaccine uptake are also present among nursing home residents (Chai, Feng, Fennell, & Mor, 2011; Li & Mukamel, 2010). One reason for the low vaccine uptake rates among Black Americans is that, in comparison to Whites, Black respondents are less likely to receive vaccine recommendations from their health care providers (Arnold, Luong, Rebmann, & Chang, 2019; Winston, Wortley, & Less, 2005; Ylitalo, Lee & Mehta, 2013), which is a strong predictor of vaccination uptake (Fu, Zimet, Latkin, &

Joseph, 2017). Importantly, evidence suggests that people are equally likely to get vaccinated when they receive health care provider recommendations regardless of their race (Ylitalo et al., 2013).

The intersection of other social inequities, such as Black Americans reporting lower incomes and being less likely to be insured (Burger, Reither, Mamelund, & Lim, 2021), also contribute to low vaccination rates. Similar to the other populations discussed, lack of access is also important to consider for racial/ethnic minorities. One study found that Black respondents were the most represented among participants who reported wanting to get vaccinated against H1N1 but being unable to access the vaccine (Galarce et al., 2011).

Further, mistrust in the health care system, feelings of racial consciousness in medical settings, and prior experiences with discrimination also inhibit vaccine uptake among Black Americans (Quinn et al., 2017). Some evidence also suggests that Blacks are less likely to perceive vaccines as safe in comparison to Whites (Galarce et al., 2011; Usher-Pines, Maurer, & Harris, 2011). Given that trust appears to affect vaccination decisions, one study examined the sources that Black parents trust most for vaccine-related information (Fu, Haimowitz, & Thompson, 2019). The highest trust was reported for pediatricians and CDC vaccine scientists whereas the lowest trust was reported for school principals and pastors. Moreover, participants reported higher trust in medical professionals when there was racial concordance (i.e., when the medical professional was also Black). The same concordance effects were not found for other authority figures. This finding comports with prior findings showing that racial concordance is generally associated with improved health care outcomes and utilization among racial/ethnic minority patients (e.g., Saha, Komaromy, Koepsell, & Bindman, 1999).

Well-designed intervention studies have seldom been done in this area (Galbraith et al., 2016) and the few interventions that have been done show relatively small or inconsistent effects. For example, DiClemente et al. (2015) implemented an educational intervention that was specifically developed for Black girls and was aimed at increasing HPV vaccination uptake. There was no effect of the intervention on whether or not participants received the first dose and a statistically nonsignificant increase in vaccine compliance for the second and third doses for those in the intervention group. Kriss et al. (2017) exposed pregnant Black women to two different interventions: a cognitive messaging intervention (i.e., participants were given information about the vaccine) and an affective messaging intervention (i.e., participants were exposed to testimonials from others). Compared to the control, vaccine uptake was significantly higher for those who received the cognitive intervention but not for those who received the affective intervention. However, these same interventions were also assessed for influenza vaccine uptake and produced no differences in comparison to the control group (Frew et al., 2016). Finally, a review of 41 studies on interventions to reduce vaccine uptake disparities concluded that multicomponent, locally designed interventions were most effective, suggesting that interventions may need to adopt multiple strategies in tandem to produce desired behavioral change (Crocker-Buque, Edelstein, & Mounier-Jack, 2016).

Other Medicaid recipients

There are several populations disproportionately served by Medicaid that are important to consider in the context of COVID-19 vaccination. First, low-income adults represent a substantial number of Medicaid recipients. Among low-income adults, a lack of access to health care, despite being insured, is a critical barrier (Gilstad-Hayden, Durante, Earnshaw, Rosenthal, & Ickovics, 2015; Survadevara, Bonville, Rosenbaum & Domachowske, 2014). Galarce, Minsky, and Viswanath (2011) found that adults living under the poverty line in rural areas were the most represented among

participants who reported being willing to receive the H1N1 vaccine but who had not tried to get it. This may reflect the increased difficulty of finding or traveling to adequate health care services. A survey of low-income mothers also found that mothers were more likely to report that their children were up to date on their vaccinations when they had greater trust in their health care provider (Gilbert, Mersky, & Lee, 2021). This survey further found that mothers who were experiencing greater mental health symptoms were less likely to vaccinate their children.

Pregnant women are also among those who are eligible for Medicaid and this program is the largest payer of pregnancy-related services in the U.S. (Kaiser Family Foundation, 2019). A recent review of 155 studies examining vaccine uptake and hesitancy among pregnant women found that the most pronounced barriers to vaccine uptake were: concerns regarding safety for pregnant women, concerns about vaccine efficacy, low knowledge about the vaccine or disease, not receiving a recommendation from a health care provider, and a lack of access (Wilson, Patterson, Jarrett, & Larson, 2015).

Although few studies have explored interventions to increase vaccine uptake among populations served by Medicaid, the populations covered by Medicaid may help inform targeted interventions. There is a high amount of overlap with residents of long-term care facilities; more than 60% of adults in these settings are also Medicaid recipients. Similarly, both Black and Hispanic Americans are overrepresented among Medicaid enrollees (Kaiser Family Foundation, 2013). Accordingly, interventions shown to be effective in these populations may also improve uptake among Medicaid recipients. Interventions specific to the Medicaid population are also important to consider. Medicaid recipients are highly likely to be connected to a patient centered medical home where care is coordinated across a variety of services. Given existing evidence that messages from health care professionals are strongly associated with vaccine uptake (Gargano et al. 2013), this may be an ideal site to stage interventions given the regular contact with health care professionals and the coordination with vaccine providers. Indeed, previous evidence suggests that adolescent females who have public insurance have greater odds of receiving the HPV vaccine, likely because they had greater exposure to health care professionals and vaccine messaging (Tsui et al. 2013).

