

**COVID-19 Vaccination Hesitancy: The Science, Theory, and Messaging**

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## **Introduction**

Originating as a pneumonia in Wuhan, China, the 2019 novel coronavirus (SARS-CoV-2) has, in a relatively short period, lead to a global pandemic. The World Health Organization (2021) indicated that at the beginning of March 2021, there have been over 115.3 million known cases of COVID-19 and 2.5 million deaths globally. The Centers for Disease Control and Prevention (CDC, 2020) indicate that in the United States, there are over 28.6 million known cases and over 517,000 deaths attributable to COVID-19, and in El Paso County, there are over 125,000 known cases and over 2,150 deaths attributable to COVID-19 as of early March, 2021.

Few evidence-based treatments for COVID-19 have been tested as efficacious or made available to the public. Yet, three vaccines have been authorized for emergency use by the FDA (Johnson & Johnson, Moderna, Pfizer). As such, strict public health measures including isolation, social distancing, quarantine of those infected or exposed, community containment, limiting social gatherings, frequent handwashing, and face mask utilization have been mandated (see Howard et al., 2021; Wilder-Smith & Freedman, 2020 for reviews). In early March 2021, Texas will lift many of the government restrictions. To reduce the spread of COVID-19, the continuation of these measures, coupled with rapid and widespread vaccination of the population, is strongly recommended (CDC, 2021). While in these initial phases of vaccine distribution, demand for the vaccine is outpacing supply. It is clear from previous pandemics, other vaccine uptake, and studies of COVID-19 vaccines, that a non-trivial portion of U.S. residents — and those residing on the border of the U.S. and Mexico — will either be hesitant to become vaccinated or refuse to do so. To reduce viral spread, hospitalizations, and deaths, strong messaging and outreach efforts to promote vaccination by large numbers of residents in the region are vital. As no best practices for doing so exist, assessing the state of the science, using strong theoretical underpinnings and formative processes, such as community-based focus groups and collaboration from multiple stakeholders, is optimal to develop messaging and outreach strategies.

### **Theory: Diffusion of Innovation**

The Diffusion of Innovation theory of social change is relatively complex (Rogers, 2003) with multiple constructs, stages, and strategies aligned with its adoption (Dearing & Singhal, 2020, LeCraw, 2020). At its base, the theory posits that an innovation, such as taking a new vaccine, should be communicated through appropriate and well received channels, to promote adoption (Dearing & Singhal, 2020). Innovations are weighed by individual adopters based on its relative advantage over alternatives, complexity, compatibility, observability, and trialability. Adopters are categorized as innovators, early adopters, the early majority, the late majority, and laggards. This simply means some people adopt a change quickly, such as signing-up for the COVID19 vaccine, while others wait a while or even actively resist vaccination. The diffusion system within the theory indicates the identification and implementation by community opinion leaders as change agents.

Given the novelty and urgency surrounding the COVID-19 pandemic and vaccination, distinct components of the theory are more or less salient to promoting adoption of vaccination. For example, personal trialability is not feasible because vaccination is a point in time event. Many individuals, likely around 70% within the El Paso community (Cooper, 2021), are among those

who will become vaccinated early in the availability process. Thus, constructs within the model focused upon in this report include the recruitment of the approximate 30% of individuals in late majority and laggard categories. In other words, we are focusing on a sub-group of people who indicate they do not want the vaccine. The study includes assessments of relative advantage, complexity, and observability; and ideal communication channels within the Paso del Norte region.

### **Theory: The Health Belief Model**

The Health Belief Model (HBM; Rosenstock et al., 1988) suggests that health-related action is predicated on motivation via perceived susceptibility, perceived seriousness/threat, perceived benefits, perceived barriers, perceived self-efficacy, and cues to action. Ultimately, the health recommendation must be optimal in weighing benefits against costs. Each component of the model will be addressed here in an effort to develop outreach and messaging that will most likely result in individuals becoming vaccinated, reducing their risk, leading to disease prevention and the enhancement of public health.

