12-1-2022

COVID-19 Vaccine Acceptance Behavior among Hispanics/ Latinxs in Nevada: A Theory-Based Analysis

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COVID-19 VACCINE ACCEPTANCE BEHAVIOR AMONG HISPANICS/LATINXS IN NEVADA: A THEORY-BASED ANALYSIS

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A dissertation submitted in partial fulfillment
of the requirements for the

Doctor of Philosophy – Public Health

School of Public Health
The Graduate College

University of Nevada, Las Vegas
December 2022

UNLV | GRADUATE COLLEGE

Dissertation Approval

The Graduate College
The University of Nevada, Las Vegas

October 31, 2022

This dissertation prepared by

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entitled

COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis

is approved in partial fulfillment of the requirements for the degree of

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Abstract

The COVID-19 pandemic has impacted many lives around the world, leaving negative repercussions including health effects, economic downturns, and social and physical restrictions. The pandemic has also revealed many disproportionate health impacts on vulnerable populations, especially among the Hispanic and Latinx populations. The use of the three COVID-19 vaccines in the United States has presented a form of protection against additional negative impacts. However, hesitancy toward the COVID-19 vaccine has hindered its rapid uptake, preventing the country from reaching herd immunity and ultimately ending the pandemic. Current research is minimal in understanding the intentions of receiving the COVID-19 vaccine among Hispanic and Latinx populations and the sustenance of this behavior change to ensure there is a follow-up to complete the vaccination series. Additionally, there is limited research on using theory-based approaches to identifying determinants of the COVID-19 vaccine. The study aimed to use the Multi-Theory Model (MTM) of health behavior change to explain the intention of initiating and sustaining the behavior of COVID-19 vaccination, among the Hispanic and Latinx populations that expressed and did not express hesitancy towards the vaccine in Nevada. Using a quantitative cross-sectional and survey-based research study design, data were collected among Hispanics and Latinxs over the age of 18 who are currently residing in Nevada, using a 50-item questionnaire. Data were analyzed using multiple linear regression modeling. Of the 231 respondents, 36.4% (n=84) of individuals expressed hesitancy in taking the COVID-19 vaccine. Two MTM constructs of the initiation model, participatory dialogue ($b = 0.113$, $p < 0.001$) and behavioral confidence ($b = 0.358$, $p < 0.001$), and an income range of $25,000 to $49,999 ($b = 0.486$, $p = 0.007$) displayed statistically significant associations with the initiation of COVID-19 vaccine acceptance among vaccine-hesitant individuals. This model accounted for 63.0% of the

variance. Similarly, the same two constructs, participatory dialogue ($b = 0.072$, $p < 0.001$) and behavioral confidence ($b = 0.206$, $p < 0.001$), and age ($b = 0.017$, $p = 0.003$) were also significantly associated with the initiation of COVID-19 vaccine acceptance among non-vaccine-hesitant individuals and accounted for 63.2% of the variance. Among vaccine-hesitant individuals, emotional transformation ($b = 0.087$, $p < 0.001$) was the only construct, along with age ($b = -0.019$, $p = 0.004$), to be significantly associated with the sustenance of COVID-19 vaccine acceptance and accounted for 37.3% of the variability. Lastly, emotional transformation ($b = 0.177$, $p < 0.001$) displayed a statistically significant association with the sustenance of COVID-19 vaccine acceptance among non-vaccine-hesitant individuals and accounted for 66.4% of the variability. Results from this study provide evidence that the MTM is a useful tool in predicting COVID-19 vaccine acceptance behavior among Hispanics and Latinxs in Nevada and should be used in intervention designs and messaging to promote vaccine uptake.

Acknowledgments

First and foremost, I would like to thank our Heavenly Father for gracing me with the knowledge, power, strength, and guidance to complete this research and my Ph.D. program.

I would like to express my deepest gratitude to my committee chair and advisor, Dr. Manoj Sharma for his continuous knowledge, patience, encouragement, feedback, and guidance throughout the last years of my program and in completing this research. In addition, I would like to send many thanks to my dissertation committee for your expertise and support during my research and analysis: Dr. Brian Labus, Dr. Erika Marquez, and Dr. Chia-Liang Dai.

I would also like to send many thanks to the amazing former and current staff at Immunize Nevada for maintaining a supportive and dedicated work environment to foster teamwork and friendship that have helped to encourage the work that I do.

Thank you to Verenice Martinez and Natasha Carny for helping me with the translations of my survey and recruitment materials. Thank you to Noehealani Antolin and Alise Fern for always being so willing to read through my research and provide feedback.

Last but certainly not least, I could not have undertaken this journey without the support of my loving family. To the most helpful and loving husband, Brandon Nerida, thank you for allowing me to pursue my passion and encouraging me to continue my education. To my supportive parents, Irwin and Theresa Wong, thank you for setting the foundation for me to graduate as a first-generation college student. I hope I have made you proud. To my sister, Tiana Wong, thank you for always being my biggest cheerleader and helper. And lastly, to my two sons, Jantzen and Kaizen Nerida, thank you for your patience as I learned to be a new mommy while managing to continue my education. You two have been my biggest motivation. Thank you.

Dedication

I dedicate my work to my parents, Irwin and Theresa Wong, and my husband, Brandon Nerida, for their continuous love, support, and constant encouragement. I also dedicate my work to my two sons, Jantzen and Kaizen Nerida, who have kept me motivated throughout my program and whom I hope to inspire to dream big and pursue their passions.

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Chapter 1: Introduction

Introduction

What started on December 31, 2019, quickly evolved over a very short, three-month period as the COVID-19 pandemic and quickly became a global public health issue that has impacted many lives in drastic ways, including individuals' and communities' health, economic shifts, and social and physical restrictions. The repercussions that the COVID-19 virus inflicted on the world have left many populations trying to get back to a "normal" life to this day.

The drastic impact COVID-19 had on the United States left over 90 million total cases and over 1 million total deaths as of August 4, 2022 (World Health Organization [WHO], n.d.). Additionally, the COVID-19 pandemic exposed the disproportionate health impacts on vulnerable populations, including the inequalities affected by income, age, race, sex, and geographic location (WHO, 2021 May 20; Khubchandani & Macias, 2021). This was particularly evident among the Hispanic and Latinx populations across the United States. Compared to White non-Hispanic people, Hispanic or Latinx people are 1.5 times as likely to be diagnosed with COVID-19, 2.3 times as likely to be hospitalized because of COVID-19, and 1.1 times as likely to die from COVID-19 (Centers for Disease Control and Prevention [CDC], 2022 March 10). They also face a significantly larger loss of unemployment and economic fallout due to job losses as a result of the global pandemic (Zamarripa & Roque, 2021). Due to having the highest uninsured rates, the majority of these populations being unauthorized or undocumented immigrants and ineligible for Medicaid or other government benefits, and having significant language barriers, the Hispanic and Latinx populations have faced many challenges that make them vulnerable to COVID-19 and the drastic effects that have impacted them (Heard, 2020).

Although the COVID-19 pandemic posed many negative effects on the health and economy of the country, the introduction of the COVID-19 vaccine provided protection from

additional negative impacts. As of June 2021, three vaccines had been approved for Emergency Use Authorization (EUA) by the U.S. Food and Drug Administration (FDA): Pfizer–BioNTech (BNT161b2), Moderna (mRNA-1273), and Janssen (Ad26.COV2.S; FDA, 2021). According to studies, the Pfizer, Moderna, and Janssen vaccines showed 95%, 94.1%, and 66% efficacy respectively in clinical lab settings at preventing illness, including severe disease leading to hospitalization and death (Baden et al., 2021; Oliver, 2021; Polack et al. 2020). Since then, FDA approved the Pfizer-BioNTech COVID-19 vaccine on August 23, 2021 (FDA, 2021) and the Moderna COVID-19 vaccine on January 31, 2022 (FDA, 2022). However, hesitancy toward the COVID-19 vaccine has hindered its rapid uptake, preventing the country from reaching herd immunity and ultimately ending the pandemic.

Vaccine hesitancy is defined as a "delay in acceptance or refusal of vaccines despite availability of vaccine services" (WHO, 2014) and has emerged as a public health issue threatening the end of the COVID-19 pandemic. Many are hesitant to receive the COVID-19 vaccine for various reasons, including the fear of vaccine side effects, the safety of the vaccine, and its effectiveness given how new the vaccine was (Lin et al., 2020). Addressing these hesitancies and building vaccine confidence is key to increasing vaccine uptake.

Vaccine hesitancy is prevalent among the Hispanic and Latinx populations. A study conducted by Snyder et al. (2020) found that among Mexican men who were surveyed on their reasons for receiving or denying a routine vaccination, approximately 40% had received a routine immunization more than five years prior to the study. When asked about why they chose not to get vaccinated, responses included a fear of needles or of the side effects from the vaccine; being lazy, irresponsible, or not caring about the need for getting vaccinated; a lack of time or inconvenience due to conflicting work schedules; or not knowing or hearing the importance of

getting vaccinated (Snyder et al., 2020). Additionally, a literature review analyzed by Khubchandani and Macias (2021) found that among 13 studies, a combined average of 30.2% of Hispanics were hesitant against the COVID-19 vaccine. Predictors of hesitancy included sociodemographic characteristics of age, gender, education, and household size; mistrust and historical racial discrimination; exposure to myths and misinformation; previous beliefs about vaccines and vaccination uptake; and concerns about the safety, efficacy, and side effects of the vaccine (Khubchandani & Macias, 2021). Both studies show how vaccine hesitancy affects vaccine uptake among the Hispanic and Latinx populations.

Vaccine hesitancy is evident in the lack of uptake. As of September 20, 2022, 79.31% of all people in the United States had received at least one dose of the COVID-19 vaccine, where only 68.76% of people had completed the initial primary series of the vaccination (i.e., having received two doses of the Pfizer or Moderna vaccine or one dose of the Janssen vaccine) and 11.55% of people had not completed the series (i.e., only received one of the two doses of the Pfizer or Moderna (Our World in Data, 2021). Of the total population in the United States that reported their race and ethnicity, approximately 41 million people, or 64.0% of people who identified as Hispanic/Latino received at least one dose of the COVID-19 vaccine, and almost 35 million people, or 55.0% of people who identified as Hispanic/Latino were considered fully vaccinated as of August 31, 2022 (USA Facts, 2022 September 27). In Nevada specifically, as of August 31, 2022, approximately 5.2 million total doses had been administered statewide, with nearly 2.4 million people, or 77.0% of the state having received at least one dose of the COVID-19 vaccine (USA Facts, 2022 September 27). Of those Nevadans who have been vaccinated, almost 2.0 million people, or 62.0% of the population are considered fully vaccinated and approximately 780,000 people or 25.0% of the population had received their booster doses (USA

Facts, 2022 September 27). Among the Hispanic and Latinx populations in Nevada, approximately 540,000 people or 54% of the Hispanic population in Nevada had received at least one dose of the COVID-19 vaccine; this equated to 27.7% of the total Nevada population that had received at least one dose of the COVID-19 vaccine (Nevada Health Response, 2022). Although more than half of the Hispanic and Latinx populations have shown to receive the COVID-19 vaccine, Hispanics/Latinxs and African Americans have shown to be less likely to receive the COVID-19 vaccine compared to Whites (Ndugga et al., 2022). However, between January 31, 2022, and March 7, 2022, the Hispanic/Latinx populations saw a larger increase in the number of people who were recently vaccinated (38%) compared to the total population (17%), including over Whites (Ndugga et al., 2022). These current vaccination rates have shown that Hispanics and Latinxs have recently begun to rapidly accept the COVID-19 vaccine, but a large amount of vaccine hesitancy and health disparities they face continue to affect the overall vaccine acceptance behavior. Because Hispanic and Latinx communities experience vaccine disparities and may lack financial resources or knowledge on the importance of vaccines, it is imperative to address these concerns and close the health inequity gap to ensure this population has access to the COVID-19 vaccine and are aware of the importance of receiving it.

Problem statement

Because the Hispanic and Latinx populations around the United States are significantly vulnerable to COVID-19 complications, hospitalizations, and deaths (CDC, 2021 May 26), further investigation is needed to understand their perceptions and intentions of receiving the COVID-19 vaccine and completing the vaccine series, compared to other racial and ethnic groups. Based on this information, four problems were identified to be addressed by public

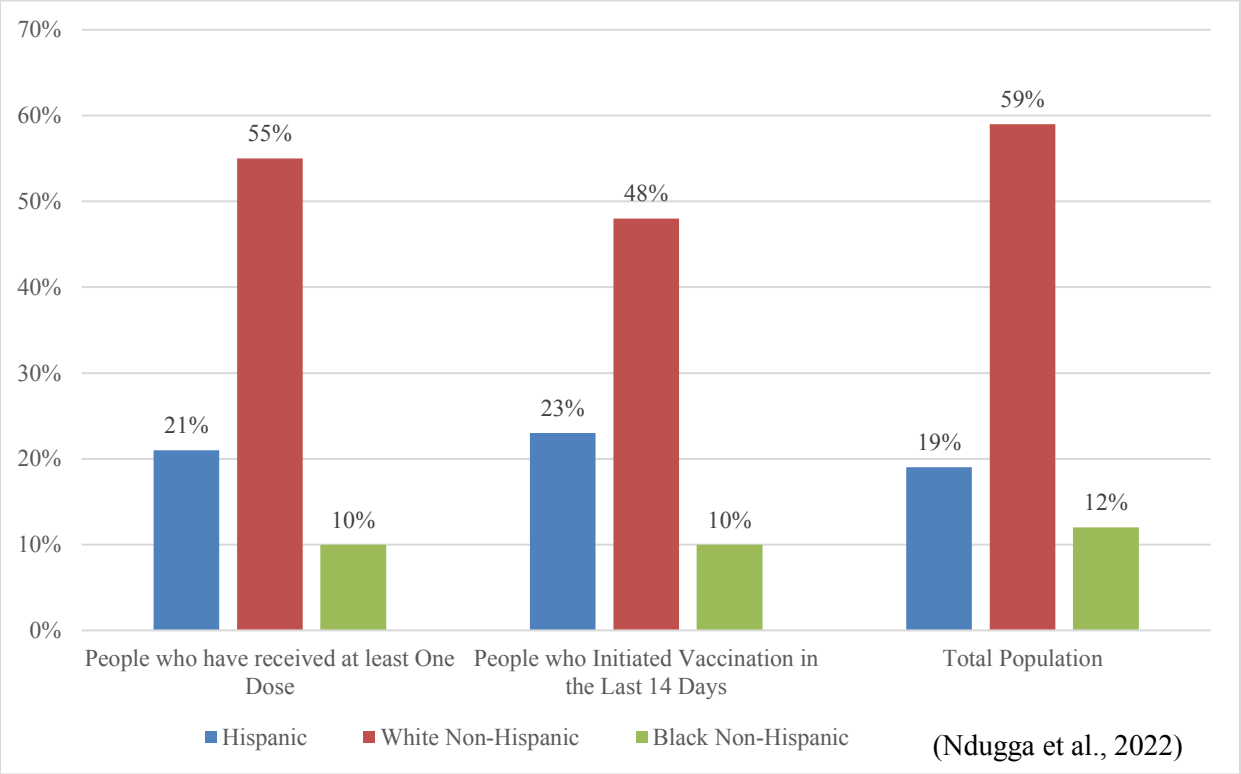
health professionals: 1) There are high rates of COVID-19 in Hispanics and Latinxs in the United States and Nevada; 2) There are low rates of vaccination in Hispanics and Latinxs in the United States and Nevada; 3) There is little literature, especially theory-based literature, focusing on the determinants of COVID-19 vaccination in Hispanics and Latinxs; and 4) There is a problem of Hispanic and Latinxs not interested in or following through in taking the second dose or booster vaccines. This is further supported by the data to be presented.