INTERVENTIONS TO IMPROVE VACCINE ACCEPTANCE

Beyond those described above, there are other interventions that have been tested with the general population that may also be informative when designing interventions for COVID-19 vaccination in the populations of interest. Jarrett et al.'s (2015) systematic review of 181 studies on vaccine-related interventions found that the most effective interventions were those that specifically targeted unvaccinated populations, increased vaccine knowledge, improved convenience and access, mandated vaccinations, and included religious or other leaders to promote vaccination. The review also noted social mobilization as an effective strategy for improving uptake among low-income parents. Interventions that were less effective included incentive-based interventions or other passive interventions, such as informational websites and posters. Another review identified reminder and recall systems and community-based approaches as effective strategies for improving uptake (Olson, Berry, & Kumar, 2020).

Reviews have also found strategies that were relatively ineffective at changing vaccine attitudes and uptake or produced mixed results. First, in a review of interventions targeting parental vaccine attitudes, Sadaf et al. (2013) found that educational interventions only produced significant effects in roughly half of the reviewed studies. Second, though perceived likelihood, severity, and susceptibility to illness predict vaccination behavior (Brewer et al., 2007), a meta-analysis concluded that messaging which emphasizes risk does not increase vaccine uptake (Parsons, Newby, & French, 2018). Finally, many studies have compared gain-framed messages (i.e., messages which emphasize the positive

consequences of vaccination) and loss-framed messages (i.e., messages which emphasize the negative consequences of not getting vaccinated) and two recent reviews found no clear evidence for an effect of message framing (O’Keefe, & Nan, 2012; Penta & Baban, 2018). However, one study found an advantage of loss-framed messages among Black and Hispanic mothers but no difference among White mothers, suggesting race/ethnicity might moderate messaging effects (Lechuga, Swain, & Weinhardt, 2011).

Importantly, reviews have noted the distinct absence of well designed, rigorous studies that assess change in vaccination following an intervention or a mass vaccine campaign (Dube et al., 2015; Jarrett et al., 2015; Sadaf et al., 2013). One concluded, “there is no strong evidence to recommend any specific intervention to address vaccine hesitancy/refusal” (Dube et al., 2015, p. 4200). In the absence of effective general interventions, multimodal and population-specific interventions are important to consider.

INSIGHT ON COVID-19 VACCINE ACCEPTANCE

We conducted a systematic review of the literature on attitudes toward and willingness to receive the COVID-19 vaccine and the identified studies are summarized in Table 2. Studies in this area primarily addressed three research questions: 1) how many people intend to get the COVID-19 vaccine; 2) what subgroups are more or less willing to receive the vaccine; and 3) what characteristics of the vaccine are associated with vaccine hesitancy? These questions can inform interventions to improve COVID-19 vaccine uptake by identifying the scope of the problem (i.e., estimating how many people indicate they are vaccine hesitant or would refuse the vaccine), the populations that are most in need of intervention, and the concerns that a potential vaccine campaign should address.

The systematic literature review identified 18 studies which estimated the percentage of people who reported they would receive the vaccine when it became available, 7 which estimated people who were hesitant, and 15 which reported the number of people who would decline the vaccine (see Table 3 for summary). The sample-weight mean prevalence rates indicated that 58.6% intended to vaccinate whereas 22.6% were unsure or undecided, and 29.1% did not intend to vaccinate. Of note, there was one study that examined health care workers and one study that examined long-term care staff, both of which showed lower vaccine intention rates (57.5% and 44.9%, respectively) than the average. National polls conducted in January suggest that vaccine hesitancy and refusal are waning, even among minority groups, and more people now express an intention to receive the vaccine as soon as possible (Kaiser Family Foundation, 2021; see Appendix B for demographic breakdown of those who would accept and reject the vaccine). The average percentage of people willing to take the vaccine was 64% across five polls from January, which was up from an average of 57% across four polls from December (Table 4).

We next assessed the populations that were most at risk for declining the vaccination by conducting a meta-analysis to compare the odds of declining vs. accepting the vaccine across demographic groups. Results (Table 5) showed that women (OR = 1.736, 95% CI [1.376, 2.096]), republicans (OR = 2.302, 95% CI [1.300, 3.303]), low-income (OR = 1.386, 95% CI [1.059, 1.713]), and Black (OR = 2.23, 95% CI [1.603, 2.844]) respondents had higher odds of refusing the vaccine than men, democrats, higher income, and White respondents. Hispanics also had marginally higher odds of vaccine refusal in comparison to White respondents (OR = 1.476, 95% CI [.944, 2.007]). Further, older adults reported higher vaccine intentions in comparison to younger adults (OR = .658, 95% CI [.428, .887]). Somewhat in contrast though, early vaccination reports show that women made up 63% of those who have already been vaccinated (McPhillips, 2021).