### **Vaccination Hesitancy**

- The most frequently measured construct surrounding vaccination thus far has been willingness to become vaccinated once the vaccine is available to the individual (Callaghan et al., 2020; Cooper, 2021). Given that most individuals remain ineligible for vaccination, it is not feasible to assess these intentions relative to future behavior; however, a small, yet growing, literature has assessed vaccination hesitancy.
- In recent data collected from students at the University of Texas at El Paso, approximately 30% indicated they were unlikely or neutral in terms of becoming vaccinated (Cooper, 2021).
- Vaccination hesitancy rates among Texans are reported to be approximately 40%, with Hispanic/Latinx individuals demonstrating less hesitancy (36%; Sim, Marks, Sutton, Ben-Porath, & Evans-Pigford, 2020).
- A large survey of American adults estimated 31.1% of individuals did not intend on becoming vaccinated (Callaghan et al., 2020).
- Globally, the United States ranks among those countries with higher rates of vaccine hesitancy — approximately 43% according to a systematic review (Sallam, 2021).
- In a survey of U.S. medical students, 23% reported vaccination hesitancy (Lucia, Kelekar, & Afonso, 2020).
- Suggestions: Note that vaccination hesitancy rates within the U.S., Texas, among Hispanic/Latin individuals, and among regional college students fall between 30-43%. While medical students seem to report less hesitancy, rates of 23% from those entering the healthcare profession are of potential concern.

### **Regional Focus Groups**

Five focus groups were conducted remotely on February 26<sup>th</sup> and 27<sup>th</sup>, 2021. All groups were recruited from through social media and/or promotora outreach from El Paso and Dona Ana counties. To be eligible for focus group inclusion participants responded “no” or “maybe” to

whether they planned to become vaccinated once available to them. Two groups were conducted in English (11 respondents; 6 males, 5 females). Three groups were conducted in Spanish: two groups were recruited broadly from the region (10 respondents; 2 males, 8 females), and one group was recruited through the National COVID-19 Resiliency Network composed of Migrant workers (10 respondents; 2 males, 8 females). Each group lasted 90 minutes and included polls, chats, and encouraged dialogue among participants and with the moderator. A semi structured script was developed and delivered and with attention to Diffusion of Innovation Theory, the Health Belief Model, and empirical evidence on COVID-19 vaccination hesitancy and other risk reduction strategies.

### *Perceived Susceptibility/Risk*

- Defined as the perception the individual is at risk to contract COVID-19 either with or without vaccination.
- Two studies have assessed risk perception relative to vaccination hesitancy. One in Italy observed that risk perception and vaccination hesitancy were inversely related such that greater risk perception of COVID-19 was associated with reduced hesitancy (Caserotti, Girardi, Rubaltelli, Tasso, Lotto, & Gavaruzzi, 2021). Another large study in the U.S. demonstrated similar findings (Callaghan et al., 2020).
- Findings from regional focus groups conducted in English suggested, on average, moderate rates of risk perception of COVID-19 contraction with or without the vaccine. Those who reported decreased risk perception noted strong adherence to preventive behaviors, uncertainty about vaccine effectiveness, and overall good health. Those who reported greater risk perceptions also noted the potential lack of effectiveness of vaccine, the dramatic spread of COVID-19 in the region, the rapidity of vaccine development, others' lack of practicing preventive behaviors, and the spread of different variants of COVID-19.
- Data from regional focus group conducted in Spanish suggested, on average, moderate levels of perceived risk with or without the vaccine. Decreased risk perceptions were reported primarily because of practicing preventive health behaviors. Increased risk perceptions were based on ineffectiveness perceptions, conceptualizations that vaccines contain the virus, and anecdotal evidence from friends and family who received vaccine yet became ill. Note that the migrant worker focus group perceived elevated risk perceptions relative to other focus group respondents in English or Spanish.
- *The seemingly most common theme across all focus groups was the need for greater education about vaccines, their effectiveness, and their safety profiles. mRNA technology was not well understood (“how is it going to change my DNA?”). From a Diffusion of Innovation perspective, simply, is there a relative advantage of becoming vaccinated (v. not) to reduce the risk (and severity) of COVID-19?*
- Suggestions: Elevate perceived risk within the community of abstaining from vaccination; reduce perceived risk after becoming vaccinated; highlight best practices and relative advantage of community vaccination and practicing preventive behaviors; provide education on vaccine effectiveness and safety.

