

**COVID-19 Vaccination Hesitancy and Resistance:
An Update on 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, led to a global pandemic. The World Health Organization (2021) indicated that at the beginning of June 2021, there have been over 174 million known cases of COVID-19 and 3.7 million deaths globally. The Centers for Disease Control and Prevention (CDC, 2021a) indicate that in the United States, there are over 33.2 million known cases and over 595,000 deaths attributable to COVID-19, and in El Paso County, there are over 136,000 known cases and over 2,600 deaths attributable to COVID-19 as of early June, 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). The administration of vaccines in El Paso has rolled out gradually, yet relatively rapidly, resulting in 58.1% in the county being fully vaccinated, and 71.76% being partially vaccinated (Texas Department of State Health Services [DSHS], 2021). Uptake in El Paso county is markedly higher than observed in Texas (44.53% full vaccinated, 54.44% partially vaccinated; DSHS, 2021). However, younger adults and males appear to be among the least vaccinated within the community (El Paso Matters, 2021; DSHS, 2021). Recent estimates from the U.S. Department of Health and Human Services (2021) indicate that in El Paso 15.3% of individuals are vaccination unsure or hesitant, with 5.32% being strongly hesitant about vaccination. In recent data collected from students at the University of Texas at El Paso, 23.3% indicated being unsure or hesitant about vaccination, with 7% of students noting strong hesitancy (Cooper, 2021). Taken together in conjunction with data from previous pandemics, other vaccine uptake, and studies of COVID-19 vaccines, a non-trivial portion of U.S. residents on the border of the U.S. and Mexico — particularly young adults — are not or possibly will not opt to become vaccinated. Given the present availability of vaccine for children 12 years and older and the likelihood that emergency use authorizations will be sought for children 2 years and older, understanding vaccinating children and parental decisions toward doing so is also important (thus these issues are addressed later in this report). To reduce viral spread, hospitalizations, and deaths, strong messaging and outreach efforts to promote vaccination by these residents in the region are vital, especially in light of the emerging Delta variant in the U.S. and its resistance particularly to partial vaccination (Callaway, 2021). 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 COVID-19 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. Over 70% of individuals 12 years and older within the El Paso community (Texas Department of State Health Services, 2021) have 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 subgroup of people who indicate they have not opted to become vaccinated, despite its availability. 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/Resistance

- 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).
- Vaccine hesitancy in the U.S. is associated with: female sex, less education, less income, having children at home, rural dwellers, political affiliation (Republican), and the perceived threat of getting infected with COVID-19 in the next 1 year (Khubchandani et al., 2021).
- Vaccine resistance rates, while measured less frequently, indicate that resistance rates in the U.S. are higher among: females (25% v. 18% males), those with lower income (29% v. 11% with higher income), those with lower levels of education (30% v. 8% with higher education), and Independents and Republicans (31%, 30% v. 11% Democrats) (Lazer et al., 2021).
- As noted earlier, hesitancy/resistance rates in El Paso appear to be lower (15%; DSHS, 2021), with college students (i.e., young adults) demonstrating higher rates (23%; Cooper, 2021) and young adults and males being less frequently vaccinated (El Paso Matters, 2021; DSHS, 2021).

- Suggestions: Note that vaccination hesitancy/resistance rates vary based on sociodemographics. Females, younger age, lower levels of education and income, physician advice, and political affiliation appear most salient. However in El Paso, it is important to note young adult males are the *least vaccinated* group to date; focusing resources, if limited, within this group is recommended.

Regional Focus Groups

Three focus groups were conducted remotely on May 18th, May 19th, and June 8th, 2021. All groups were recruited through social media from El Paso and Dona Ana counties. To be eligible for focus group inclusion participants indicated they were eligible for vaccination yet had not been vaccinated. A secondary criteria was being either a parent or intending to become a parent. Two groups were conducted in English (13 respondents; 6 males, 7 females; *Mage* = 35.8 years, *SD* = 10.69 years; more urban dwelling). One group was conducted in Spanish: (5 respondents; all females; *Mage* = 34.3 years, *SD* = 11.96 years; more rural dwelling). Recruitment of focus group participants proved to be challenging, as only approximately 10% of individuals noted being unvaccinated, and fewer were parents or intended to be parents. Note that in the initial English focus group, despite inclusion criteria, only 5 (of 11) respondents were not vaccinated, and of these only two respondents were parents. These recruitment challenges suggest both that the majority of the region is vaccinated and the possibility that unvaccinated individuals may be less interested in sharing their perspectives on vaccination. 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 with attention to Diffusion of Innovation Theory, the Health Belief Model, and empirical evidence on COVID-19 vaccination resistance.