Beyond the relationships that could be meta-analyzed, higher religiosity (Callaghan et al., 2020; Olagoke, Olagoke, & Hughes, 2020), endorsement of conspiracy theories (Hursh, Strickland, Schwartz, & Reed, 2020; Romer & Jamieson, 2020), lower trust in the government (Lazarus et al., 2020), and exposure to misinformation (Loomba, de Figueiredo, Piatek, Graaf, & Larson, 2020) were associated with a lower likelihood of getting vaccinated, and greater concern about or perceiving higher risk of getting COVID-19 were positively associated with vaccine intentions (Callaghan et al., 2020; Khabchandani et al., 2021; Reiter, Pennell, & Katz, 2020; Thunstrom, Ashworth, Finnoff, & Newbold, 2020). Relatedly, one study found that there was a misperception among participants that being in good health indicated one did not need to receive the vaccine (Desveaux et al., in press). Of particular relevance for the populations of interest, vaccine intentions were higher for people who had health insurance in comparison to those who did not and were higher among people who had private vs. public health insurance (Reiter et al., 2020). Participants further reported that one important factor they would consider in their decision to get vaccinated is whether the vaccine is covered by their health insurance (Reiter et al., 2020). Additionally, experiences with racial discrimination appear to be a barrier for racial/ethnic minorities getting vaccinated (Savoia et al., 2021).

POSSIBLE MESSAGING AND INTERVENTIONS

The final set of studies sought to identify the characteristics of the vaccine that related to vaccine intentions. Several studies found that people expressed concerns about getting a rapidly developed vaccine or one that was approved for emergency use (Desveaux et al., in press; Goldman et al., 2020; Hursh et al., 2020; Kreps et al., 2020; Thunstrom et al., 2020). Other chief concerns included the risk of side effects or adverse reactions to the vaccine (Desveaux et al., in press; Motta, 2021; Reiter et al., 2020; Ruiz & Bell, 2021; Taylor et al., 2020; Unroe, Evans, Weaver, Rusyniak, & Blackburn, 2020), a preference for developing natural immunity (Ruiz & Bell, 2021; Taylor et al., 2020), or concerns about commercial profiteering (Taylor et al., 2020). People also reported being more willing to vaccinate when the vaccine offered a longer protection duration (Kreps et al., 2020), was highly effective (Lima, Hwang, Cha, & Cha, 2020; Motta, 2021; Pogue et al., 2021), and was developed in the United States (Kreps et al., 2020; Motta, 2021). Financial support offered by one's organization, such as having paid sick days, was similarly associated with an increased willingness to vaccinate (Desveaux et al., in press).

Franklin Templeton and Gallup conducted an experimental study in which they varied the messaging participants received about the vaccine and then assessed intentions to vaccinate (Rothwell, 2020). The experiment varied the time at which the vaccine became available as well as the descriptions of the approval process, the efficacy, and the side effects of the vaccine (see Appendix A for the specific language presented to participants). Vaccine intention rates were highest when the messaging emphasized high efficacy (i.e., 100% efficacy vs. 50% efficacy), no serious effects (i.e., stated there were no serious side effects vs. providing no information about side effects), and included more reassurance about the approval process (i.e., stated it was approved after three rounds of clinical trials and FDA approval vs. stating it was approved after FDA approval alone).

A nationwide poll conducted by the de Beaumont Foundation in conjunction with the American Public Health Association and others similarly assessed the effectiveness of different public health messages on vaccine intentions. They found the most effective messages were "getting vaccinated will help keep you, your family, your community, the economy, and your country safe and health;" "at 95 percent efficacy, this vaccine is extraordinarily effective at protecting you from the virus;" and "vaccines will help bring this pandemic to an end." They also found that respondents said they were most willing to take the

vaccine for their family in comparison to doing so for their country, the economy, their community, or their friends.

Another experiment examined the effects of messaging on COVID-19 vaccine acceptance (Green et al., 2021). They used messages that emphasized each of the following: getting vaccinated to prevent harm to one's self and others, because others they know are doing it, because scientists recommend it, because a personal physician recommends it, or out of patriotic duty. Each treatment condition resulted in less vaccine hesitancy and resistance in comparison to the control (which simply asked if they would get vaccinated without any additional messaging) with the exception of the appeal to patriotism. The largest effects were found for messages that emphasized scientists' recommendations or recommendations from a personal physician. Heterogeneity analyses showed the effects were consistent across demographic subgroups. They also conducted an experiment where they assessed vaccine intentions as a function of different people and public figures receiving the vaccine publicly. There were only small effects for this type of intervention and political figures receiving the vaccine publicly actually increased vaccine hesitancy.

A few studies considered people's perceptions of making vaccination mandatory to assess the potential effectiveness of this public health strategy. Across studies, respondents reported negative perceptions of vaccine mandates and a preference for making the vaccine voluntary (Largent et al., 2020; Lucia et al., 2020; Shaw et al., 2021). Negative views of vaccine mandates were particularly pronounced among people who reported low intentions to receive the vaccine (Largent et al., 2020; Lucia et al., 2020).

Finally, the CDC recently implemented the Pharmacy Partnership for Long-Term Care Program to increase vaccine uptake among long-term care staff and residents (Gharpure et al., 2021). The intervention consisted of partnering skilled nursing facilities with local pharmacy providers to help manage vaccine distribution, administration, and management. Within the first month of the program, the facilities saw moderately high vaccine coverage with a median of 77.8% of residents and 37.5% of staff members receiving at least one dose of the vaccine. The CDC also offers further guidance for long-term care facilities here: [Long-Term Care Facility Toolkit: Preparing for COVID-19 Vaccination \(cdc.gov\)](https://www.cdc.gov/long-term-care/facility-toolkit/).

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Table 1. Summary of studies assessing vaccine uptake in specialized populations of interest.