Hispanics and Latinxs in the United States had one of the highest rates of COVID-19 cases. According to the CDC (2021 November 11), between March 2020 through October 2021, the age-adjusted laboratory-confirmed COVID-19 associated hospitalizations was 1207.7 per 100,000 population among Hispanics or Latinos, compared to 1553.9 per 100,000 population in non-Hispanics Indian or Alaska Natives and 1256.3 per 100,000 population in non-Hispanic Blacks. Studies have shown that Blacks and Hispanics or Latinxs have the highest percentage of hospitalized patients with a median of 44% and 36%, respectively, compared to Whites with a median of 16% (CDC, 2021 November 11). Similarly, this population has the highest rates of COVID-19 cases in Nevada. On August 31, 2021, approximately 45% of reported COVID-19 cases in Nevada were among the Hispanic and Latinx populations (Kaiser Family Foundation, 2021). More recently, as of August 4, 2022, 30.9% of cases and 20.4% of deaths were among the Hispanic and Latinx populations in Nevada (Nevada Health Response, 2022). This is why our problem is that Hispanics and Latinxs have the highest rates of COVID-19.

Although Hispanics and Latinxs in the United States are among the most vulnerable groups and most negatively affected by COVID-19 complications, at one point since the introduction of the vaccine, they had one of the lowest rates of COVID-19 vaccination uptake in the United States, and in Nevada. As of October 31, 2022, approximately 541,580, or 54.9% of

people who identified as Hispanic had initiated the vaccination series (Nevada Health Response, 2022). This accounts for approximately 27.7% of the total population in Nevada who received at least one dose of the vaccine (Nevada Health Response, 2022). Compared to other non-Hispanic groups in Nevada, Hispanics were shown to have the second highest vaccination rates where non-Hispanic Whites had 36.0% of the total population who initiated the vaccination series (Nevada Health Response, 2022). Figure 1 further highlights that although Hispanics/Latinxs have the second highest vaccination rates compared to other non-Hispanic groups, their vaccination uptake rates are still significantly lower than their non-Hispanic White counterparts. This is evident in that Whites have significantly larger vaccine uptake rates among those who received at least one dose of the vaccine and initiated the series in the last 14 days, compared to Hispanics/Latinxs and Blacks in the United States. At the start of the vaccination rollout, Hispanics and African Americans had the slowest acceptance of the COVID-19 vaccine, leading to lower rates of uptake. However, increases in programming and messaging across Nevada to the Hispanic and Latinx populations have been shown to help increase these vaccination rates over time. The Hispanic and Latinx populations are one of the most vulnerable to COVID-19 and the least likely racial/ethnic group to receive the COVID-19 vaccine. Several factors like misinformation, myths, citizenship status, language barriers, work schedules, lack of understanding of virtual technologies to schedule vaccine appointments, etc. are responsible for this disparity (Hamel et al., 2021).

Figure 1: Race/Ethnicity of people receiving a COVID-19 vaccine in the U.S. as of July 6, 2022

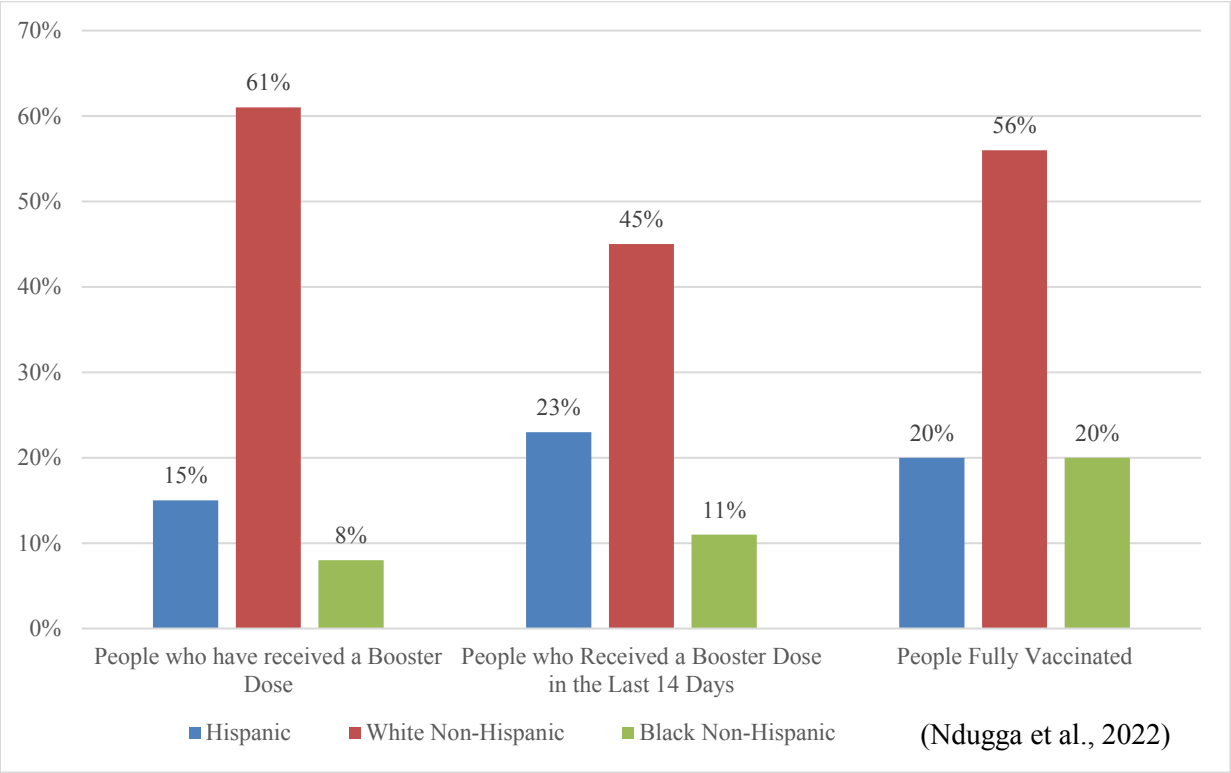


Another problem is that there is little literature, especially theory-based literature, focusing on the determinants of COVID-19 vaccination in Hispanics and Latinxs. While there are many studies assessing COVID-19 vaccine hesitancies and what would encourage someone to get a COVID-19 vaccine, there is very little research that is focused specifically on the Hispanic and Latinx populations, particularly rooted in theory.

The last problem we identify is that Hispanics and Latinxs are not interested in or following through with taking the second dose or booster vaccines. According to the CDC, in a report that analyzed first and second dose completion between December 14, 2020, to February 14, 2021, approximately 88.0% of people in the United States who initiated their COVID-19 vaccine completed the primary series within the recommended time period, 8.6% had not

received the second dose but was still within the recommended time period to receive it, and 3.4% had missed their second dose and was outside of the recommended time period (Kriss et al., 2021). Among those who were either not yet vaccinated or completely refused the second dose, Hispanic and Latinxs had only seen 87.0% of their series completion rates compared to other non-Hispanic races (Kriss et al., 2021). Several factors, as previously described, including side effects, immigration status, cost of the vaccine, taking time off of work to get the vaccine, and having to travel to get the vaccine (Hamel et al., 2021), may also be the reason many people choose not to receive the second required dose of the COVID-19 vaccine. Historically, multi-dose vaccinations also pose an issue for completing a vaccination series. When the COVID-19 vaccine rollout began, a major concern was issuing second dose reminders to patients to ensure series completion due to previous experiences from incomplete series completion of routine immunizations (Dawson et al., 2021). This similar issue is also affecting the COVID-19 vaccine uptake of second doses and booster doses, which is evident in the uptake of booster doses since it was recommended by the FDA in 2021. According to Ndugga et al. (2022), as of July 14, 2022, Hispanics made up 15% of the total United States population who had received a booster dose. Although Hispanic people had shown to have a slight increase in vaccine and booster uptake, Blacks and Hispanics have shown to have lower vaccine booster dose uptake compared to Whites (Ndugga et al, 2022). Figure 2 further highlights how Hispanics/Latinxs disproportionately receive COVID-19 booster doses compared to their White non-Hispanic counterparts. Although their booster dose acceptance rates are slightly higher than Blacks in the United States, Hispanics/Latinxs receive significantly fewer booster doses overall and over the last fourteen days, as of July 6, 2022 (Ndugga et al, 2022). Therefore, follow-up of the COVID-19 vaccination series for completion and booster doses has been a challenge.

Figure 2: Race/Ethnicity of people 5 years and older receiving a COVID-19 booster dose in the U.S. as of July 6, 2022



While many organizations have been working on strategies to increase COVID-19 vaccination rates among the Hispanic and Latinx population (Acevedo, 2021), to our knowledge, there is minimal research that has been done to understand their intentions of receiving the COVID-19 vaccine among this population and the sustenance of this behavior change to ensure there is follow up to complete the vaccination series. This knowledge would be particularly useful, especially in Nevada, to understand the factors that would help to increase COVID-19 vaccination initiation and sustenance of receiving the second dose and/or booster dose, to further develop health promotion programming, messaging, and interventions that are specifically tailored to Hispanics and Latinxs. Based on our current research, theory-based work for identifying determinants of the COVID-19 vaccine has been limited and there is a need for more

research in using newer theories in this area. Because of this, the importance of our study was to utilize a newer theory to identify and address these needs.

Purpose of the study

The purpose of this study was to use a fourth-generation theory-based approach of the Multi-Theory Model (MTM) of health behavior change to explain the intention of initiating COVID-19 vaccination based on participatory dialogue, behavioral confidence, and changes in the physical environment, and the sustenance of this behavior change based on emotional transformation, practice for change, and changes in the social environment, among the Hispanic and Latinx populations that expressed and did not express hesitancy toward the vaccine in Nevada.

Research questions and statistical hypotheses

This study analyzed COVID-19 vaccine intent for initiation and sustenance among two groups of participants: those who expressed hesitancy toward the COVID-19 vaccine and those who did not express hesitancy toward the COVID-19 vaccine. The covariates that were controlled for because of their possible effects found on COVID-19 vaccination uptake status were race, gender, education level, religion, income, and employment status (Viswanath et al., 2021). So, there were four research questions:

1. Among those who did not express hesitancy toward the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for

age, race, gender, education level, religion, income, and employment status?