Perceived Susceptibility/Risk

- Defined as the perception the individual is at risk to contract COVID-19 either with or without vaccination.
- Three 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). Two other large studies in the U.S. demonstrated similar findings (Callaghan et al., 2020; Khubchandani et al., 2021).
- 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, overall good health, having contracted COVID-19 previously, and reduced community rates and spread of COVID-19. Those who reported greater risk perceptions also noted the potential lack of effectiveness of vaccine, the rapidity of vaccine development, and the spread of different variants of COVID-19.
- Data from the 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, concern over underlying conditions, and anecdotal evidence from friends and family who received vaccine yet became ill.

- *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 and herd immunity continue to be not well understood.*
- 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 mRNA technology, vaccine effectiveness and safety. Promote knowledge that previous infection is not a reliable source of immunity.

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/resistance to perceived severity.
- Regional findings from focus groups conducted in English indicated that on average, respondents perceived COVID-19 to be only moderately severe with or without vaccine. Decreased severity was more often related to younger individuals not becoming as ill as more mature adults, knowing individuals who had contracted COVID-19 with only mild symptoms, and believing that vaccinated individuals continue to become infected. A decrease in severity perception of COVID-19 with the vaccine related to evidence indicating 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.
- Suggestions: Validate accurate perceived severity of COVID-19 without vaccination; educate about the rarity of “break-through” contraction of COVID-19 once vaccinated; 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: vaccine effectiveness noted through reduced rates of infection, hospitalizations, death; the potential to travel and congregate more readily; the

importance of becoming vaccinated for others, including family, friends, and the community; and the anticipated feelings of “relief” and “peace of mind” in practicing individual “responsibility.”

- Regional focus group findings conducted in Spanish were clear and predominantly about becoming vaccinated benefiting family and friends.
- 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/resistance (Callaghan et al., 2020; Kreps et al., 2020; Lazer et al., 2021; 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; Khubchandani et al., 2021, Lazer et al., 2021), self-identifying as Black (Callaghan et al., 2020; Khubchandani et al., 2021; Lazer et al., 2021; Momplaisir et al., 2021), Latinx (Khubchandani et al., 2021; Lazer et al., 2021; Sim et al., 2020), rural dwelling (Khubchandani et al., 2021), and female (Callaghan et al., 2020; Lazer et al., 2021; Khubchandani et al., 2021) have been associated with vaccination hesitancy/resistance.
- 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 (Khubchandani et al., 2021; Lazer et al., 2021; Sim et al., 2020), and mistrust of health-related and informational sources (Murphy et al., 2021) appear to be associated with vaccine hesitancy/resistance.
- 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) insufficient data (e.g., duration of immunity); 7) mistrust of data and process; 8) lack of education and understanding of development and vaccine technology (e.g., mRNA); 9) perceptions that cases, hospitalization, and deaths have decreased dramatically not necessitating individual level vaccination; 10) uncertainty of becoming vaccinated with underlying conditions; and 11) logistics and time. In addition, religiosity and conservative perspectives seemed related to greater hesitancy. Some respondents indicated a preference for the single dose vaccine, though many reported some mistrust of the single dose vaccine.
- Regional focus group findings conducted in Spanish suggest barriers include effectiveness, safety, and development; potential side effects were frequently noted as barriers. Respondents identified concerns such as being non U.S. citizens and the belief that data collected will be used against them. There was little variation in religious or political beliefs noted. Significant fears were noted regarding the single dose vaccine as a result of safety concerns.

- *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, safety, mRNA technology, the strength of the data and process despite rapidity, guidance for those with underlying conditions (e.g., diabetes), and significantly reduced logistical barriers within the community. Messaging, outreach, and efforts to target Spanish speaking residents in the region should additionally focus on 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 and Spanish indicate that respondents are familiar with how and where to become vaccinated. A preference for receiving the vaccine from a trusted provider and/or clinic was noted by many.
- Suggestions: Strengthen self-efficacy and vaccination rates through individual healthcare providers' and clinics' advocacy and promote availability within these.

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; participants reported use of social/digital media and 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 health workers/promotoras (e.g., Familias Triunfadoras); many also strongly endorsed the importance of familial opinion leaders. Respondents voiced a preference for unity in messaging; many participants reported greater use of traditional media. 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. Family- and community-based messages were strongly endorsed as well. Religious leaders were endorsed infrequently as sources from whom to receive vaccination messaging.
- Suggestions: Messaging and outreach 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.* Hope-based, empathy-based, and social responsibility-based messaging will likely be motivating, as will strong, continued promotora outreach.