Citation	N	Population	Major Findings
Arnold, Luong, Rebmann, & Chang (2019)	115,775	Pregnant women	Black pregnant women were less likely to get vaccinated against the flu than White, Hispanic, and Asian women. Black and Asian women were less likely to receive vaccine recommendations from their health care providers in comparison to White women.
Beal, Kadakia, Reed, & Plake (2020)	25 studies	Older adults	Pharmacists' participation in the vaccination process increased access to vaccines among older adults
Burger, Reither, Mamelund, & Lim (2021)	45,599	Black and White adults	White women were the most likely to have been vaccinated against H1N1 and Black women were the least likely. Black respondents reported lower incomes and were less likely to be insured than White respondents.
Cai, Feng, Fennell, & Mor (2011)	850,000	Long-stay nursing home residents	Black residents were 14-16% less likely to be vaccinated than White residents within the same facility.
Chan et al (2013)	1,300	Nursing home health care staff and residents	Nursing home staff were less likely to encourage residents to get the pneumococcal vaccine when they had less information about the vaccine
Crocker-Buque, Edelstein, & Mounier-Jack (2016)	41 studies	Racially/ethnically diverse children and adolescents	Reviewed studies on ways to reduce inequalities in vaccine uptake among children and adolescents. Multicomponent interventions which were locally designed were the most effective. Escalating interventions (i.e., those that started with unobtrusive methods such as letters and then escalated to home visits) were also effective. Evidence on community outreach programs was mixed.



DiClemente, Murray, Graham, & Still (2015)	216	Black girls	<p>Conducted a randomized control trial to assess the effects of a culturally-appropriate educational intervention on HPV vaccine uptake.</p> <p>The intervention included information about the vaccine, targeted motivating factors, and showed similar role models obtaining the vaccine. The information was all tailored to Black populations specifically.</p> <p>An equal number of people in the control and intervention conditions began the HPV vaccine course and the intervention group was more likely to complete the course</p>
Frew et al. (2016)	95	Pregnant Black women	<p>Conducted a randomized control trial to assess the effects of a cognitive (i.e., informational intervention) and an affective messaging intervention (i.e., testimonials of others) on influenza vaccine uptake.</p> <p>No differences in vaccine uptake were observed between conditions.</p>
Fu, Haimowitz, & Thompson (2019)	110	Black parents	<p>Participants were asked to rate their level of trust for vaccine advice for a variety of sources.</p> <p>Trust was highest for pediatricians and CDC vaccine scientists. Levels of trust were lowest for school principals and pastors.</p> <p>Trust was higher for race-concordant medical authority figures than race dis-concordant figures. The same was true for vaccine-preventable disease survivors.</p> <p>Race concordance did not matter for non-medical sources.</p>
Fu, Zimet, Latkin, & Joseph (2017)	400	Black parents	<p>Receiving stronger recommendations from health care providers resulted in an increased likelihood that children were vaccinated.</p> <p>Parents having higher trust in their health care providers was also associated with increased uptake.</p>
Galarce, Minsky, & Viswanath (2011)	1,569	US adults	<p>Black respondents were the least likely to perceive the H1N1 vaccine as safe.</p>



			<p>Black respondents were more likely to report that they wanted to receive the vaccine but did not have access to it.</p> <p>People living under the poverty line in rural areas were the most likely group to report that they were willing to receive the vaccine but had not yet tried to get it.</p>
Gatwood et al (2020)	382,483	Older adults who were Medicare recipients	<p>People residing in rural areas, areas with lower health literacy, and areas with more republican voters were less likely to be vaccinated for the flu and pneumococcal.</p>
Gilbert, Mersky, & Lee (2021)	813	Low-income mothers	<p>Greater trust in one’s health care provider was related to more positive vaccine attitudes and were more likely to report their child was up to date on their vaccinations.</p> <p>Mothers experiencing mental health symptoms were less likely to vaccinate their children.</p>
Gilstad-Hayden, Durante, Earnshaw, Rosenthal, & Ickovics (2015)	1,300	Low-income adults	<p>Vaccine uptake was lower among uninsured adults and those who had less access to health care.</p>
Hall et al (2020)	26,466,244	Older adults receiving Medicare	<p>Using Medicare beneficiaries’ records, this study found that Blacks and Hispanics were less likely to be vaccinated against the flu than White respondents.</p> <p>Fewer recent visits to a physician was associated with decreased likelihood of receiving the vaccine.</p>
Hebert, Frick, Kane, & McBean (2005)	6,746	Medicare beneficiaries	<p>White beneficiaries were more likely to have been vaccinated than Black or Hispanic beneficiaries.</p> <p>When comparing beneficiaries who visited the same providers during the same weeks, White beneficiaries were more likely to receive the vaccine than Black beneficiaries and this was explained by a higher number of patient-initiated vaccine visits.</p> <p>There were no racial differences in receiving the vaccine when the medical appointment was initiated for another reason.</p>



Hernandez et al. (2019)	187	Latina college students	Latina women were more likely to say they would get the COVID-19 vaccine if they received a recommendation from a Latina health care professional. Latina women with medical mistrust preferred racially concordant health care professionals when receiving vaccine recommendations.
Ho et al (2019)	8,837	Older adults	Conducted a randomized crossover trial intervention to increase influenza and pneumococcal vaccine uptake. The intervention materials included informational flyers and posters with uncomplicated messages encouraging vaccination that were available in clinics. Uptake rates were significantly higher during the intervention phase than the control phase.
Jain, van Hoek, Boccia, & Thomas (2017)	35 studies	Older adults	Older adults were less likely to be vaccinated when they lived alone or lived in rural and low-income areas. There was no consistent effect of household income.
Kaljee et al (2017)	48	Older adults	Barriers noted include the cost of health care and lack of transportation. Respondents also indicated that trust in their healthcare provider was key. Patient-physician communication was also important and participants reported feeling as though physicians weren't forthcoming and didn't address concerns.
Kriss et al (2017)	95	Pregnant Black women	Participants were primarily Medicaid recipients (88%). Conducted a randomized control trial to assess the effects of a cognitive (i.e., informational intervention) and an affective messaging intervention (i.e., testimonials of others) on Tdap vaccine uptake. Compared to the control, women who received the cognitive messaging intervention were significantly more likely to receive the Tdap vaccination. There was a nonsignificant increase among the affective messaging intervention group.