### *Perceived Severity/Seriousness*

- Defined as the perception of how severe COVID-19 is to the individual with or without becoming vaccinated.
- No studies were noted within the literature relating vaccination hesitancy to perceived severity.
- Regional findings from focus groups conducted in English indicated that on average, respondents perceived COVID-19 to be severe with or without vaccine. Decreased severity was more often related to younger individuals not becoming as ill as more mature adults. Increased severity perceptions were associated with hospitalization rates, death rates, and knowing individuals who have contracted COVID-19 and/or died from the virus. A mild decrease in severity perception of COVID-19 with the vaccine related to evidence and messaging suggesting individuals do not become as ill once vaccinated.
- Regional focus group findings conducted in Spanish suggested moderate to high perceived severity whether vaccinated or not. Reasons were similar to English speaking focus group participants, yet also included some responses of potential ineffectiveness of the vaccine to stop individual contraction of COVID-19, fatalistic religious beliefs, and the importance of vaccination always being optional. These latter reports, and slightly higher perceived severity, were indicated by the migrant worker focus group.
- Suggestions: Validate accurate perceived severity of COVID-19; monitor findings regarding individual risk for contracting COVID-19 after becoming vaccinated and message accordingly; educate as to reduction in community risk and spread with vaccination.

### *Perceived Benefits*

- Defined as perceived benefits to becoming vaccinated against COVID-19.
- Heightened perceived benefits are associated with increased willingness to become vaccinated (Callaghan et al., 2020; Kreps, Prasad, Brownstein, Hswen, Garibaldi, Zhang, & Kriner, 2020; Momplaisir, Haynes, Nkwihoreze, Nelson, Werner, & Jemmott, 2021).
- Perceived benefits from studies include perceived effectiveness and safety (Callaghan et al., 2020; Kreps et al., 2020; Momplaisir et al., 2021); editorials have suggested social responsibility, altruism, and empathy as perceived benefits promoting vaccination (Chou & Buddenz, 2020; Finney Rutten et al., 2020).
- Findings from regional focus groups conducted in English suggest perceived benefits of vaccination include: only mild beliefs in vaccine effectiveness, the potential to travel and congregate more readily, and the importance of becoming vaccinated for others, including family, friends, and the community.
- Regional focus group findings conducted in Spanish were similar in terms of benefiting family and friends, yet travel to and from Mexico for self, family, and friends was highlighted, rather than travel more generally.
- Suggestions: Continue emphasizing vaccine effectiveness, particularly at the community level, yet strongly emphasize respect for others (family and friends), and future ability to congregate and travel more readily.