$H_0$1: There is no association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A1: There is an association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

2. Among those who did not express hesitancy toward the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and changes in the social environment explain the intent of sustaining the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$2: There is no association between emotional transformation, practice for change, and changes in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A2: There is an association between emotional transformation, practice for change, and changes in the social environment with the intention of sustaining COVID-19 vaccination while

controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

3. Among those who expressed hesitancy toward the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$3: There is no association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A3: There is an association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

4. Among those who expressed hesitancy towards the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and changes in the social environment explain the intent of sustaining the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$4: There is no association between emotional transformation, practice for change, and changes in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A4: There is an association between emotional transformation, practice for change, and changes in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

Theoretical framework

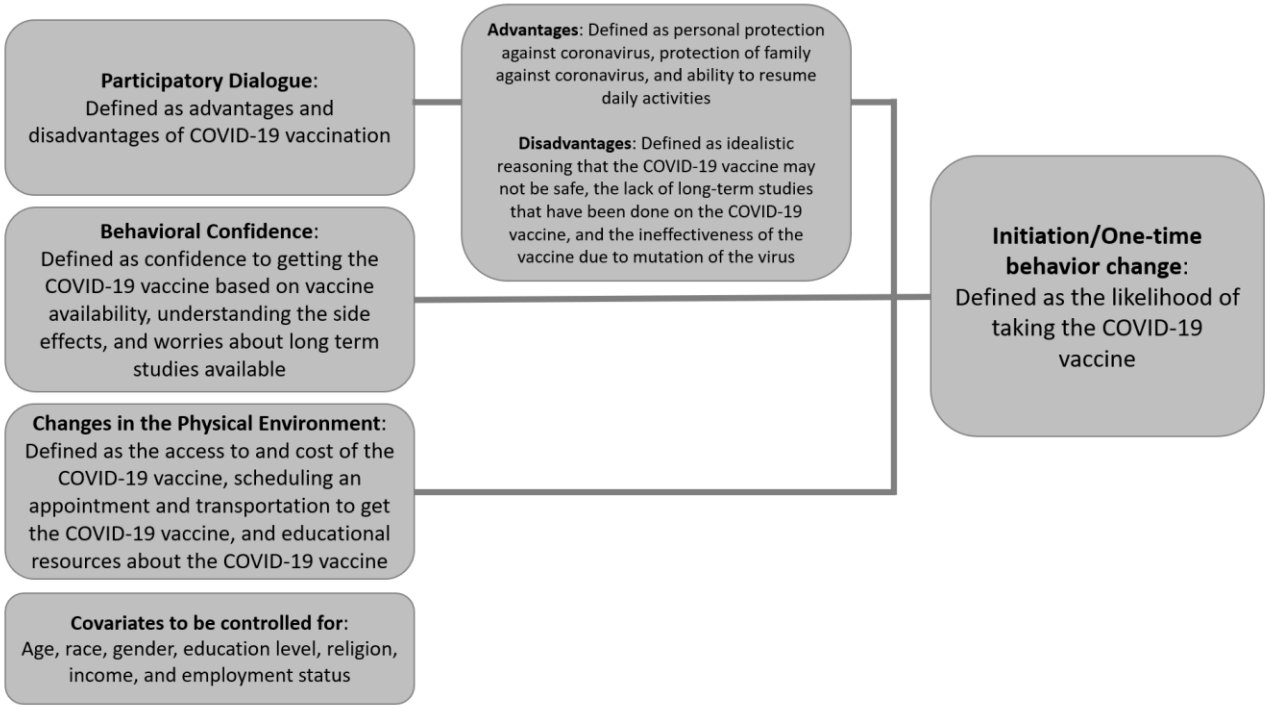
When selecting an appropriate model that predicts behavior change, many of the health behavior theories available were limited to the constructs that it focused on. These theories also did not include studying cultural factors, socioeconomic status, and previous experiences in how they predict or create behavior change (Sharma, 2015). The multi-theory model (MTM) was introduced based on collective intelligence from various theories and addresses these issues to predict both one-time and long-term behavior changes at the individual, group, and community levels (Sharma, 2022). Because of its unique ability to explain the intention and sustenance of behavior change, the MTM theory was ideal for explaining the health behavior change of COVID-19 vaccination.

There are two components of the MTM that facilitate health behavior change: 1) initiation of the behavior change, and 2) sustenance or continuation of the health behavior

change (Sharma, 2015). Initiation of the behavior change refers to a one-time or short-term change that progresses a person from one behavior to another (Sharma, 2015). Sustenance or continuation of the health behavior change is the long-term change that continues after initiation is enacted (Sharma, 2015). Unlike other previous health behavior change theories, these two components are important to differentiate within the model to ensure that the constructs within them are studied and understood separately since they affect very different parts of the health behavior change (Sharma, 2015).

The first component of MTM, the initiation of change, includes three main constructs: 1) participatory dialogue, 2) behavioral confidence, and 3) changes in the physical environment (Sharma, 2015). Figure 3 shows how the constructs of this component interact. Participatory dialogue focuses on the advantages and disadvantages of health behavior change, and how this dialogue to create change can be facilitated by a health educator (Sharma, 2015). The difference with participatory dialogue, compared to similar constructs of other health behavior models, is that the dialogue must be a two-way communication to initiate the change. Behavioral confidence is a culturally-specific term that refers to the confidence or belief that the person is capable of initiating and achieving the desired behavior change (Sharma, 2015). While similar to self-efficacy, behavioral confidence is different in that it is influenced internally and externally by influential people, such as a health educator/counselor/therapist, belief in God, belief in a powerful other, etc. (Sharma, 2015). Lastly, changes in the physical environment refer only to the physical, not social, surroundings that provide resources for the person to initiate the behavior change (Sharma, 2015).

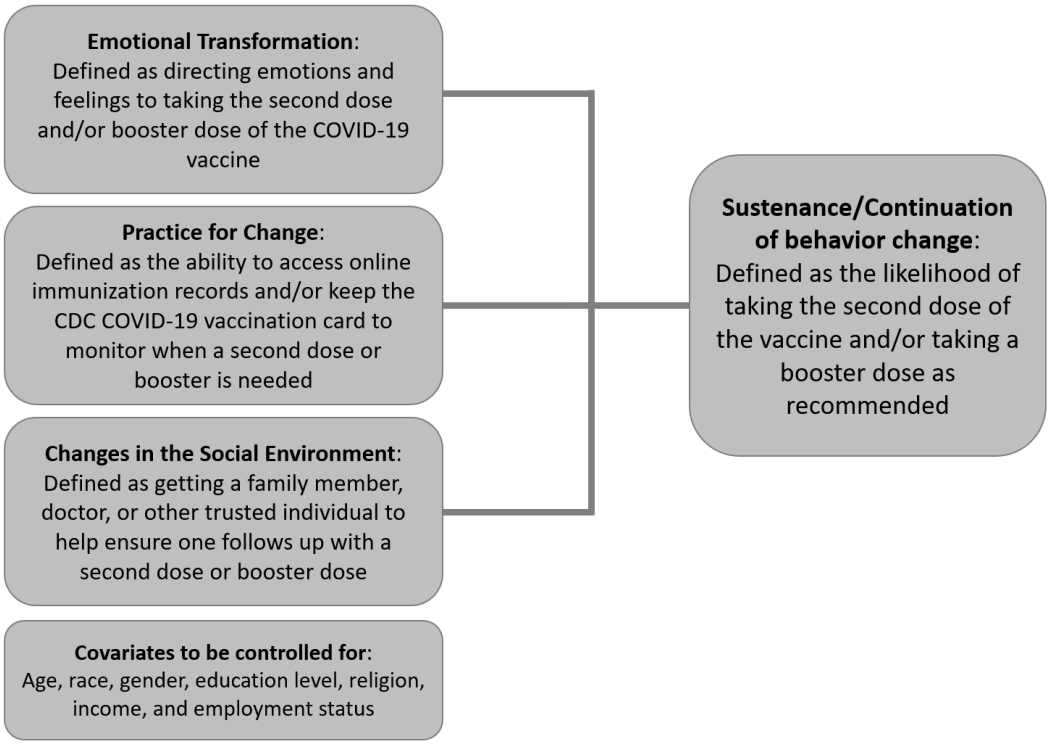
Figure 3: Constructs in the initiation of health behavior change in the multi-theory model of health behavior change



The second component of MTM, sustenance or continuation of the health behavior change, includes three main constructs, as well: 1) emotional transformation, 2) practice for change, and 3) changes in the social environment (Sharma, 2015). Figure 4 shows how the constructs of this component interact. Emotional transformation is when a person transforms or converts their emotions towards the health behavior change, they are trying to sustain, instead of doubting the change, acting impulsively, or not acting at all (Sharma, 2015). Practice for change is when the person constantly thinks about the health behavior change that is to be made, and continuously evaluates and adjusts the strategies, overcomes the barriers, remains focused on maintaining that behavior change (Sharma, 2015). This is further supported by mindfulness meditation which can be completed with a diary or journal to track the health behavior change process (Sharma, 2015). Lastly, changes in the social environment refers to the social support,

either natural or artificial, from the environment that creates a positive relationship with sustained behavior change (Sharma, 2015).

Figure 4: Constructs in the sustenance of health behavior change in the multi-theory model of health behavior change



The present study utilized the multi-theory model (MTM) of health behavior change as the theoretical framework to determine the intentions of receiving the COVID-19 vaccination among the Hispanic and Latinx populations in Nevada. Because this study followed the use of the MTM framework that was described in a study done by Sharma et al. (2021), the initiation model and its three main associated constructs were used to assess the intent among the Hispanic and Latinx population in Nevada to receive the COVID-19 vaccination as a one-time behavior (i.e., first dose). The present study also used the sustenance model and its three main associated

components to assess the continued health behavior change of following up for their second dose appointment and booster doses.

MTM focuses on cultural factors and socioeconomic status, which is important among the Hispanic and Latinx populations that may have an increased amount of vaccine hesitancy due to barriers they face regularly. Many Hispanics and Latinxs lack health insurance which may cause a barrier to accessing vaccines. Additionally, Hispanic adults may also have a lack of information regarding the importance of getting vaccinated, the safety of vaccines, and/or knowledge of resources on where to get low to no-cost vaccines, creating more barriers to vaccination.

Operational definitions

Hispanic or Latino: According to the United States Census Bureau (2020), the United States Office of Management and Budget (OMB) defines Hispanic or Latino as "a person of Cuban, Mexican, Puerto Rican, South Central American, or other Spanish culture or origin regardless of race." The standards of the OMB also define that race and Hispanic ethnicity, or origin are two different and distinctive concepts; this is why a person may be of any race but report themselves as Hispanic or Latino for their ethnicity. For this study, it was operationalized as the study population.

Latinx: Latinx has been commonly understood as the Latino/a (or Hispanic) population (Trujillo-Pagán, 2018). The x is added to show the growth in Latinx movements while addressing the concerns of issues of gender and queerness (Padilla, 2016; Milian, 2017). In this study, it was operationalized as the terminology used to describe all individuals of the Latin ethnicity,

regardless of gender identity; this included Latino, Latina, and all other sexual and gender minorities (SGM).

Vaccine hesitancy: Vaccine hesitancy is defined as a "delay in acceptance or refusal of vaccines despite availability of vaccine services" (World Health Organization [WHO], 2014) and has emerged as a public health issue threatening the end of the COVID-19 pandemic. COVID-19 vaccine hesitancy can include various reasons, such as the fear of vaccine side effects, the safety of the vaccine, and its effectiveness given how new the vaccine was (Lin et al., 2020). Addressing these hesitancies and building vaccine confidence is key to increasing vaccine uptake. In this study, vaccine hesitancy was operationalized with an initial question that determined the participant's current state of vaccine hesitancy.

Vaccine acceptance: Vaccine acceptance is defined as "the degree to which individuals accept, question, or refuse vaccination" (Thomson et al., 2015). In this study, vaccine acceptance was constitutively defined as the health behavior that Hispanics and Latinxs of Nevada were able to identify and define: the advantages and disadvantages of the COVID-19 vaccine, the confidence to receive the vaccine, the ability to overcome barriers in the physical environment to receiving the vaccine, the emotional feelings toward the vaccine, the abilities to maintain the behavior change of receiving the vaccine, and the social support to encourage vaccination uptake.

Participatory dialogue: This component of the initiation construct had been taken from the multi-theory model of health behavior and focused on the dialogue that is used to create change when facilitated by a health educator (Sharma, 2015). In this study, it was operationalized as the

advantages of COVID-19 vaccination and disadvantages of COVID-19 vaccination as described below and measured by subtracting the disadvantage score from the advantage score to derive a possible score of -12 to +12 units.

Advantages of COVID-19 vaccination: This construct had been taken from the multi-theory model of health behavior change in which it means the benefits of behavior change (Sharma, 2015). In this study, it was operationalized as personal protection against coronavirus, protection of family against coronavirus, and ability to resume daily activities and measured on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) with the scores summed and a possible range of 0 to 12 units.

Disadvantages to COVID-19 vaccination: This construct had been taken from the multi-theory model of health behavior change in which it means the detriments of behavior change (Sharma, 2015). In this study, it was operationalized as idealistic reasoning that the COVID-19 vaccine may not be safe, the lack of long-term studies that have been done on the COVID-19 vaccine, and the ineffectiveness of the vaccine due to mutation of the virus and measured on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) with the scores summed and a possible range of 0 to 12 units.

Behavioral confidence: This component of the initiation construct had been taken from the multi-theory model of health behavior and focused on the confidence or belief that the person is capable of initiating and achieving the desired behavior change (Sharma, 2015). In this study, it was operationalized as confidence in getting the COVID-19 vaccine based on vaccine

availability, understanding the side effects, and worries about long term studies available and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0 to 12 units.

Changes in the physical environment: This component of the initiation construct had been taken from the multi-theory model of health behavior and focused on the physical surroundings that provide resources for the person to initiate the behavior change (Sharma, 2015). In this study, it was operationalized as the access to and cost of the COVID-19 vaccine, scheduling an appointment and transportation to get the COVID-19 vaccine, and educational resources about the COVID-19 vaccine and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0 to 20 units.

Construct of the intention of initiation: This is one of the two constructs that had been taken from the multi-theory model of health behavior change which means the one-time or short-term change that progresses a person from one behavior to another (Sharma, 2015). In this study, it was operationalized as the likelihood of taking the COVID-19 vaccine and measured on a scale of not at all (0), somewhat likely (1), moderately likely (2), very likely (3), completely likely (4) with the scores deriving a possible range of 0 to 4 units.

Emotional transformation: This component of the sustenance construct had been taken from the multi-theory model of health behavior and focused on when a person transforms or converts their emotions towards the health behavior change they are trying to sustain (Sharma, 2015). In this

study, it was operationalized as directing emotions and feelings to take the second dose and/or booster dose of the COVID-19 vaccine and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0 to 24 units.

Practice for change: This component of the sustenance construct had been taken from the multi-theory model of health behavior and focused on the person's thoughts about the health behavior change that was made, and continuously evaluates and adjusts the strategies, overcomes the barriers, and remains focused on maintaining that behavior change (Sharma, 2015). In this study, it was operationalized as the ability to access online immunization records and/or keep the CDC COVID-19 vaccination card to monitor when a second dose or booster is needed and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0 to 20 units.

Changes in the social environment: This component of the sustenance construct had been taken from the multi-theory model of health behavior and focused on the social support from the environment that creates a positive relationship with sustained behavior change (Sharma, 2015). In this study, it was operationalized as getting a family member, doctor, or other trusted individual to help ensure one follows up with a second dose or booster dose and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0 to 12 units.