Leung et al (2017)		Older adults	<p>Conducted a randomized control trial to examine the influence of an educational intervention on influenza vaccine uptake.</p> <p>The educational intervention was designed based on the health beliefs model and included information about prevalence, modes of transmission, symptoms of the flu, and efficacy and side effects of the vaccine.</p> <p>There was an 8.6% increase in vaccine uptake in the intervention vs. control group three days after the intervention.</p>
Li & Mukamel (2010)	12,622	Nursing home residents	<p>Black nursing home residents were significantly less likely to have received the influenza and pneumococcal vaccines in comparison to White residents.</p> <p>Black residents were also less likely to have their vaccinations documented in comparison to White residents.</p>
Looijmans-van den Akker et al (2010)		Nursing home health care staff	<p>Conducted a randomized control trial to assess the effectiveness of an intervention to increase vaccine uptake among nursing home health care staff</p> <p>The intervention included an outreach visit, informational meetings, and a local coordinator to organize and promote vaccination.</p> <p>The intervention results in a 9% increase in vaccination rates.</p>
Lorini et al (2020)	2,135	Nursing home staff	<p>Tested the effectiveness of an intervention to improve influenza vaccine uptake among nursing home staff</p> <p>The intervention consisted of sending a personalized letter to all nursing home staff that emphasized the professional responsibility to get vaccinated to protect residents and the difficulties that would arise if colleagues got sick and had to miss work.</p> <p>A greater number of people in the intervention vs. control group reported they intended to receive the influenza vaccine during the next flu season.</p>

Mahmood, Kim, Kabir, Kedia, & Ray (2020)	40,555	Older adults	Food insecure older adults were less likely to get the pneumonia vaccine in comparison to food secure older adults. Food security did not affect influenza vaccine uptake rates.
Mangtani et al (2005)	5,572	Older adults	Older adults with lower socioeconomic statuses were less likely to get vaccinated against the flu.
McCaul, Johnson, & Rothman (2002)		Older adults	Conducted an intervention to examine the effects of message framing and action instructions affect flu vaccine uptake. There were no differences in uptake as a result of loss- vs. gain-framed messaging. The inclusion of an action plan significantly increased vaccination rates.
Nan, Xie, & Madden (2012)	222	Older adults	Conducted an experiment to examine the effects of message framing on H1N1 vaccine acceptance among older adults. There were no differences in vaccine acceptance between the gain- vs. loss-framed message conditions. Perceptions of vaccine efficacy significantly predicted acceptance.
Okoli et al (2019)	Meta-analysis	Older adults	Older, White, and higher income elderly adults were more likely to receive the influenza vaccine.
Prati, Pietrantoni, & Zani (2012)	311	Older adults	Conducted an experiment to assess the effects of persuasive messages on vaccine uptake. Compared to the control and a didactic condition, narrative messaging increased perceived risk of the flu, perceived efficacy of the vaccine, and self-efficacy related to vaccination. However, it did not increase intent.
Quinn et al (2017)	1,657	White and Black adults	Black participants had lower trust and perceived a higher risk of side effects than White participants. Racial consciousness in health care settings and frequency of discrimination were associated with lower probability of getting vaccinated.

Shroufi, Copping, Vivancos, & Slack (2008)	53	Nursing home residents	Uptake was higher among residents when their nursing home had a vaccination policy in comparison to when they did not.
Suryadevara, Bonville, Rosenbaum, & Domachowske (2014)	1,041	Low-income adults	A key barrier for those who wanted to receive the vaccine but had not yet was limited access.
Tsui et al (2013)	468	Immigrant and low-income adolescent females	Adolescents with public insurance had greater odds of HPV vaccine initiation.
Uscher-Pines, Maurer, & Harris (2011)	4,040	US adults	Black respondents were less likely to receive the H1N1 and influenza vaccines than White respondents. Hispanics were less likely to receive the flu vaccine but not the H1N1 vaccine. Whites were more likely to agree that vaccines are safe. Whites were more likely to be vaccinated in retail clinics than Blacks.
Wilson, Paterson, Jarrett, & Larson (2015)	155 studies	Pregnant women	Key barriers to vaccine uptake were concerns regarding safety for pregnant women, concerns about vaccine efficacy, low knowledge about the vaccine or disease, no recommendation for a health care provider, and a lack of access. Racial/ethnic minority women were less likely to get vaccinated.
Winston, Wortley, & Lees (2005)	4,577	Medicare beneficiaries	Black and Hispanic respondents were less likely to be vaccinated than White respondents for pneumonia. Black and Hispanic respondents were less likely to report that a health care provider had recommended getting vaccinated.
Worasathit et al (2015)	2,693	Older adults	Conducted an experimental study to assess the effects of education on influenza vaccine acceptance. The intervention group reported higher vaccine acceptance and a greater willingness to pay for the vaccine than the control group.