Cues to Action: Activations, Events, Incentives

- A growing number of communities, states, and the federal government have begun to incentivize vaccination (e.g., Brocas, 2021) and/or attempt to make getting vaccinated easier (CDC, 2021b).
- While few studies have been conducted as to the effectiveness of incentives, one recent reports suggests incentives seem effective for some individuals, particularly males, and other than cost, there seem to be few adverse effects of these efforts (Dickler, 2021).
- Findings from regional focus groups conducted in English suggested that the overwhelming majority would prefer the vaccine be available at a convenient site (e.g., gym, bar, restaurant), provided by their physician, and somewhat fewer suggested a sporting event (e.g., Chihuahuas baseball game). A minority of participants indicated being swayed by a cash or other incentive.
- Findings from regional focus groups conducted in Spanish suggested a strong preference for receiving vaccine from their physician, with a small percentage suggesting a convenient location. Again, incentives were minimally endorsed.
- Findings from community stakeholders, particularly data analyses from El Paso County heat mapping, suggest Zip Code Tabulation Areas (ZCTAs) with the greatest number of individuals left to vaccinate as priority targets: 79936, 79938, 79924, and 79912. Further, community stakeholders suggested within these target areas potential sites for vaccination activations such as home improvement retailers, barbers, and movie theaters to target young adult males.

- Suggestions: Strongly encourage and/or assist healthcare providers to offer vaccinations onsite. Pilot test mobile vaccination clinics at area gyms, bars, restaurants, home improvement retailers, barbers, and movie theaters to assess effectiveness, and expand these efforts if effective. Assess these activations in high priority ZCTAs. Sporting or other large scale events may yield increases in vaccination uptake.

Child Vaccination

- Hesitancy of parents toward their children receiving COVID-19 vaccination has been assessed in only one study within the U.S. (Rhodes et al., 2020). This study of parents of at least one child under the age of 4 years indicated a general unwillingness to become vaccinated and/or have their children vaccinated. Willingness toward vaccination of both self and children was associated with higher levels of education. It should be noted, this study was conducted in 2020 and targeted parents of young children.
- Studies of non-COVID-19 vaccinations globally and generally have suggested approximately 29% parental refusal rate, with greater refusal associated with mothers and those with lower levels of education (Khattak et al., 2021). Within the U.S., relative to their children receiving the HPV vaccination, 17.6% of parents reported hesitancy, which was most associated with: mothers, those of lower education and income, and those who had not received advice from their physician (Nguyen et al., in press).
- One recent editorial from MDs at Johns Hopkins questions the prudence of focusing limited resource efforts on vaccinating healthy children, focusing more on promoting child vaccination efforts in those with underlying conditions (e.g., obesity).
- One systematic review of studies between 2008 and 2019 of parental vaccination hesitancy and effective messaging strategies to promote child vaccination efforts suggested effective and ineffective strategies (Olson et al., 2020).
 - Effective strategies: were multicomponent; included a dialogue or face to face element; were tailored to parents' vaccine beliefs, education, SES, historical experiences, political and religious affiliations; utilized trusted messengers; used storytelling, emotive anecdotes, imagery; and/or used scientific evidence delivered in an accessible, non jargon-laden, manner.
 - Ineffective strategies: were too heavily statistical/numeric; fear-based; and/or tried to correct or debunk myths about childhood vaccinations.
- The majority of findings from regional focus groups conducted in both English and Spanish suggested that parents extended their perspectives on becoming vaccinated themselves to their intentions toward having their children vaccinated including views on: risk, severity, benefits, barriers, and cues to action.
- Findings that surfaced unique to child vaccination included: 1) children in some cases were educated about COVID-19 vaccination and wanted to become vaccinated (despite parental resistance); 2) parents overwhelmingly value messaging and availability of vaccine from their children's healthcare provider; and 3) parents reported a preference for the ability for themselves and/or children to become vaccinated at or after school.
- Suggestions: Promotora outreach and healthcare provider dialogues and vaccine availability by providers are strongly recommended. Messages can be anecdotal, emotive, and/or evidence based yet using accessible terminology. Schools and educators should

take an active role in child vaccination efforts as both convenient locations and trusted messengers. The potential that children's perspectives on vaccination may impact parental views also seems important to consider. Focusing on children with underlying conditions, such as obesity, is likely the first priority in vaccinating children.

Theory: The Socioecological Framework

The desired outcomes associated with the implementation of social media and promotora outreach, as well as potential activations and events, 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., Brofenbrenner, 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 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.
- The science, theory, and messaging associated with COVID-19 vaccine hesitancy/resistance 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, highly individualized and personal barriers to become vaccinated, and lack of clarity and understanding surrounding vaccine effectiveness and safety further exacerbate community public health efforts. Thus, a multifaceted outreach approach emphasizing healthcare provider engagement and advocacy, strong promotora outreach, activations that capitalize on convenience, ease, and priority areas, all highlighted by digital/social media, is grounded in science and theory and based on community-based data from those yet to be vaccinated, as well as regional health promotion partners.

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