Construct of the intention of sustenance: This is the second of the two constructs that had been

taken from the multi-theory model of health behavior change which means the long-term change that continues after initiation is enacted (Sharma, 2015). In this study, it was operationalized as the likelihood of taking the second dose of the vaccine and/or taking a booster dose as recommended and measured on a scale of not at all (0), somewhat likely (1), moderately likely (2), very likely (3), completely likely (4) with the scores deriving a possible range of 0 to 4 units.

Assumptions

This particular study assumed that the target population is representative of Hispanic and Latinx views and perspectives in Nevada. By limiting our target population to Hispanics and Latinxs for participation, we assumed that we were getting an accurate representation of the population we were studying. This study also assumed that all participants provided honest contributions to the survey, which allowed researchers to analyze the results accurately and draw conclusions based on these responses. The third assumption is that the survey instrument and theoretical framework being used elicited reliable responses from participants. The utilization of the MTM provided researchers with reliable results to draw conclusions based on the theoretical framework constructs. The last assumption of the study was that respondents understood the survey questions being asked. It was important to translate the survey instrument to ensure that we were capturing the sample population that was representative of the United States population (Brown, 2015). Assuring that the survey was written at a reasonable grade reading level and translated into the Spanish language, assumed all participants were able to understand and partake in answering the questions. Because some English-language terms may not translate precisely into other cultures, such as the Spanish language (Brown, 2015), it was important for researchers to translate the survey into Spanish, and then retranslate the survey back into English.

Limitations

There were some limitations to the study design being used. Because we were using a cross-sectional design, the association may not equal causation, meaning that although study results may indicate a certain intention to receive the vaccine, this particular study did not show if the person actually received the vaccine or not (Wang & Cheng, 2020). Additionally, directionality was unclear because the independent and dependent variables were being measured at the same time. The last limitation of the study design was that the data was only an indication of that particular point in time. Results of this same study may be different from six months ago or six months from now due to new and emerging information and programs surrounding COVID-19 vaccination. However, this particular study design was useful for our research because it provided relatively quick answers for this population in a short amount of time and was very cost-effective (Wang & Cheng, 2020). With immunization programs, messaging, and interventions rapidly being implemented to increase immunization uptake, the quicker this information was analyzed, the faster programs can adopt these strategies to be culturally appropriate and effective.

There were also some biases that were potentially present in this study. Selection bias may have occurred, particularly volunteer bias, membership bias, or nonresponse bias (Wang & Cheng, 2020). Participation in this survey was voluntary, so only those who wanted to answer a survey had participated. This may have led to volunteer bias and more people who were very confident in the vaccine and/or very vocal about hesitancies toward the vaccine. Similarly, membership bias may have occurred depending on recruitment methods if participants were only recruited from a particular group of people, rather than from the general population (Wang &

Cheng, 2020). Nonresponse bias is when people who respond to a survey are systematically different from those who do not. In this study population, people may not have wanted to participate in a survey in person or may not have had access to an online survey, which causes nonresponse (Wang & Cheng, 2020). Although these biases may have occurred, ensuring the anonymity of the survey and allowing for multiple methods to take the survey reduced this bias.

Another type of bias that may have occurred is information bias, particularly recall bias, unacceptability or desirability bias, and interviewer bias (Wang & Cheng, 2020). With recall bias, since the exposure and outcome are being assessed simultaneously, participants' knowledge of the exposure and outcome may not have been accurate (Wang & Cheng, 2020). With unacceptability or desirability bias, participants may have answered questions in a way that was viewed favorably by others, rather than what they truly believed. Additionally, if we had needed an interpreter or researcher to assist with administering the survey, interview bias may have occurred if they lead the person to a particular answer. Information bias was reduced by blinding participants and interviewers or interpreters of the study purpose. Although these biases may have been present in the study, this study provided useful information about the COVID-19 vaccination intent to initiate among the Hispanic and Latinx populations. Because there was no previous study conducted that looked specifically at this problem, this allowed researchers to use other research methods to investigate further.

Confounders in this study that should have been analyzed may refer to the likelihood that someone is able to receive the COVID-19 vaccine or not (Patel et al., 2021). One confounder in this study could be those with known severe allergies to vaccine components because this prevents someone from getting vaccinated whether they are hesitant or not. Similarly, those with immunosuppressed immune systems who cannot receive the vaccine were also a confounder

because they too are unable to receive the vaccine. These may have affected study results; however, the probability of this occurring within our sample size is rare and may not have affected study results.

Delimitations

The inclusion criteria for participation in the study were participants who identified as: (1) of Hispanic or Latinx descent; (2) aged 18 years or older; (3) currently residing in Nevada; and (4) provided informed consent. Exclusion criteria that removed participants from the study were those who were mandated to receive the vaccine for employment or school requirements. Although the COVID-19 vaccine is currently available for six-month-olds and older, survey participants were limited to 18 years and older due to being the legal age to make decisions for themselves about vaccination intent. Because many Hispanics and Latinxs in Nevada may not have access to a computer or the internet due to socioeconomic and immigration status, de-identifying paper surveys were administered to ensure that this population was well represented and addressed any barriers to participation. Similarly, because many Hispanics and Latinxs in Nevada may be exclusively Spanish-speaking, we administered the survey in both English and Spanish, and electronically and by paper and pencil- this allowed us to address potential barriers to participation with this specific population.

A survey-based study, whether it be administered online or in person, posed the potential for missing data, especially among the Hispanic and Latinx populations (Brown, 2015). Depending on socioeconomic or immigration status, non-response may have occurred if participants could not understand the survey, which is why we proposed to have the survey administered in both English and Spanish and that the survey questions were written at a

reasonable grade reading level. Nonresponse may have also occurred if surveys were asking identifying questions, which may have imposed a fear of deportation among the Hispanic and Latinx populations. We controlled this threat by inflating our sample size and accommodating for potential nonresponse.

This particular study may have had a social desirability threat to external validity, which may have affected the study's generalizability. Social desirability is when participants respond to researchers in a way that they think researchers want to hear, rather than what they actually believe in. Due to language barriers or lack of knowledge, participants may have looked to researchers for what they think are the correct answers rather than their genuine thoughts. The classic Likert scale of the agreement was not used in this survey to reduce this kind of bias. The study had been limited in its generalizability (Brown, 2015).

Significance of the study

Every year, millions of lives are saved through vaccination, which is why it has been considered one of the public health's most effective and successful tools in preventing the spread of disease (Baldolli et al., 2020). The CDC listed vaccinations as one of the greatest public health achievements in the twentieth century to improve health and eliminate infectious diseases (CDC, 1999). Vaccines have proven benefits of their effectiveness in preventing illness and disease, as well as improving life expectancy (Badur et al., 2020; CDC, 1999). However, due to the growing views of vaccine hesitancies over the past few years, we have seen the re-emergence of once declared eliminated or eradicated diseases. More people are continuing to dismiss the need for vaccines to prevent the spread of diseases, which ultimately makes other people, especially those who are unable to get vaccinated or those who are at higher risk for more complications,

vulnerable to these illnesses. Results from this study were used to create implementation strategies to address common vaccine hesitancy for the COVID-19 vaccine. Especially in times of a global pandemic caused by COVID-19, understanding how to address vaccine hesitancy is an important contribution to public health ensuring everyone has access to this successful public health tool, ending this pandemic, and preventing the spread of disease across the world.

In addition to ensuring that everyone has access to the COVID-19 vaccination, this study was significant in providing data on addressing health behavior changes related to COVID-19 vaccination uptake. Vaccine hesitancy affects the acceptance and uptake of all vaccinations; therefore, the findings from this study were significant to social and behavioral sciences by providing information on how to create health behavior change that is culturally appropriate through participatory dialogue with healthcare professionals and other trusted individuals. In order to increase vaccine uptake among the Hispanic and Latinx populations, two-way communication is important to influence behavior change for the initiation and sustenance of getting the COVID-19 vaccine. By creating behavior change for the COVID-19 vaccine, the significant strategies found may also be effective in creating the same behavior change for other routine vaccines that one may be hesitant about, such as the Human Papillomavirus (HPV) vaccine and influenza (flu) vaccine.

The COVID-19 pandemic has further amplified the health disparities that exist in the United States among minority groups, especially the Hispanic and Latinx populations. This is evident in that the Hispanic and Latinx populations have been significantly affected by COVID-19 with a large number of hospitalizations and deaths (CDC, 2022 March 10). While many may be interested in receiving the COVID-19 vaccine, vaccine hesitancy (i.e., lack of knowledge of COVID-19 vaccine, trust in healthcare professionals or personal contact, etc.) and access-related

barriers (i.e., lack of health insurance, transportation, convenience, etc.) among this particular population may prevent the initiation and uptake of the COVID-19 vaccine (Acevedo, 2021). In order to address these concerns, public health officials must be able to understand the concerns and barriers of the COVID-19 vaccine that are specific to the Hispanic and Latinx populations. Results from this study were used to create implementation strategies that are culturally competent among the Hispanic and Latinx populations in increasing COVID-19 vaccine uptake in Nevada. Although the generalization of implementation strategies to the greater United States is unknown, this study may serve as a model for other states to analyze their Hispanic and Latinx populations, and implementation strategies may also be shared to address common barriers and hesitancies toward the COVID-19 vaccine.

The use of a theoretical framework for this study provided a valuable tool for the development, implementation, and evaluation of public health initiatives, such as addressing vaccine hesitancy for the COVID-19 vaccine. Although the MTM is a relatively new model, it has been studied to predict various health behavior changes, including physical activity, dietary/nutritional eating, alcohol consumption, stress management, smoking cessation, etc. What makes this model effective is that the constructs in the two components of the model are independent and not related to each other (Sharma, 2015). This is important because this allows researchers to look at each concept to see what is most effective at initiating or sustaining the behavior change (Sharma, 2015). Additionally, the MTM can be used to create behavior change among individuals, within groups, and at community levels, making it a very versatile tool compared to other theories that only focus on just the individual or larger groups (Sharma, 2021). The MTM is an ideal tool to use on specific populations being studied because it is the only health behavior change model to be applicable in studying behavior change across different

cultures (Sharma, 2015). Results from this study provided a contribution to the use of the MTM and provided recommendations on how to create health behavior changes using these all-encompassing constructs.

The findings from this study were important to public health professionals, health education specialists, and healthcare providers to provide considerations when designing vaccine implementation programs and educational messaging that promotes behavioral confidence. Findings also provided data on the advantages and disadvantages of the COVID-19 vaccine that were effective in dialogue to create health behavior change, especially among healthcare providers or individuals that may be significantly trusted by the Hispanic and Latinx population. Healthcare providers and other trusted individuals play a very important role in increasing behavioral confidence in initiating and sustaining the COVID-19 vaccine uptake. Because it is important to be culturally sensitive to be the most effective in increasing vaccine acceptance and confidence, these messages and programming are important to correct misinformation and fake news that is circulating around the COVID-19 vaccine.

Summary

The COVID-19 pandemic quickly became a global public health issue that has impacted many lives in drastic ways, including hundreds of thousands of deaths and hospitalizations. The Hispanic and Latinx populations across the United States have disproportionately been affected by the repercussions of the pandemic, including having higher rates of cases, hospitalizations, and deaths compared to other races. Although a COVID-19 vaccine has become available to end the pandemic and stop the spread of the disease, the Hispanic and Latinx populations remain hesitant to receive this vaccine due to historical racism and systemic biases. In order to increase

awareness and education about the importance of the COVID-19 vaccine through tailored implementation programs, the purpose of this study was to use a theory-based approach of the Multi-Theory Model (MTM) of health behavior change to explain the intention of initiating COVID-19 vaccination based on participatory dialogue, behavioral confidence, and changes in the physical environment, and the sustenance of this behavior change based on emotional transformation, practice for change, and changes in the social environment, among the Hispanic and Latinx population that expressed and did not express hesitancy toward the vaccine in Nevada. In order to properly develop a culturally competent survey that was used to conduct this cross-sectional study using the MTM, it is important to understand the origins from which vaccine hesitancy among Hispanics and Latinxs stem, as well as to understand COVID-19 vaccine hesitancies and factors that may contribute to COVID-19 vaccine initiation and sustenance behavior.

Chapter 2: Literature Review

Introduction

The purpose of this study was to use a theory-based approach of the Multi-Theory Model (MTM) to explain the intention of initiating and sustaining COVID-19 vaccination health behavior among the Hispanic and Latino population that expressed and did not express hesitancy toward the vaccine in Nevada. The purpose of this chapter is to conduct a literature review of the effects of COVID-19 on the Hispanic and Latinx communities, the COVID-19 vaccine, and the hesitancies and barriers affecting vaccine uptake. Secondarily, the literature review also helps understand the historical and current concerns and barriers that are affecting COVID-19 vaccination uptake among the Hispanic and Latinx populations. The chapter further breaks down why Hispanic and Latinx people are less likely to get vaccinated and includes some proposed intervention strategies to increase vaccine uptake. The literature review also delineates the reasons for the hesitancy and barriers to vaccination uptake, and what factors can create a health behavior change that would affect the intention of initiating and sustaining COVID-19 vaccination. Specifically, chapter two will cover the literature review strategy, the public health impact outcome, the epidemiological review, the findings of the literature review broken down into four themes (1-Vaccine hesitancy towards influenza immunizations prior to COVID-19; 2 - COVID-19 vaccine hesitancy among the Hispanic and Latinx Populations; 3 - More than just hesitancy: Barriers to getting COVID-19 vaccine; and 4 - Proposed intervention strategies to increase COVID-19 vaccine uptake), the instrumentation review, review of the Multi Theory Model, and review of the covariates.

Literature search strategy

Due to the nature of how new and evolving the COVID-19 pandemic and vaccines are, the literature search strategy that was used for this study consisted of searches on databases that would provide relevant information. Keywords included COVID-19, vaccine hesitancy, vaccine acceptance, Hispanic and/or Latino/Latina/Latinx, and Multi Theory Model. The University of Nevada, Las Vegas Library database was searched for articles. Google search was also used to search relevant and recent articles that have emerged about COVID-19 and the vaccines among the Hispanic and Latinx populations in the United States and Nevada. Sources of information that were used included peer-reviewed journal articles, national and state statistics, and news articles. Although news articles are not usually considered reliable and credible resources, the news articles used were analyzed to determine if the articles were based on opinion or facts, to ensure credibility.