Wray et al (2009)	108	Older Black adults	<p>Conducted a randomized control trial to assess the effects of vaccine safety messages on vaccine beliefs.</p> <p>The intervention group had more accurate and favorable vaccine beliefs than the control group.</p>
Ylitalo, Lee, & Mehta (2013)	9,274	US adults	<p>Receiving a health care provider recommendation was associated with a five-fold increase in HPV vaccine uptake.</p> <p>Racial/ethnic minorities were less likely than Whites to receive a recommendation.</p> <p>People were equally likely to receive the vaccine if a health care provider recommended it regardless of race.</p>

Table 2. Summary of studies assessing COVID-19 vaccine uptake.

Citation	N	Sample	Vaccine Construct	Major Findings
Bogart et al (2021)	101	HIV-positive Black adults	Vaccine hesitancy	Greater mistrust related to COVID-19, such as believing the government was withholding information, was associated with greater vaccine hesitancy.
Callaghan et al (2020)	5,009	U.S. adults	Intent to vaccinate	<p>Vaccine refusal was higher among women; Black, religious, conservative, less educated, and low-income participants.</p> <p>Vaccine refusal was lower among Hispanics and people who have higher worry about COVID-19 and people who believe vaccines are safe and effective.</p>
Desveaux et al (in press)	8,634	Non-physician healthcare workers in Canada	Intent to vaccinate	<p>Younger adults and those with lower educational attainment were less willing to get vaccinated.</p> <p>Unwillingness was also associated with the belief that people in good health do not need to get vaccinated, lower confidence that</p>



				<p>the vaccine provides protection, concern about side effects, and mistrust of the rapid development process.</p> <p>Participants reported being more likely to get vaccinated if financial supports such as paid sick leave were available.</p>
Fisher, Bloomstone, Walder, Crawford, Fouayzi, & Mazor (2020)	991	U.S. adults	Intent to vaccinate	<p>Women, Black, and Hispanic participants were less willing to vaccinate.</p> <p>Participants over 60 were the most likely to vaccinate.</p>
Gadoth et al (2020)	609	Healthcare workers	Intent to vaccinate, belief that vaccination will protect them from COVID-19	Nurses, women, and Black and Hispanic participants were more likely to refuse the vaccine.
Goldman et al (2020)	2,524	Caregivers	Intent to vaccinate children	The majority of caregivers expressed that the COVID-19 vaccine should undergo standard testing rather than an expedited testing process.
Hursh, Strickland, Schwartz, & Reed (2020)	534	U.S. adults	Intention to vaccinate	<p>People were less likely to vaccinate if the vaccine was developed more rapidly and it increased the level of efficacy required for vaccine acceptance.</p> <p>Conservatives, people who endorsed conspiracy theories, and women required higher efficacy.</p>
Khubchandani et al (2021)	1,878	U.S. adults	Intention to vaccinate	<p>Women, caregivers, republicans, and low-income participants were more hesitant to get the vaccine.</p> <p>Being concerned about infection and believing oneself to be vulnerable to infection predicted increased intent.</p>
Kreps et al. (2020)	1,971	U.S. adults	Intention to vaccinate	<p>People were less likely to vaccinate when the vaccine was approved for emergency use rather than underwent a full approval.</p> <p>Longer protection duration and development in the U.S. predicted increased intent.</p>



Largent et al (2020)	2,730	U.S. adults	Intention to vaccinate	Republicans and Black participants were less likely to vaccinate.
Lazarus et al (2020)	773	U.S. adults	Intention to vaccinate	Older adults were more likely to report being willing to vaccinate in comparison to younger adults. Higher education was positively associated with vaccine acceptance. Higher trust in the government was positively associated with vaccine acceptance.
Lima, Hwang, Cha, & Cha, (2020)	572	U.S. and U.K. adults	Intention to vaccinate	People were more likely to vaccinate themselves in comparison to their children. Messages about the high effectiveness of the vaccine increased willingness to vaccinate.
Loomba, de Figueiredo, Piatek, Graaf, & Larson (2020)	4,000	U.S. adults	Intention to vaccinate	Women, republicans, and those exposed to misinformation about the vaccine were less likely to vaccinate.
Lucia, Kelekar, & Afonso (2020)	168	Medical students	Intention to vaccinate immediately	Participants preferred the vaccine be voluntary rather than mandated.
Lyu et al (2020)		Analyzed tweets	Vaccination attitudes	Older people had more positive attitudes toward getting vaccinated. Women expressed more vaccine hesitancy.
Malik, McFadden, Elharake, & Omer (2020)	672	U.S. adults	Intent to vaccinate	Men, older adults, and White (vs. Black) participants were more likely to vaccinate.
Mercadante & Law (2021)	525	U.S. adults	Intent to vaccinate	Older adults and people who knew someone affected by COVID-19 reported greater vaccine acceptance. Low-income participants were less likely to vaccinate.



Motta (2021)	990	U.S. adults	Intent to vaccinate	Participants were most likely to vaccinate when the vaccine was made in the U.S., was highly effective, and had low risk of side effects.
Olagoke, Olagoke, & Hughes (2020)	501	U.S. adults	Intent to vaccinate	Religiosity, external health locus of control, and beliefs that religion can protect against COVID-19 were negatively associated with intent to vaccinate.
Pogue et al (2020)	316	U.S. adults	Intent to vaccinate; attitudes toward COVID-19 vaccine	People were more likely to vaccinate when the effectiveness of the vaccine was high and when they showed more vaccine acceptance in the past. Knowledge about COVID-19 and political affiliation did not predict intent.
Reiter, Pennell, & Katz (2020)	2,006	U.S. adults	Intent to vaccinate	Men, liberals, and people with health insurance were more likely to get vaccinated. Black and low-income participants were less likely. Knowledge about COVID-19 and perceived severity of COVID-19 were positively associated with intent. Factors that influenced vaccination intent included whether it was recommended by a doctor, the current infection rate, vaccine efficacy, whether its covered by insurance, and the potential side effects.
Romer & Jamieson (2020)	840	U.S. adults	Intent to vaccinate	Belief in conspiracy theories was associated with less vaccine acceptance. This relationship was mediated by perceived harm of COVID-19.
Ruiz & Bell (2021)	804	U.S. adults	Intent to vaccinate	Chief concerns were about the side effects, doubts about efficacy, and a preference for developing natural immunity. People who had been vaccinated for the flu were more likely to get the COVID-19 vaccine. Men, older adults, and democrats were more likely to get vaccinated.