### *Perceived Barriers*

- Defined as tangible and psychological costs to becoming vaccinated against COVID-19.
- Perceived barriers are associated with vaccine hesitancy (Callaghan et al., 2020; Kreps et al., 2020; Momplaisir et al., 2021; Murphy, Vallières, Bentall, Shevlin, McBride, Hartman, et al., 2021; Olagoke, Olagoke, & Hughes, 2020).
- Sociodemographics such as younger age (Cooper et al., 2021), self-identifying as Black (Callaghan et al., 2020; Momplaisir et al., 2021), Latinx (Sim et al., 2020), and female (Callaghan et al., 2020) have been associated with vaccination hesitancy.
- Perceived lack of effectiveness and safety (Callaghan et al., 2020; Kreps et al., 2020; Momplaisir et al., 2021; Murphy et al., 2021); religiosity (Olagoke et al., 2020), conservative political beliefs (Sim et al., 2020), and mistrust of health-related and informational sources (Murphy et al., 2021) appear to be associated with vaccine hesitancy.
- Findings from regional focus groups conducted in English suggested perceived barriers to becoming vaccinated were numerous and included: 1) perceived ineffectiveness, especially at the individual level preventing transmission; 2) perceived *long-term, unknown* side effects; 3) the rapidity of trials and approval; 4) effects on reproductive health; 5) feeling forced to get vaccinated; 6) familial pressure not to get vaccinated; 7) insufficient data (e.g., duration of immunity); 8) mistrust of data and process; 9) lack of education and understanding of development and vaccine technology (e.g., mRNA); 10) perception that since not widely available, it may not be safe (e.g., observability may be necessary to reduce hesitancy); and 11) fears (e.g., general vaccination fears, conspiracy beliefs). In addition, religiosity and conservative perspectives seemed related to greater hesitancy. Some respondents indicated a preference for the single dose vaccine, though others reported some mistrust of the single dose maker.
- Regional focus group findings conducted in Spanish suggest barriers include effectiveness, safety, and development; however, far more often noted by respondents were logistic barriers such as child care, transportation, long lines, and limited hours of operation of vaccination sites. Of particular note, respondents identified concerns such as perceived cost, being non U.S. citizens, not having social security information, and the belief that data collected will be used against them. There was little variation in religious or political beliefs noted, though some dissatisfaction with the handling of the pandemic by both the U.S. and Mexico was noted. Few respondents noted a preference for the single dose vaccine, though logistic concerns may promote greater vaccination with more ready availability of the single dose option.
- *Diffusion of Innovation constructs are salient: lack of clear relative advantage of vaccination, complexity of technology and process, and lack of observability.*
- **Suggestions:** Outreach and messaging to all in the region should include information about effectiveness (e.g., transmission prevention evolving evidence, community transmission strong evidence, severity of impact clear evidence), safety, mRNA technology, and the strength of the data and process despite rapidity. Messaging, outreach, and efforts to target Spanish speaking residents in the region should additionally focus strongly on access to all, no cost, improved logistics over time, and assurances of protection regardless of citizenship status.

## *Self-Efficacy*

- Defined as confidence in the ability to register and/or access vaccine once available.
- No studies directly measuring self-efficacy of vaccination were noted within the literature.
- Findings from regional focus group conducted in English suggest high levels of self-efficacy for accessing the internet, registration, and awareness of salient websites such as epstrong.org. Only one or two respondents lacked awareness of the process or websites.
- Regional focus groups conducted in Spanish suggested self-efficacy for access to the internet, registration, and awareness of salient websites was somewhat lower than for English speaking respondents. More respondents noted difficulty of navigating websites once accessible and aware of them.
- Suggestions: Strengthen self-efficacy for Spanish speaking residents within the region in terms of accessibility, awareness, and navigation. Consider vicarious strengthening techniques using peer models.

## *Cues to Action/Preferred Messaging, Channels, and Opinion Leaders*

- Cues to action are defined as receiving messages and outreach to promote willingness to become vaccinated against COVID-19. Positive cues to action are associated with increases in willingness to become vaccinated, while negative cues to action may promote hesitancy.
- Studies have suggested positive, effective cues to action largely emanate from healthcare professionals (Finney Rutten et al., 2020; Lucia et al., 2020; Momplaisir et al., 2021; Murphy et al., 2021). Negative cues to action associated with increased hesitancy and anti-vaccination perspectives have been noted in studies of social media and networking (Wilson & Wiysonge, 2020) and mistrust of authoritative sources (Murphy et al., 2021).
- One study cited evidence-based practices for vaccine hesitancy such as training healthcare professionals to deliver accurate, up-to-date, consistent, and positively framed messages to those within the healthcare systems, patients, and their family and friends (Finney Rutten et al., 2020).
- Regional focus groups of English speaking respondents suggested negative cues to action from some mistrust of national and local governmental messaging, mixed and confusing messaging, and cynical/skeptical messages from family and friends. More positive cues to action were noted from healthcare providers, family and friends, and family and friends who are healthcare providers. Respondents voiced a preference for unity in messaging; younger participants reported greater use of social/digital media, while older adults reported greater use of traditional media channels. Opinion leader preferences were: the use of credible sources such as frontline healthcare professionals and the use of personal testimonials, particularly from vaccine hesitant individuals who decided to become vaccinated. While messages and outreach from healthcare professionals and testimonials were overwhelmingly endorsed and suggested content including education and experiences on the benefits and safety of vaccination, other types of messaging included bolstering optimism and emphasizing family, friend, and community empathy and responsibility. Religious leaders were endorsed infrequently as sources from whom to receive vaccination messaging.