Over 165 articles resulted in the searches; however, after assessing the articles for relevance and eligibility by briefly reviewing the abstracts and then reading the articles thoroughly, only 24 articles were identified with relevant material. Nearly all articles were published in either the year 2020 or 2021. Articles included in the literature review had information about COVID-19 vaccine hesitancy and/or vaccine acceptance among the Hispanic and Latinx populations, specifically, in the United States and/or Nevada.

Public health impact of outcome

The Hispanic and Latinx communities have faced negative health and economic effects due to the COVID-19 pandemic, including increases in COVID-caused hospitalization and death and increases in unemployment, which further caused fewer earnings, inabilities to pay for

mortgage or rent, and inability to put food on the table (Zamarripa & Roque, 2021). Among the Hispanic and Latinx populations in the United States, the Kaiser Family Foundation December 2020 COVID-19 Vaccine Monitor had reported that nearly half (52%) of Hispanic and Latinx adults have lost their jobs or income since the start of the pandemic in February of 2020 (Kearney et al., 2021)**.** While the COVID-19 vaccine has been proven to be effective in preventing hospitalization and death, increasing vaccination uptake and community immunity has other added benefits to address the lasting effects that the pandemic has caused. Vaccinations have been proven to be the most cost-effective strategy to prevent the spread of disease and to reduce morbidity and mortality (Rodrigues & Plotkin, 2020). Additionally, there are the added economic benefits of preventing loss of pay and productivity due to the vaccine preventing illness and reducing recovery periods (Rodrigues & Plotkin, 2020). Social benefits of getting vaccinated include an effort to provide lifesaving, equitable resources to underprivileged populations, and increasing life expectancy, two items that the Hispanic and Latinx populations suffer from without access to vaccines (Rodrigues & Plotkin, 2020). Through the increase in COVID-19 vaccination uptake, public health professionals hope to provide equitable access to healthcare services to ultimately end the pandemic and provide economic relief to the communities that have suffered the most.

Epidemiological review

While the COVID-19 pandemic has affected millions of people, and reported over four million deaths, in the United States alone, COVID-19 has caused over 33 million total cases and nearly 600,000 total deaths (WHO, 2021 June 13). Of the 18% of the United States population that identify as Latinx, nearly 33.8% of reported cases are among the Hispanic and Latinx populations (Moore, 2021); however, this also does not consider the cases that are not reported

due to fears of tracking or utilizing medical services. The CDC reports that in all regions of the United States, Hispanic and Latinx patients have the highest cumulative proportion of hospitalization rates compared to their White counterparts in the same regions (Romano et al., 2021). Depending on the time of the year, different regions also saw different spikes in the number of hospitalizations of COVID-19 patients that were Hispanic and Latinx- for example, the Western region saw a spike in Hispanic patients' hospitalization rates in the month of July, and continued to increase compared to other months (Romano et al., 2021). According to the APM Research Lab (2021), Latinx, Pacific Islander, Indigenous, and Black Americans have seen a mortality rate that is double that of the White and Asian American races. In addition, Hispanic and Latinx people living in America are 2.8 times as likely to be hospitalized by COVID-19 and are 2.3 times as likely to die from COVID-19, compared to their White counterparts (APM Research Lab, 2021). Similarly, the Latinx population is 2.5 times as likely to be uninsured compared to their White counterparts, further exemplifying the lack of access to affordable healthcare services when it is needed, such as when one is infected by COVID-19 and required hospitalization (NIHCM, 2021). Although this does not give an exact number of deaths we see for the Hispanic and Latinx populations, we are reminded of the inequities the minority populations are experiencing, which includes the large amount of hospitalization and deaths that the Hispanic and Latinx populations are encountering.

Nevada is also experiencing similar effects in that the Hispanic and Latinx populations are seeing the second-highest cases and death rates, following non-Hispanic Whites. In Nevada, as of August 4, 2022, nearly 200,000 Hispanics accounted for COVID-19 cases, which made up approximately 30.9% of cases (Nevada Health Response, 2022). Additionally, almost 2,300 Hispanics accounted for COVID-19 deaths, which made up approximately 20.4% of the deaths

(Nevada Health Response, 2022). With the rising cases of new variants in the United States and Nevada, in July 2021, nearly 25% of the new COVID-19 cases were caused by the Delta variant (López, 2021). Since then, more variants of SARS-CoV-2 have been evolving, proving to be more contagious and vaccine-resistant (WHO, 2022). Additionally, as of August 31, 2022, the bivalent boosters, or the "updated boosters," of the Pfizer and Moderna vaccines were recommended by the FDA as an amendment to the emergency use authorizations (FDA, 2022 August 31). While these booster recommendations were not available during the time of this study, the primary series and original booster recommendations of the vaccines have still proven to show that those who are vaccinated but become infected with the new variants, still have some protection against hospitalization and death from COVID-19. Because of the rapidly increasing numbers of COVID-19 infections, hospitalization, and deaths among the Hispanic and Latinx populations, vaccination uptake is more important to reduce the morbidity and mortality rates and provide equitable access to health resources that are available.

Vaccine hesitancy towards influenza immunizations prior to COVID-19

Although many of the Hispanic and Latinx population are accepting of getting the COVID-19 vaccine, others are still hesitant due to historical and pre-existing experiences that have previously affected the hesitancy of getting vaccinated, including lower access to adequate healthcare providers to minority populations, historical mistrust, cost-related concerns, and lower awareness and education of the importance of the vaccine (Khubchandani et al., 2021). While not a comprehensive list, these are some of the factors that have affected the uptake of routine immunizations that have been available for years. Unfortunately, this is translating to the lack of vaccine uptake among these minority populations that have been negatively impacted by the COVID-19 pandemic and would greatly benefit from receiving the COVID-19 vaccine.

The acceptance of the COVID-19 vaccines has also been linked to historical reluctance to accept other routine immunizations, especially the seasonal flu vaccine (Gibson et al., 2021; Latkin et al., 2021). The Hispanic and Black communities have traditionally had lower rates of flu vaccine coverage, compared to Whites in the United States (Gibson et al., 2021). Survey results of a study conducted by Latkin et al. (2021) showed that those who did not intend to get the COVID-19 vaccine when it became available had 79% lower odds (aOR=0.21) of receiving a flu vaccine in the previous year. Although another study by Malik et al. (2020) found contrasting results of flu vaccine acceptance predicting COVID-19 vaccine acceptance. The study showed that of the 450 surveyed participants, unemployed individuals were more likely to report denying the acceptance of both the flu vaccine and the COVID-19 vaccine (Malik et al., 2020). In contrast, education levels proved that flu vaccine acceptance would not be the same outcome for COVID-19 vaccine acceptance, in that 10% of those who did not complete high school did not receive the flu vaccine, yet 60% of this group also reported that they would accept the COVID-19 vaccine when it became available (Malik et al., 2020). Additionally, in comparison to younger adults, older adults reported higher flu vaccine uptake (69%) and higher intent to get vaccinated with the COVID-19 vaccine when it became available (Malik et al., 2020). Due to the similar symptoms of the flu and COVID-19 illnesses, many are making the inaccurate assumption that these diseases are not as deadly as people are making them out to be, causing those who were previously hesitant about the flu vaccine just as hesitant about the COVID-19 vaccine. Although this does cause a significant impact on vaccine uptake and has shown to have a significant relationship, it is important to address the specific hesitancies that people have about the COVID-19 vaccine, rather than focusing on the hesitancies that affected the flu vaccine uptake.

COVID-19 vaccine hesitancy among the Hispanic and Latinx Populations

Because the COVID-19 pandemic has had a disproportionate effect on the health of the Hispanic and Latinx populations, it is important to understand the specific hesitancies they may have that prevent this population from getting the COVID-19 vaccine. Early in the vaccine development stages, many Hispanics and Latinx reported that they were interested in the COVID-19 vaccine. A survey conducted by Langer Research in September 2020, prior to publications of the experimental research of the three COVID-19 vaccines, found nearly 34% of the Latinx participants trusted the vaccine's safety, and nearly 40% trusted the effectiveness (Wan, 2020). Those who trusted the vaccine also reported having received their flu vaccines in previous years, a better understanding of their racial identity, and higher education levels (Wan, 2020). Similarly, another national panel survey that was conducted by Salmon et al. (2021) prior to the EUA of the COVID-19 vaccine revealed that nearly 52% of Hispanics in the United States intended to definitely or probably get vaccinated as soon as the vaccine became available to them. Among this group of people, also called "Intenders," there were 6.07 times higher odds that they discussed COVID-19 with their healthcare provider and 44.37 times higher odds that they considered the COVID-19 vaccine an important tool to stop the spread of infection (Salmon et al., 2021). Intenders also had 10.27 times higher odds of being confident in vaccine safety, compared to the rest of the study population (Salmon et al., 2021). With many people trusting the vaccine and showing interest in receiving it, the prospect of reaching herd immunity quickly among the Hispanic and Latinx populations seemed promising.

When the first vaccines were introduced and just about to be released in the United States, the December 2020 Kaiser Family Foundation COVID-19 Vaccine Monitor found that among Hispanic adults, 61% trusted the safety and effectiveness of the vaccine, 61% believed

that the vaccine would be distributed equally, and 60% were confident that the development of the vaccines had considered the needs of the Hispanic and Latinx people (Kearney et al., 2021). This finding showed that the Hispanic and Latinx populations may have been interested in receiving the vaccine early on because they believed that it would provide protection against COVID-19 for all people, no matter their race, ethnicity, age, etc. However, after the release of the plans for vaccine distribution across the United States, because many of the Hispanic and Latinx populations were not eligible for the vaccine right away, the long wait to get vaccinated may have allowed for more time to increase vaccine hesitancy.

Early in the release of the COVID-19 vaccine, vaccine distribution plans prioritized age requirements, such as older adults that were aged 75+, rather than increased risk factors of COVID-19, such as those living in multigenerational homes that are common among the Hispanic and Latinx population (Silva, 2021). This put a major toll on the Hispanic and Latinx populations because while many may have been interested in getting vaccinated to protect their large household and to stop the spread of disease, they were denied access to the vaccine because they might not have met the age or occupation requirements. Therefore, causing a further divide early on in the vaccine distribution plan, and allowing for more time to increase their exposure to misinformation.

Age was also found to be a significant factor in determining vaccine uptake in that many younger Hispanics had expressed more vaccine hesitancy compared to older adults (Kearney et al., 2021). In the same December 2020 Kaiser Family Foundation COVID-19 Vaccine Monitor, results found that older Hispanic adults older than age 50 reported the same confidence in the vaccine upon its release, only more of them trusted the vaccine compared to their younger adult counterparts (those younger than 50) (Kearney et al., 2021). Among the Hispanic adults over 50

years, 73% trusted the safety and effectiveness of the vaccine, 70% believed that the vaccine would be distributed equally, and 68% were confident that the development of the vaccines also considered the needs of the Hispanic and Latinx people, compared to 56%, 57%, and 56% respectively among their younger than 50 years counterparts (Kearney et al., 2021). The Kaiser Family Foundation vaccine monitor also found that many younger Hispanic adults, including those who were considered essential workers during the COVID-19 pandemic, had expressed more vaccine hesitancy compared to older Hispanic adults (Kearney et al., 2021). Many of the younger adults reported not trusting government officials but trusting the local health department, the CDC, and their doctor (Kearney et al., 2021). However, the majority of these older Hispanic adults still reported trust in their doctor, health care providers, or other trusted groups and individuals, such as the CDC, the FDA, Dr. Fauci, President Joe Biden, and their local public health department (Kearney et al., 2021). These divisions among the different age groups may be caused by various factors: younger adults believing they are healthy and do not need the vaccine, not believing that they are at risk of getting hospitalized or dying from COVID-19, or they are exposed to more misinformation due to frequent use of social media and the digital divide between the younger and older adults. The discussions on social media and through word of mouth about vaccine side effects and other misinformation may have played a determining factor in causing more Hispanics and Latinxs to become hesitant in getting the vaccine.

While social media has been a great way for distant people to connect and provide up-to-date information, it has also been a way for people to also spread misinformation about the COVID-19 pandemic and the vaccine. This is especially true among non-native English speakers exacerbating the problem of spreading misinformation about the COVID-19 vaccine to them

(Narea, 2021). For those who may not refer to credible sources of information, such as government officials, the CDC, or a trusted primary care provider, social media has played a large role in spreading false rumors about the vaccine. When social media is filled with mixed information that is both true and not true, many immigrant communities are unable to determine which information about the vaccine is actually trustworthy or not (Silva, 2021). While social media now has taken extra precautions to prevent the spread of misinformation through fact-checkers, many still rely on social media to connect with personal contacts or influential figures that may potentially discourage vaccine uptake. Word of mouth is also another means of getting or passing on information among this Hispanic and Latinx population. There is a sense of trust in family, friends, and neighbors to provide their knowledge and opinions to help make decisions about getting the vaccine. As misinformation continues to spread among the Hispanic and Latinx community, the less intent they have to get the vaccine, even if they had originally planned to.

With the continuous spread of misinformation, vaccine hesitancy continues to rise, and more people are becoming hesitant about the COVID-19 vaccine. Various studies have found that approximately a third of the Hispanic population is very hesitant to get vaccinated. A literature review conducted by Khubchandani and Macias (2021) found that among racial and ethnic minorities in the United States, 30.2% of Hispanics reported that they were hesitant or unwilling to get the COVID-19 vaccine when it became available. Similarly, according to the Kaiser Family Foundation COVID-19 Vaccine Monitor, approximately 8% of Hispanic adults reported that they would probably not get the COVID-19 vaccine and 18% would definitely not get it (Kearney et al., 2021). In order to reach a high herd immunity percentage, it is important that more people are vaccinated; however, with nearly a third of the Hispanic and Latinx population unwilling to get vaccinated, this still puts them at high risk for COVID-19

complications and disproportionate effects.