				Black, Hispanic, and low-income participants reported lower intent.
Savoia et al (2021)	2,650	U.S. adults	Intent to vaccinate	Black and older participants reported more vaccine hesitancy. Past racial discrimination predicted more hesitancy. Women expressed lower hesitancy.
Shaw et al (2021)	5,287	Health care workers	Intent to vaccinate	Women and Black participants were less likely to vaccinate.
Taylor et al (2020)	1,772	U.S. adults	Intent to vaccinate	Mistrusting the benefit of the vaccine, worrying about side effects, concerns about commercial profiteering, and a preference for natural immunity were associated with lower vaccine intent.
Thunstrom, Ashworth, Finnoff, & Newbold (2020)	3,133	U.S. adults	Intent to vaccinate	People were likely to vaccinate if they perceived a greater risk for infection. The novelty of the vaccine was an impediment to getting vaccinated.
Unroe, Evans, Weaver, Rusyniak, & Blackburn (2020)	8,243	Long-term care staff	Intent to vaccinate	Men, older, and White participants were more likely to vaccinate. Reasons for not vaccinating included concern about side effects, health concerns, doubts about the efficacy, and religious reasons.

Table 3. Percentage of respondents indicating COVID-19 vaccine acceptance and refusal from published studies.

Citation	N	% Accept	% Unsure	% Refuse
<i>Vaccine intentions</i>				
Bogart et al (2021)	101			32
Callaghan et al (2020)	5,009	69.15		30.85



Fisher, Bloomstone, Walder, Crawford, Fouayzi, & Mazor (2020)	991	57.6	31.6	10.8
Gadoth et al (2020)	609	32.3		1.31
Goldman et al (2020)	2,524	67.6		
Khubchandani et al (2021)	1,878	79	15	7
Largent et al (2020)	2,730	61.4		
Lazarus et al (2020)	773	75.42		
Loomba, de Figuirodo, Piatek, Graaf, & Larson (2020)	4,000	41.2		
Lucia, Kelekar, & Afonso (2020)	168	75		23
Malik, McFadden, Elharake, & Omer (2020)	672	67		33
Mercadante & Law (2021)	525	66.7		33.3
Pogue et al (2020)	316	68.57	15.89	15.57
Reiter, Pennell, & Katz (2020)	2,006	69	17	14
Ruiz & Bell (2021)	804	62.2	23	14.8
Savoia et al (2021)	2,650	59.7	21.7	18.6
Shaw et al (2021)	5,287	57.5	26.4	15.9
Taylor et al (2020)	1,772	75		25
Unroe, Evans, Weaver, Rusyniak, & Blackburn (2020)	8,243	44.9		55.1



Vaccine Uptake

Gharpure et al (2021)	Residents	77.8
	Staff	37.5

Table 4. Percentage of respondents indicating COVID-19 vaccine acceptance and refusal from national polls.

Polling Agency	% Accept	% Unsure	% Refuse
<i>December</i>			
APNorc	47%	27%	26%
deBeaumont	60%		
Pew	60%		39%
Reuters	61%		
<i>January</i>			
CNN	66%		30%
Gallup	65%		35%
KFF	47%	31%	20%
Long Island University	71%	10%	19%
Washington Post	71%		27%



Table 5. Demographic characteristics predicting vaccine refusal.

Construct	k	OR	95% CI
Women	12	1.733	1.403, 2.064
Black	11	2.223	1.603, 2.844
Low income	5	1.386	1.059, 1.713
Republican	5	2.302	1.300, 3.303
Older adults	8	.658	.428, .887
Hispanic	7	1.476	.944, 2.007

Note: Women = reference group is males; Black and Hispanic = reference group is White respondents; Low income = reference group is higher income respondents; Republican = reference group is democrats; Older adults = reference group is young adults; an odds ratio of 1 indicates no difference in vaccine refusal between the two groups; an odds ratio higher than 1 indicate the group is more likely to refuse the vaccine in comparison to the reference group and an odds ratio lower than 1 indicates the group is less likely to refuse the vaccine in comparison to the reference group.



Appendix A: Vaccine messaging conditions (Rothwell, 2020)

Versions of the Vaccine Question Randomly Assigned to Respondents, by Information Type