- Regional focus groups of Spanish speaking respondents also suggested negative cues to action from some mistrust of national and local governmental messaging, mixed and confusing messaging, and cynical/skeptical messages from family and friends. More positive cues to action were noted from community healthcare workers/promotoras; many also strongly endorsed the importance of familial opinion leaders. Respondents voiced a preference for unity in messaging; many participants reported greater use of social/digital media, some reported greater use of traditional media channels (e.g., Noticias 26 was mentioned frequently). As with English speaking respondents, the use of credible sources such as frontline healthcare professionals (especially those known to them), and the use of personal testimonials providing education about vaccination, effectiveness, and safety were focal. Hope and family-based messages were strongly endorsed as well. Religious leaders were endorsed infrequently as sources from whom to receive vaccination messaging.
- Suggestions: Messaging efforts (regardless of language preference) should use frontline healthcare workers and personal testimonials from vaccinated individuals, perhaps recruiting those who were initially hesitant. Both education-based and experientially-based messages will likely be well received. Encouraging vaccinated family members to share their willingness to receive the vaccine and positive experiences that arose from doing so may also be a strong approach. *Messages and outreach should be positively framed.* The use of social/digital media to reinforce credible sources at the national (e.g., CDC, news organizations) and local (e.g., UMC, promotoras) levels may also be effective. Hope-based, empathy-based, and social responsibility-based messaging will likely be motivating, as will strong, continued promotora outreach. The use of community and religious leaders may augment much more strongly prescribed messaging and outreach efforts.

### **Theory: The Socioecological Framework**

The desired outcomes associated with the implementation of social media and promotora outreach, as well as healthcare professional modeling, are grounded in the socioecological framework adopted by the National Institute of Minority Health and Health Disparities (2018). Although the utilization of multisystem ecological approaches are not novel (e.g., Bronfenbrenner, 1979), the emergence of this type of framework within the research and application of regional COVID-19 efforts reflects the need for the use of shared metrics, particularly in addressing novel public health concerns. In the model, determinants of health outcomes are associated within five domains of influence (biological, behavioral, physical/built environment, sociocultural environment, and health care system) across four levels of influence (individual, interpersonal, community, and societal). In the present efforts, the recognition that individual health behavior influences and is influenced by interpersonal, community, and societal norms and behaviors is critical. This is particularly true of vaccination (while maintaining preventive behaviors) to reach herd immunity, thereby reducing the risk of: family and friend transmission, community transmission, overwhelming the healthcare system, and fostering societal divisiveness and disharmony. Thus, utilizing this approach to optimize public health promotes the ability and likelihood that multiple researchers, stakeholders, policy makers, and institutions can address vaccine-promoting health attitudes and behaviors over time in a systematic, comprehensive, and coordinated fashion.

## **Limitations within this Report**

- The severity, recency, and urgency surrounding the local and regional spread of COVID-19 and its consequences necessitate a swift action-oriented response, especially with growing vaccination dissemination, yet evolving policies on preventive strategies.
- Vaccine dissemination is in early phases; thus, actual vaccine resistance and the potential of inconsistency between intentions and behaviors remain unknown.
- The science, theory, and messaging associated with COVID-19 vaccine hesitancy are novel and limited; no best practices have been established, thus a relatively heavier emphasis on formative processes.

## **Conclusions**

Health behavior change is often challenging; doing so with a novel, fatal, rapidly spreading virus presents even greater complexities. Further, the rapid process, less well-known vaccination technology, and lack of clarity and understanding surrounding vaccine effectiveness and safety further exacerbate community public health efforts. Thus, a multifaceted outreach approach including digital/social media and promotoria outreach is likely more effective when grounded in theory and science. Here, utilizing state of the science COVID-19 vaccination hesitancy data, and input from formative focus groups within the context of the Diffusion of Innovation Theory and the Health Belief Model, both couched within the Socioecological Framework has yielded strong theoretically, empirically, and regionally-based suggestions to support message development, implementation, and outreach.

### **Author's Note**

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