The intent to get vaccinated is ultimately determined by values, cultures, and experiences (Salmon et al., 2021). Many cultures have various views on vaccination, including the COVID-19 vaccine, which have affected vaccine uptake. Similarly, trust in influential individuals within specific cultures have shown to also affect the uptake of COVID-19. Certain cultures like the Hispanic and Latinx communities rely heavily on the trusted voices within their communities to provide their expertise about vaccinations, to help encourage others to make the same decision (Salmon et al., 2021). Trust in the government is still a lingering concern for many who were still definitely or probably going to get the vaccine, especially among the Hispanic and Latinx populations, for those who may be undocumented (Wan, 2020). Requirements for having to present a government-issued identification pose a hesitancy to get vaccinated due to concerns of being identified by immigration status (Reverby, 2021). Additionally, mistrust of government sponsorships and the use of herbal remedies have been identified as reasons for choosing not to get vaccinated (Reverby, 2021). Because many of the Hispanic and Latinx communities have had negative historical experiences with racism and medical exclusions, they would much rather trust the voices within their communities, which provides optimal opportunities for community organizations and individuals such as pastors to provide support for the vaccine to encourage uptake.

When building trust within the Hispanic and Latinx communities to ensure people get vaccinated, it is important to address and debunk the myths and misconceptions that the government is using vaccination to harm people or to insert tracking devices (Reverby, 2021). When this type of news spreads through social media or word of mouth, it further adds to the distrust of vaccines and adds more fear, rather than hope that the vaccine will end the pandemic

and the spread of disease. Many Hispanic and Latinx communities, especially those who may be undocumented, have received a lower level of education; therefore, when their trusted resource such as social media or word of mouth continues to spread false information, they automatically assume this is true, furthering their trust in vaccines and ultimately causing hesitation. Proper education of the vaccine and the use of credible sources to provide further support is important to address vaccine hesitancy and to increase vaccine uptake.

Addressing concerns and misinformation is not only important to encourage COVID-19 vaccination uptake for the first dose, but for the required second dose and recommended boosters, as well. Dawson et al. (2021) state that the challenges seen in the follow-through of multi-series routine vaccination are similar to the hesitancies that people tend to have with the COVID-19 vaccination second dose uptake. This can include the confusion of the multiple vaccine options and timelines to complete the series, side effects that are felt after the first dose that deter or delay returning for the second dose, scheduling concerns that may not allow for individuals to take time off of work once again, and inequities that make receiving the first dose just as difficult to get the second dose, such as transportation, access to the internet to book appointments, or having a reliable and consistent healthcare provider (Dawson et al., 2021). Although these are concerns of the general public, Hispanics and Latinxs may experience the inequities that prevent them from receiving their second dose or any additional boosters.

Although early vaccine hesitancy is what initiates the disparity of vaccine uptake among the Hispanic and Latinx populations, a lack of access to the vaccine is also to blame and must be addressed (Narea, 2021). Ensuring that people have easy and reliable access to the COVID-19 vaccine, as well as addressing and educating on any concerns about the COVID-19 vaccine will provide an adequate environment to encourage this health behavior change.

More than just hesitancy: Barriers to getting COVID-19 vaccine

When trying to improve vaccination rates, many people automatically assume the issue to manage is understanding and addressing vaccine hesitancy. However, there are additional barriers in combination with vaccine hesitancy that affect vaccine acceptance health behavior. In terms of the COVID-19 vaccine and the Hispanic and Latinx community's vaccination rates, as of July 2021, communities of color have reported lower average vaccination uptake rates; however, this is not solely caused by vaccine hesitancy, but rather access barriers to getting the vaccine (Sobo et al., 2021).

People of color suffer from health inequities caused by COVID-19, such as higher hospitalization rates, higher disease severity, and higher rates of death (Sobo et al., 2021). These people, including the Hispanics and Latinxs, who experienced the COVID-19 inequities have reported wanting to get vaccinated when it became available; however, access issues beyond the lack of transportation, lack of access to the internet, and education gaps, have prevented many of them from receiving it (Sobo et al., 2021). One of these issues is that they are being given the "least effective" vaccine among the three that were available; being "vaccine impeded" due to their providers' attitudes of not encouraging vaccination; and a practical barrier of not being able to care for family members should their experience with the vaccine cause them to experience a side effect of being sick (Sobo et al., 2021). Other factors such as lower education, vulnerability to vaccine myths and misinformation, lower income, geographical living disadvantages, perceived barriers to access vaccines, experiences with discrimination, and medical mistrust all affect the uptake of the COVID-19 vaccine (Khubchandani & Macias, 2021). All of these factors are affected due to discrimination against the Hispanic and Latinx populations, and all other people of color.

Historical and present-day effects of systemic racism, marginalization, and medical neglect have affected the uptake of the COVID-19 vaccine among the Hispanic and Latinx populations (Quinn & Andrasik, 2021). The COVID-19 pandemic has highlighted the many healthcare inequities that the Hispanic and Latinx communities have experienced for years, including access to health resources and vaccines. Additionally, the additional fears of being vaccinated and exposing one's immigration status, and a communication and technology barrier have added to these challenges that the Hispanic and Latinx communities must face daily (Narea, 2021). When the COVID-19 vaccination distribution first rolled out, it was perceived that minorities were given a lower allocation for the vaccines (Khubchandani & Macias, 2021; Feldman, 2021). Many states were also not able to provide information about the COVID-19 vaccine or signs directing to vaccination sites in languages other than English (Silva, 2021, Narea, 2021). These two barriers, in addition to the distance to vaccination sites or a digital divide to book appointments online, easily created an additional challenge for the non-Spanish-speaking Hispanic and Latinx populations to get the vaccine.

During the vaccine roll-out, allocation is intended to stock all pharmacies; however, people of color tend to live in areas that are "pharmacy deserts," or areas that are not readily accessible to big chain pharmacies, making it nearly impossible or extremely difficult for someone to find a vaccine close to home (Reverby, 2021). These areas are also typically lacking in hospitals and medical providers, creating a lack of easy access to healthcare services (Johnson, 2021). Hispanics and Latinxs have reported that they rely on public transportation, and vaccination clinic times are only available during normal working hours during which they are unable to take off from their own jobs (Narea, 2021). These pose further problems because when

vaccines are unavailable where it is convenient or easily accessible to the community, the result is typically denial of the vaccine because no one wants to go out of their way to get vaccinated.

In addition to a lack of convenient places or transportation to clinics, when vaccinating locations did open up their allocation to the public, many used an online appointment system to require someone to make an appointment in advance. This enhances the lack of access to the COVID-19 vaccines among the Hispanic and Latinx populations because many do not have access to the internet or a smartphone to be able to complete such tasks, making it nearly impossible for them to get a vaccine when they wanted to (Narea, 2021; Reverby, 2021). Additionally, the appointment systems and signs for these clinics were only in English, creating a barrier for the Hispanic and Latinx people who did not know how to understand English to book an appointment, or were not able to understand that they were eligible for the vaccine despite their citizenship status (Narea, 2021). This type of system adds to the hesitancy issue because the vaccine is not being equally distributed to the Hispanic and Latinx populations, leading them to believe that they were not prioritized in the vaccine distribution planning process.

Different articles have stated that while there are many Hispanic and Latinx people who are hesitant about the vaccine, we are also seeing that majority of Hispanics are not hesitant about the vaccine itself; but are more so skeptical about the logistics and medical system that it stems from (i.e., belief that hospitals are only after their money, fear of the government, etc.) (Mejia, 2020). For example, when mass vaccination clinics first opened up, National Guard members in military clothing and FEMA were used to provide vaccinations. These immediately made immigrants feel unsafe and uncomfortable getting vaccinated due to a fear of being exposed or deported (Feldman, 2021). This is another access issue because many vaccination sites were using these resources to vaccinate as many people as possible, but when the Hispanic

and Latinx communities see that government workers are staffing the vaccination sites, they may choose to ultimately not get the vaccine at all, assuming all sites operate in the same format.

The cost of the vaccine has also become a prominent issue as to why many people are not getting vaccinated. Many Hispanic and Latinx people lost their jobs due to the pandemic, ultimately resulting in a loss of health insurance coverage; therefore, the cost of a health service like the COVID-19 vaccine may be of concern if people are charging for the vaccine (Narea, 2021). Although the vaccine is completely free of charge to ensure everyone has access to a COVID-19 vaccine no matter their citizenship status, only 66% of Latinx people reported definitely or probably getting the vaccine when it became available (Wan, 2020). Vaccines can get very pricey; however, this statistic shows that even though people have free access to vaccines, some are still not likely to get them. Many Hispanic and Latinx people have also been scammed into paying for something like the vaccine or getting a COVID-19 test, which also adds to the fear and distrust. This shows the importance of proper education about the cost of the vaccine to eliminate the misinformation being spread.

While addressing access barriers may be a challenge to ensure that all Hispanics and Latinxs are trusting and comfortable with receiving the vaccine, intervention strategies have been suggested to increase these rates while addressing both access barriers and hesitancies towards the vaccine. Both are important to consider explaining this health behavior change.

Proposed intervention strategies to increase COVID-19 vaccine uptake

Based on the review of literature, the authors proposed some intervention strategies or other suggestions that would help to increase COVID-19 vaccine uptake, including addressing vaccine hesitancy and access barriers. One of the first proposed intervention strategies is to address vaccine hesitancy that is specific to the Hispanic and Latinx population through

transparent, honest, respectful, and open conversations with community members and healthcare professionals (Khubchandani & Macias, 2021; Khubchandani et al., 2021; Quinn & Andrasik, 2021). Relationship building is key to building trust and respect among the Hispanic and Latinx populations, and individuals in the community who are promoting the vaccine (Quinn & Andrasik, 2021). The Hispanic and Latinx populations receive their information from sources that they trust, including healthcare providers (if they have one), community organizations, other community members, and through word of mouth from family and friends. Having individuals that are trusted by the Hispanic and Latinx communities available to combat myths, misinformation, and conspiracy theories may be more effective in providing more accurate, credible information compared to the information that is found through social media. It is important to build this trust by continuing to listen to the population's needs and to understand the different barriers and fears they may experience when trying to access the COVID-19 vaccine (Quinn & Andrasik, 2021). When there is a lack of trust in government officials, it is important that credible information is passed down through other sources of trusted individuals that understand this minority population, rather than completely rely on them to search for the correct information themselves.

Many of the Hispanic and Latinx hesitancies come from historical and present-day injustices and inequalities in health education and health services. This is why it is important to use fact-based and non-judgmental or confrontational communication with this community to ensure accurate information with trusted individuals (Khubchandani & Macias, 2021). While government officials may not be trusted sources of information, healthcare providers should continue to help increase the knowledge and awareness of the COVID-19 vaccine, as well as answer any questions or concerns Hispanics and Latinxs may have about the virus or the vaccine

itself (Khubchandani & Macias, 2021). Healthcare providers are considered the experts and educators for all health-related problems. By taking the extra time to address questions and concerns during a health visit, providers are more likely to convince their patients to get the vaccine and/or to continue thinking about it to make an informed decision for themselves.

Continued communication is key to encouraging vaccine uptake, which is why it is proposed to use a multimodal approach to communicate the importance of the COVID-19 vaccine and to promote COVID-19 vaccination clinics is important to account for the differences in access to technology among the Hispanic and Latinx populations (Khubchandani & Macias, 2021; Quinn et al., 2021). Similarly, communication means, educational resources, information sheets, and vaccine consent forms should be available in languages other than just English (Khubchandani & Macias, 2021; Quinn et al., 2021). Many Hispanics and Latinxs are interested in getting the vaccine; however, if they are unable to get their questions about the vaccine answered in their native language or are unaware of where to get vaccinated due to language barriers, they may choose to not get vaccinated instead. Communication may also include educating people about the vaccine through means of target outreach, such as canvassing or door knocking and educating at places of employment, to ensure that people are aware of the health and economic benefit of getting the COVID-19 vaccine (Narea, 2021; Silva, 2021).

Targeted approaches in the community are also important to address Hispanic and Latinx needs to get vaccinated, which shows the importance of creating community-based vaccination clinics in areas that are trusted by the Hispanic and Latinx populations, and are run by community organizations and supported by community members, such as pastors, churches, principals, and schools (Khubchandani et al., 2021). This approach to providing vaccination clinics must also have little to no barriers, including easy access to transportation, registration

and vaccine information on paper forms and in other languages, and the absence of FEMA or government officials at these community events (Khubchandani et al., 2021). By providing community-based vaccination clinics, the Hispanic and Latinx community is able to get vaccinated in areas that are easy to access and provides a comfortable environment to ask questions and get the vaccine without feeling like their citizenship status or ethnicity is being questioned or judged.

To ensure that there is equitable vaccine distribution to the ethnic and minority populations, improved and continuous surveillance is important among the Hispanic and Latinx communities to track the distribution of vaccine uptake among these populations, and to take note of where vaccine allocation is being distributed (Khubchandani & Macias, 2021). Policymakers can use relevant surveillance data to support systems and plans to provide COVID-19 vaccinations in areas that are disadvantaged, or receive the lowest allocations (Khubchandani et al., 2021). Equitable distribution of the COVID-19 vaccines is important to ensure that people of all races and ethnicities have equitable access to vaccines, no matter where they live. Therefore, knowing where there have been pockets of vaccine allocation will be addressed through proper surveillance and further improved through programs that work to provide vaccines in these desert areas.