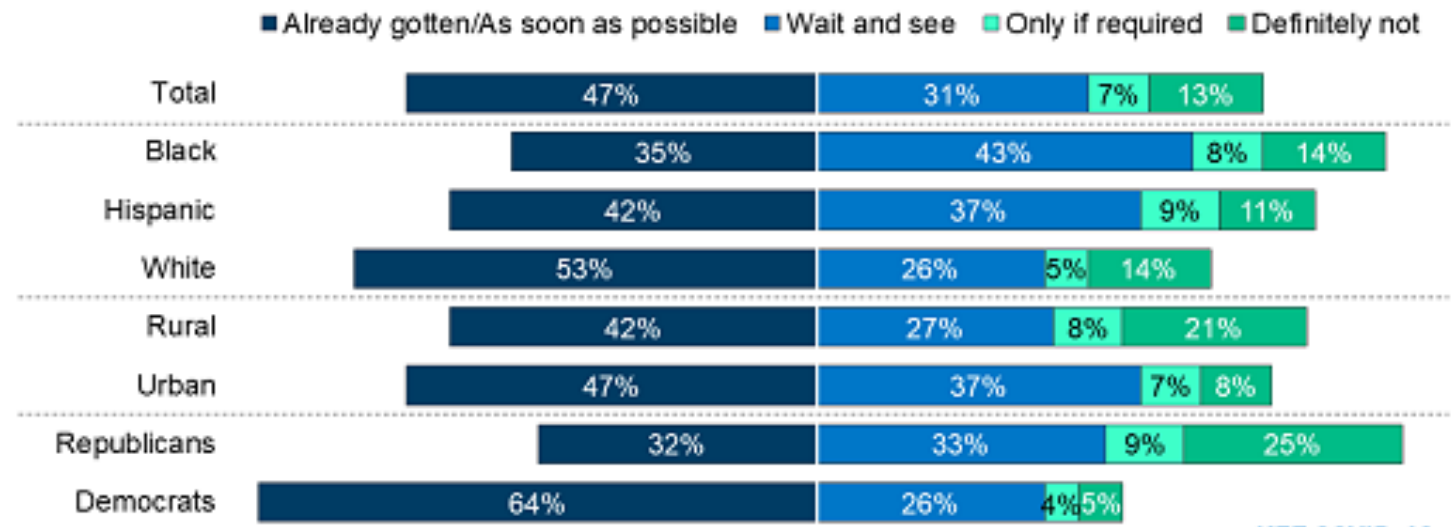
	Version 1	Version 2	Version 3
Timing	November-December 2020	January-March 2021	
Approval	After three rounds of clinical trials and FDA approval	After FDA approval	
Efficacy	Prevents disease in 50% of people vaccinated	Prevents disease in 100% of people vaccinated	[No information]
Side effects	With no serious side effects	[No information]	

FRANKLIN TEMPLETON-GALLUP ECONOMICS OF RECOVERY STUDY, OCT. 1-9, 2020

Appendix B: Kaiser Family Foundation poll results ([KFF COVID-19 Vaccine Monitor](#) | [KFF](#))

Republicans, Rural Residents Most Resistant To COVID-19 Vaccination; Black, Hispanic Adults Most Likely To “Wait And See”

Percent who say they will get a COVID-19 vaccine:



SOURCE: KFF COVID-19 Vaccine Monitor (Jan. 11-18, 2021). See top line for full question wording.

**KFF COVID-19
Vaccine Monitor**

ATTACHMENT VI: ADDITIONAL RESOURCES

Following are additional resources, available for download

- [Atkinson et al. \(2019\) Effectiveness of digital technologies at improving vaccine uptake and series completion - A systematic review and meta-analysis of randomized controlled trials](#)
- [Barsade & O'Neill \(2014\) APPENDICES Culture of Companionate Love in Long-Term Care Setting](#)
- [Barsade & O'Neill \(2014\) Culture of Companionate Love in Long-Term Care Setting](#)
- [Brewer et al. \(2007\) Meta-Analysis of the Relationship Between Risk Perception and Health Behavior - The Example of Vaccination](#)
- [Carlson & Shu \(2006\) The rule of three - How the third event signals the emergence of a streak](#)
- [Carpenter \(2013\) A meta-analysis of the effectiveness of the 'But You Are Free' compliance-gaining technique](#)
- [CONVINCE USA - Communication Strategies](#)
- [Dhanani & Franz \(2021\) Why public health framing matters - an experimental study of the effects of COVID-19 framing on prejudice and xenophobia in the US](#)
- [FINAL REPORT of NH Commission - Limited External Release to CMS](#)
- [Gerend & Sias \(2009\) Message framing and color priming - how subtle threat cues affect persuasion](#)
- [Gostin, Salmon & Larson \(2020\) Mandating COVID-19 Vaccines-JAMA Viewpoint](#)
- [Isenor et al. \(2016\) Impact of pharmacists as immunizers on vaccination rates - a systematic review and meta analysis](#)
- [Mekonnen et al. \(2019\) Effect of mobile text message reminders on routine childhood vaccination - a systematic review and meta-analysis](#)
- [Moehring et al. \(2021\) Surfacing norms to increase vaccine acceptance](#)
- [NVAC - Vaccine Confidence Subcommittee](#)
- [Parsons, Newby & French \(2018\) Do interventions containing risk messages increase risk appraisal and subsequent vaccination interaction and uptake? A systematic review and meta-analysis](#)
- [Penta & Baban \(2018\) Message Framing in Vaccine Communication - A systematic review of published literature](#)
- [Rodriguez et al. \(2019\) HPV Vaccine Interventions in the US - A systematic review and meta-analysis](#)
- [Thomas et al. \(2012\) Rural African American HPV vaccination and religiosity](#)
- [Thompkins et al. \(2020\) A Culturally Specific Mental Health and Spirituality Approach for African Americans Facing the COVID-19 Pandemic](#)
- [Volpp, Loewenstein & Buttenheim \(2020\) Behaviorally Informed Strategies for a National COVID-19 Vaccine Promotion Program - JAMA Viewpoint](#)
- [Webinar - Roles for behavioral sciences in COVID-19 Vaccination Efforts](#)
- [Xiao & Wong \(2020\) Vaccine hesitancy and perceived behavioral control - a meta-analysis](#)