An article by Lurie & Oatman (2021) of an implementation strategy that was executed in San Francisco, California. A vaccination site was run by Unidos en Salud, which was a collaborative effort between the UC San Francisco and the Latino Task Force. The collaborative efforts provided vaccines in the hardest-hit areas by COVID-19 and got many community members involved to ensure transparency and build trust and credibility (Lurie & Oatman, 2021). By getting the community involved, the program was able to provide the COVID-19

vaccine, as well as food and replacement wages for those who tested positive so that the Hispanic and Latinx communities did not feel like they were not protected when affected by COVID-19. The importance of this article and the implementation strategy is that by getting more trusted organizations involved with collaboration and funding can help to provide the Hispanic and Latinx communities with access to vaccines, as well as other important resources such as food and replacement wage support. Although this is an expensive intervention strategy, the Hispanic and Latinx populations have been hit particularly hard because of the COVID-19 pandemic for both their health and employment status. Many of them are unable to get the COVID-19 vaccine due to fear of not being able to go to work or put food on the table. Providing them the resources that they need to survive, also provides them access to the vaccine to provide further protection. This type of intervention is a great suggestion but must be able to sustain the program's funding long-term until the COVID-19 pandemic is completely over.

While the proposed implementation strategies could be effective, it is important that all must be considered simultaneously to ensure that both vaccine hesitancy and barriers are being addressed. Vaccine uptake among the Hispanic and Latinx populations is affected by vaccine hesitancy and overcoming the barriers to getting vaccinated; therefore, being culturally competent with implementation will ensure success.

Theoretical framework and instrumentation review

Our study used the MTM of health behavior change as the theoretical framework to determine the intentions of receiving and sustaining the COVID-19 vaccination among the Hispanic and Latinx populations in Nevada. The MTM is the ideal framework to assess COVID-19 vaccination uptake because of its unique ability to explain the intention and sustenance of behavior change while focusing on cultural factors and socioeconomic status.

Since its introduction, the MTM has been utilized in many articles and presentations as its theoretical framework for the study. We conducted a scoping review of the literature between November to December 2021 to assess and synthesize the studies that have used the MTM, and to determine the effectiveness of the theoretical framework in predicting and creating successful behavior change (Nerida et al., 2022). We identified 40 articles that exclusively used MTM in their study design between 2016 to November 2021. Of the 40 articles identified, four articles used a qualitative study design, four articles used an experimental study design, and thirty-two articles used a descriptive study design. The descriptive study design described in these articles utilized a similar format to our study that was conducted. Qualitative studies were found to be effective in predicting behavior change. The experimental studies also proved that the MTM is an effective framework to initiate and sustain behavior change, even when operationalizing some of the predictive MTM constructs. Lastly, the descriptive studies also found that the MTM constructs were predictive of behavior change to varying degrees with different behaviors. This further lends support that the MTM constructs are malleable to the specific behavior change and can be further assessed to determine which constructs would be most effective in predicting, initiating, and sustaining the proposed behavior change. Some highlights of the articles that were analyzed in the scoping review are further described below.

One of the first known experimental studies using the MTM to analyze the initiation and sustenance of health behavior was an article published in 2019 by Hayes et al. which studied physical activity of 30 minutes or more among African American women. The study utilized a pre-test, post-test, and follow-up evaluation of an intervention based on the MTM results, among an experimental group that was exposed to intervention sessions and activities rooted in the MTM constructs and a comparison group that received educational sessions only without the

MTM constructs (Hayes et al., 2019). Researchers found that the experimental group had increased physical activity minutes to the recommended levels per week, showing the initiation and sustenance of the behavior change. The experimental group also showed increases in being able to access exercise facilities and using exercise facility equipment, proving that there was a significant increase in the MTM construct of changes in the physical environment (Hayes et al., 2019). The last significant finding was the reduction in the average waist circumference of the experimental group, compared to the comparison group, as a result of the increase in physical activity minutes (Hayes et al., 2019). Although there were no significant differences among the different constructs, results show that utilizing the MTM framework as the foundation for survey analysis and intervention approaches is cohesively effective in achieving and sustaining health behavior change goals, such as increased physical activity.

Most recently, the MTM had been utilized to analyze the initiation of COVID-19 vaccine uptake health behavior among college students (Sharma et al., 2021). The study proved to be successful in that the three MTM constructs of participatory dialogue, behavioral confidence, and changes in the physical environment were all significantly associated with determining the initiation for vaccination uptake prior to the EUA of the COVID-19 vaccine, for those who were not hesitant in getting the vaccine (Sharma et al., 2021). However, among those who were hesitant in getting the vaccine, only the MTM construct of behavioral confidence was significant in determining vaccine initiation (Sharma et al., 2021). Because of the success the MTM-based survey had in determining the initiation for vaccine initiation, our current study proposes to utilize the same framework and survey instrument to understand the health behavior among the Hispanic and Latinx populations. The difference is that this current study looked at the

sustenance of the vaccine because of its current approval that requires a second dose and recommendations for booster doses.

Utilizing the MTM as the framework for our survey instrumentation is ideal because of the success that was found in the descriptive study by Sharma et al. (2021) to assess college students' health behavior using the MTM framework. Two other studies have been conducted to assess COVID-19 vaccine uptake using other theoretical frameworks, including the Health Belief Model and the Social Ecological Model. Although both studies are successful in assessing intent to initiate the vaccination series, they do not explore the factors that affect the sustenance of getting a second and/or booster dose of the vaccine as recommended to ensure continuous protection from COVID-19.

The first study conducted by Salmon et al. (2021) used the Health Belief Model and the Social Ecological Model as its framework for their survey to measure the intent of receiving the COVID-19 vaccine, prior to the EUA. They used six constructs to measure survey results: 1) Self-efficacy; 2) Support for individualism; 3) Support for hierarchy; 4) Confidence in the vaccine; 5) Trust in local and state public health authorities; and 6) Trust in the CDC (Salmon et al., 2021). Based on participants' responses to receive the vaccine, they were grouped according to either: 1) Intenders, or those who would definitely or probably get vaccinated right away; 2) Wait and Learn, or those who would wait to get the vaccine; or 3) Unlikely, or those who would definitely not get vaccinated (Salmon et al., 2021). Based on study results, 50% of the respondents were classified as Intenders, and reported significance of three constructs for confidence in the vaccine, trust in local and state public health authorities, and trust in the CDC (Salmon et al., 2021). The study emphasizes the importance of ensuring that knowledge of the value of the vaccine and guidance on where to get vaccinated is important to ensure the uptake of

the vaccine (Salmon et al., 2021). However, with the Hispanic and Latinx populations, it is important to address the barriers to accessing vaccines; you can guide people on where to go to get vaccinated, but if you do not address their specific cultural concerns, they may never access the vaccine. This is one of the reasons why the MTM is an important framework to use for our study to ensure we address the MTM constructs of sustenance to understand the emotional transformation, practice for change, and changes in the social environment that also affect vaccine uptake.

The second study conducted by Latkin et al. (2021) used the Social Ecological Model as the framework of their study to assess COVID-19 vaccine intentions in relation to the levels of intrapersonal, interpersonal, institutional, and community-level factors. This study was particularly important because researchers were hoping to understand the vaccine hesitancy among different races, especially among Black and Latinx Americans (Latkin et al., 2021). At the interpersonal level, researchers found that intention to not get the COVID-19 vaccine was associated with race, education attainment, political ideology, not getting an influenza vaccine the previous year, doubts about the COVID-19 pandemic, and less engagement in preventive behaviors (Latkin et al., 2021). At the interpersonal level, the intention to not get vaccinated was associated with lower perceived social norms to prevent the spread of disease (Latkin et al., 2021). At the institutional level, the intention to not get vaccinated was associated with less trust in the CDC (Latkin et al., 2021). At the community level, the intention to not get vaccinated was associated with a lower perceived likelihood of being affected by the COVID-19 virus (Latkin et al., 2021). Although the study was effective in finding which factors affect the intentions to not get the vaccine, it was not effective in finding factors that positively affected vaccine uptake intentions. Using the MTM framework in our study allows us to assess the intent to initiate the

vaccination series and to sustain the health behavior by encouraging a second dose and/or booster uptake.

Both studies show framework-based instrumentation that is very successful in assessing the intent of one to receive the COVID-19 vaccine. However, many people often do not follow up with the second dose of the vaccine due to hesitancy or personal reasons, such as disliking the side effects or no longer having easy access to a COVID-19 vaccination site. This is the importance of using the MTM model to assess all factors that affected the sustenance of the health behavior to ensure that uptake of the COVID-19 vaccine continued after getting the first dose.

Review of the covariates

The study controlled for covariates of age, race, gender, education level, religion, income, and employment status, as these were identified in a study done by Viswanath et al. (2021) as the social determinants of health that were found to have an effect on COVID-19 vaccination uptake. Study results showed that education level and employment status had a significant impact on one's decision to get the COVID-19 vaccine (Viswanath et al., 2021). Data showed that those who had higher education were more likely to vaccinate people within their care and those who were unemployed were more likely to get the vaccine for themselves and for people within their care (Viswanath et al., 2021). While this particular study only showed significant influence on vaccination status from education level and employment, age, gender, race, and education have been reported as the best model to predict COVID-19 vaccine acceptance (Malik et al., 2020)

A person’s age is also a significant factor that can determine someone’s intent to get vaccinated, especially among the Hispanic and Latinx populations (Malik et al., 2020; Kearney et al., 2021). In a survey conducted by Malik et al. (2020), of the 67% (n=450) of participants

who reported that they would accept the COVID-19 vaccine when it became available and was recommended for them, males (78%), older adults who were 55 years and older (78%), and those with a college and/or graduate degree (75%) were more likely to receive the COVID-19 compared to their counterparts. Similarly, a study conducted by Kearney et al. (2021), also found noticeable differences in vaccination uptake across the age groups among Hispanic adults, compared to other demographics like gender, education, and income, although all were still found to significantly contribute to COVID-19 vaccine uptake. This is evident in that results showed approximately 80% of Hispanic adults that were 50 years or older were more likely to "definitely" or "probably" receive the COVID-19 vaccine, and approximately 38% would get it "as soon as they can" when the vaccine becomes available (Kearney et al., 2021). In comparison, approximately 67% of Hispanic adults that were under 50 years reported to "definitely" or "probably" receive the COVID-19 vaccine, and approximately 20% would get it "as soon as they can" when the vaccine becomes available (Kearney et al., 2021). The age difference for vaccine hesitancy has been common in that younger adults typically believe they are strong and healthy and do not need a vaccine to stay that way, while older adults believe they have a weaker immune system and need a vaccine to ensure they stay protected. The differences in beliefs that affect COVID-19 uptake also translate to gender and religious differences.

A survey study by Khubchandani et al. (2021) found that females had 44% higher odds of being vaccine hesitant compared to males; however, there have been conflicting responses of which gender is considered more vaccine-hesitant. Men have traditionally been hesitant about any vaccine because of their belief that vaccines may show a sign of weakness or less masculinity, while females are more skeptical about a novel COVID-19 vaccine and would rather wait to see the effects. Gender differences regarding the COVID-19 vaccine may be

prevalent among different races and ethnicities; therefore, it is important to control for this variable as it is still a predicting factor that ultimately affects vaccine uptake.

Religion is also a covariate because it is an important aspect in the lives of the Hispanic/Latinx population; however, depending on one's religious beliefs, it may change their perception of vaccinations. Loomba et al. (2021) found that in comparison to Christians, other religious affiliations including Jewish or Atheist, were more hesitant about the COVID-19 vaccine when exposed to more misinformation. Although at the moment, COVID-19 is not a mandatory vaccine to receive to enter school or the workforce at most places, if that does become a mandated policy, this variable is important to consider as religious exemptions are currently allowed in many states to opt out of vaccination. The covariates chosen for this study all have a significant impact on the uptake of the COVID-19 vaccine; therefore, it is important to understand the initial significance each of these demographic characteristics has on one's intent to get vaccinated.

Summary and conclusions

This literature review provided key themes that emerged based on how COVID-19 has affected the Hispanic and Latinx communities, including vaccine hesitancy and access barriers. For vaccine hesitancy, a third of Hispanics and Latinxs were hesitant about receiving the vaccine due to misinformation from social media, being of younger age, and distrust in many individuals. However, increasing COVID-19 vaccine uptake is also not fixed by just addressing vaccine hesitancy; it is also about increasing access and addressing barriers. It is also noted that Hispanics need to feel like they have trust in the people whom they are communicating or working with, and hearing vaccine information in order to feel confident about getting vaccinated. This is especially true to ensure that social media is not their main form of credible

information and that they are not relying on that to get “up-to-date” on their knowledge of the COVID-19 vaccine. Age and gender have also proven that there are differences among these demographic factors, which is why they must be studied.

Our study intended to provide further research on the understanding of what hesitancies and access barriers may affect the intent to initiate and sustain the COVID-19 vaccine uptake health behavior among Hispanic and Latinx populations. COVID-19 vaccinations have proven to be effective in addressing health equity gaps and providing relief to the Hispanic and Latinx populations is health, economic, and social benefit. Based on our current research, theory-based work for identifying determinants of the COVID-19 vaccine had been limited and there is a need for more research in using newer theories in this area. Because of this, the importance of the study was to utilize a newer theory of the MTM to identify and address these needs. Therefore, the goal of this study was to use the MTM of health behavior change to explain the intention of initiating and sustaining the COVID-19 vaccine uptake among the Hispanic and Latinx populations. Chapter 3 will outline the plan of action for data collection and analysis, and instrumentation to be used in the study.

Chapter 3: Methodology

Introduction

The purpose of chapter three is to introduce and summarize the research plan that occurred for this quantitative cross-sectional and survey-based study design to analyze COVID-19 vaccine acceptance behavior among the Hispanic and Latinx populations. This study stemmed from the constructs of the MTM of health behavior change to explain the intent of initiating and sustaining the behavior of receiving the COVID-19 vaccine. This approach allowed researchers to further understand the cultural concerns that Hispanics and Latinxs have of COVID-19 vaccination that is preventing uptake and to investigate the effectiveness the MTM has in addressing health behavior change. The four research questions that were addressed analyzed the constructs of the MTM and how they predicted the initiation and sustenance of COVID-19 vaccination, among those who were vaccine-hesitant and those who were not vaccine-hesitant. Chapter three will cover the purpose of the study and research questions to be answered while going more in-depth about the study design, population and sampling, instrumentation, data collection process, ethical approval, and data analysis plan.

Purpose of the study

The purpose of this study was to use a fourth-generation theory-based approach of the MTM of health behavior change to explain the intention of initiating COVID-19 vaccination based on participatory dialogue, behavioral confidence, and changes in the physical environment, and the sustenance of this behavior change based on emotional transformation, practice for change, and changes in the social environment, among the Hispanic and Latinx populations that

expressed and did not express hesitancy toward the vaccine in Nevada.

Research questions and statistical hypotheses

This study analyzed COVID-19 vaccine intent for initiation and sustenance among two groups of participants: those who expressed hesitancy towards the COVID-19 vaccine and those who did not express hesitancy towards the COVID-19 vaccine. The covariates that were controlled for due to effects found on COVID-19 vaccination uptake status were race, gender, education level, religion, income, and employment status (Viswanath et al., 2021). So, there were four research questions:

1. Among those who did not express hesitancy toward the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$1: There is no association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A1: There is an association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in

Nevada.

2. Among those who did not express hesitancy towards the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and change in the social environment explain the intent of sustaining the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$2: There is no association between emotional transformation, practice for change, and change in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A2: There is an association between emotional transformation, practice for change, and change in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who did not express vaccine hesitancy from Hispanic and Latinx communities in Nevada.

3. Among those who expressed hesitancy towards the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

$H_0$3: There is no association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while

controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A3: There is an association between participatory dialogue, behavioral confidence, and changes in the physical environment with the intention of initiating COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

4. Among those who expressed hesitancy towards the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and change in the social environment explain the intent of sustaining the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?

H_04: There is no association between emotional transformation, practice for change, and change in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

H_A4: There is an association between emotional transformation, practice for change, and change in the social environment with the intention of sustaining COVID-19 vaccination while controlling for age, race, gender, education level, religion, income, and employment status among those who expressed vaccine hesitancy from Hispanic and Latinx communities in Nevada.

Study design

This study used a quantitative cross-sectional and survey-based research study design. Although a cross-sectional study design did not determine if an association equals causation or the directionality of outcome, this particular study design was chosen due to the need for relatively quick results among the rapid changes in program planning, its significantly low cost, and the ability to easily evaluate this particular population in a short amount of time (Wang & Cheng, 2020). The independent variables for this particular study were the constructs of the MTM from the initiation component, which included participatory dialogue, behavioral confidence, and changes in the physical environment, and the constructs of the MTM from the sustenance component, which included emotional transformation, practice for change, and changes in the social environment. The dependent variables for this study were (1) the intent of initiating and (2) completing the COVID-19 vaccination series, which were used to explain both the initiation and sustenance of the behavior change based on the MTM. Among participants, we analyzed COVID-19 vaccine intent among two groups: those who expressed hesitancy toward the COVID-19 vaccine and those who did not express hesitancy toward the COVID-19 vaccine. Covariates of this study controlled for possible effects found on COVID-19 vaccination uptake status included age, race, gender, education level, religion, income, and employment status.

Population and sampling

The population being sampled were Hispanic and Latinx individuals residing in Nevada from the years 2021 to 2022. In order to determine the required sample size for the multiple regression, an a priori sample size was calculated using the G*Power, Version 3.1.9.6

for Mac (Faul et al., 2009; Faul et al., 2020). The parameters set for this calculator for regression were an alpha level at 0.05, power at 0.80, an estimated effect size of 0.15 (medium), and three predictors (for the three constructs in each of the initiation and sustenance components of the MTM). This yielded a required sample size of 77. To account for any covariates that may be found as significant, the sample size was inflated by approximately 20%, which is around 92 for each of the hesitant and non-hesitant groups. Thus, the total sample size proposed was at least 184, which was also considered sufficient for confirmatory factor analysis (Hutcheson & Sofroniou, 1999). Given that about 30% of this subgroup was hesitant (Khubchandani & Macias, 2021), we had planned to administer the survey to at least 550 possible participants. The inclusion criteria for participation in the study were those who identified as: (1) of Hispanic or Latinx descent; (2) aged 18 years or older; (3) currently residing in Nevada; and (4) provided informed consent to participate because the study was exempt. Participants who did not meet the above inclusion criteria and were mandated to receive the COVID-19 vaccine for employment or school requirements, were excluded from the study. Because of the narrow population of participants and the large ideal proposed sample size, all vaccination statuses were invited to participate, whether or not they started or completed the full vaccination series and/or received their booster doses.

Instrumentation

The survey instrument consisted of 50 total items and was developed based on the MTM theoretical framework to assess vaccine acceptance behavior. One item assessed the current state of vaccine hesitancy (i.e., Do you currently have any hesitancy in taking the COVID-19 vaccine?), and two items assessed if the person has already completed at least one

dose or the full series of the COVID-19 vaccine dosage. Fourteen items assessed socioeconomic characteristics (i.e., age, zip code of residence, gender, ethnicity and Hispanic/Latinx subgroup, education level, etc.), two of which the questions were optional at the end of the survey as they asked about political affiliation and citizenship status. Religion is an important aspect of the lives of the Hispanic/Latinx population; therefore, it was important that the item addressing religion item included the most common religious affiliations among this population (Taylor et al., 2012). Similarly, when addressing the Hispanic/Latinx subgroup, it was important for the item to include most, if not all, of the Hispanic and Latinx origins as each group differs in many ways (Motel & Patten, 2012; Noe-Bustamante, 2019). One question assessed if the person was mandated to take the COVID-19 vaccine and two additional questions assessed a person's trust in a medical professional for COVID-19 vaccine information and encouragement. Thirty items assessed the constructs of MTM, of which 15 items assessed the initiation construct and 15 items assessed the sustenance construct.

Initiation model

The advantages and disadvantages of participatory dialogue were assessed in three separate survey sections. To assess the advantages, statements asked were based on thoughts of the COVID-19 vaccine, including "I believe that taking the COVID-19 vaccine will protect me against coronavirus infection." Conversely, disadvantages asked about thoughts on statements such as "I believe that taking the COVID-19 vaccine may not be safe." Each item was measured on a scale from never = 0 to always = 4, and was added together for a total possible score of 0 to 12 for the advantages and 0 to 12 for the disadvantages. The disadvantages score was then subtracted from the advantages score to give us a participatory

dialogue score that ranged between -12 to +12.

Behavioral confidence was assessed in three survey items and asked questions such as "Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?" Each item was measured on a scale from not at all = 0 to completely sure = 4, and was added together for a total possible score of 0 to 12 for behavioral confidence.

Changes in the physical environment was assessed in five survey items. Questions focused on the access to and cost of the COVID-19 vaccine, scheduling an appointment and transportation to receive a COVID-19 vaccine, and educational resources about the COVID-19 vaccine, such as "How aware are you of the accessibility of the COVID-19 vaccine at your pharmacy, physician's office, or community clinics?" Each item was measured on a scale from not at all = 0 to completely sure = 4, and was added together for a total possible score of 0 to 20 for changes in the physical environment.

The construct of initiation intention was assessed in one survey item. This question asked, "How likely are you to take at least one dose of the COVID-19 vaccine?" The survey item was measured on a scale from not at all likely = 0 to completely likely = 4, and was added together for a total possible score of 0 to 4.

Sustenance model

The emotional transformation construct was assessed in six survey items. Questions focused on directing emotions and feelings of confidence to taking the second dose and booster dose by overcoming challenges and concerns, and motivating oneself to take the second dose and booster dose. An example question included "How confident are you in overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in order to get your 2nd dose (Pfizer or Moderna) after you completed your 1st dose?" Each

item was measured on a scale from not at all = 0 to completely sure = 4, and was added together for a total possible score of 0 to 24 for emotional transformation.

Practice for change was assessed in five survey items. Questions focused on the ability to access online immunization records, keeping the CDC COVID-19 vaccination card, setting a calendar reminder to monitor when a second dose or booster dose is needed, setting an appointment to receive the next dose of the vaccine, and overcoming work and/or childcare barriers to receive the vaccine. An example question included "How sure are you that you can keep your CDC COVID-19 vaccination card to monitor when a 2nd dose and/or booster is needed?" Each item was measured on a scale from not at all = 0 to completely sure = 4, and was added together for a total possible score of 0 to 20 for practice for change.

Changes in the social environment was assessed in three survey items. Questions focused on a family member, medical professional, or other trusted individual to help ensure follow-up with the second dose or a booster dose, such as "How sure are you that you can get the help, if needed, of a family member to encourage or remind you to get the 2nd dose and/or booster when needed?" Each item was measured on a scale from not at all = 0 to completely sure = 4, and was added together for a total possible score of 0 to 12 for changes in the social environment.

The construct of sustenance intention was assessed in one survey item. This question asked, "How likely are you to take the second dose and/or a booster dose of the vaccine?" The survey item was measured on a scale from not at all likely = 0 to completely likely = 4, and was added together for a total possible score of 0 to 4.

Survey translation

The survey was written in English and translated into Spanish to ensure there was

access to the predominant languages of the Hispanic and Latinx populations. The survey was then retranslated back to English to ensure proper translation of survey content.

Face and content validity

The instrument was validated by six experts in public health and the Hispanic and Latinx populations to ensure content validity. The experts included professors with doctorate degrees in public health and/or the MTM theoretical framework, community partners that focused on and worked with the Hispanic and Latinx populations, and individuals who were knowledgeable about the COVID-19 vaccination based on their involvement with vaccine distribution. The experts were asked about their thoughts on the face validity, content validity, and readability of the instrument. The survey had undergone two rounds of review with these experts before being sent to four community members of the Hispanic/Latinx populations to read through the instrument for ease and clarity. After the validation by experts, the instrument had a Flesch Reading Ease score of 52.3 and a Flesch-Kincaid Grade Level of 9.9 overall. A Flesch Reading Ease score of 52.3 indicates that the survey is fairly difficult to read, and a Flesch-Kincaid Grade Level of 9.9 indicates a reading grade level of almost 10th grade. Although the Flesch Reading Ease score and Flesch-Kincaid Grade Level are fairly high, the instrument was thoroughly reviewed by experts and community members to ensure that face and content validity were being measured appropriately. Further, the instrument was translated into Spanish.

Construct validity

Confirmatory factor analysis was used to assess the construct validity, by using maximum likelihood estimation method for all MTM subscales being studied, including advantages, disadvantages, behavioral confidence, changes in the physical environment, emotional transformation, practice for change, and changes in the social environment. This was

determined if each construct yielded a single-factor solution and their factor loading values greater than 0.384, and an Eigenvalue that was greater than or equal to 1 (Stevens, 1996).

Reliability

Cronbach's alphas were used to determine the internal consistency reliability for each MTM construct. These values were compared to a value of 0.70 or higher to be considered acceptable (Sharma & Petosa, 2014; UCLA, n.d.).

Data collection

The survey instrument was administered via two routes: Qualtrics, a web-based survey tool, and on paper for those without access to the internet. For the completed paper surveys, the researcher inputted all answers reported on paper directly onto the Qualtrics survey. Data from all surveys were automatically collected via Qualtrics. Participants were recruited through community contacts that had an established connection with the Hispanic and Latinx populations, to ensure participants had trust and confidence in the individuals recruiting for and/or administering the survey. The electronic surveys were sent out via email upon verbal consent or at community events that were targeted at the Hispanic or Latinx populations. The researcher sent the recruitment emails (Appendix D and Appendix E) and recruitment flyers (Appendix F and Appendix G), provided in both English and Spanish, to established contacts with various Hispanic/Latinx-focused organizations to forward to potential participants. Participation was voluntary; therefore, those who saw the email were able to choose to participate or deny it. The recruitment flyer was also attached to the recruitment email to also be forwarded for additional participation through word-of-mouth. Participants were recruited via email through community contacts and at in-person events with Immunize Nevada. At in-person

events with Immunize Nevada, such as pop-up vaccination clinics, education sessions, and outreach events throughout Nevada, the recruitment flyer was displayed for participation, and paper surveys were available. The researcher and/or other volunteers asked if the person would like to participate in the survey. If the person agreed, the survey was given either in paper form or via the QR code on the recruitment flyer to complete online. Upon completion of the paper survey, the survey was put into a folder and returned to the researcher. The researcher then entered all responses into Qualtrics for further analysis.

The survey was available for participation via this form of marketing for five weeks. To prevent participants from participating twice or filling out both an online and paper survey, participants were asked if they had completed this survey and were accepted based on an honor system.

After the first five weeks of data collection, in addition to the recruitment described above, the researcher employed Qualtrics Sample Services to perform the data collection to reach the ideal sample size. The Qualtrics Sample Services delivery team managed the data collection process and invited respondents that met the geographic and demographic restrictions to complete the online survey. They also monitored data collection for the quality of completed responses for the ideal sample size and sent updates to the researcher for data quality review. The Qualtrics Samples Services collected data for six weeks until the ideal sample size was met. A total of 11 weeks was needed to collect the ideal sample size of at least 184 participants for further analysis. After all data was collected, the final sample was further analyzed to exclude participants based on the inclusion and exclusion criteria and/or with incomplete responses.

Ethical approval

This study was submitted for approval to the University of Nevada, Las Vegas Institutional Review Board (IRB). The study was first approved as exempt on May 3, 2022 (UNLV-2022-192; See Appendix I for the letter). It was then approved for its first modification to the protocol, informed consent form, and recruitment materials on June 17, 2022 (Appendix J). The final modification was approved on July 20, 2022, for an addition to the recruitment and data collection strategy (Appendix K). Participants were required to provide consent to participation in the survey by clicking on the next button in the electronic version and by continuing the survey in the paper version. Participants were allowed to choose to withdraw from the survey at any time. For Spanish-speaking participants, the consent form and survey were presented "in [a] language understandable to the subject" (Office of Research Integrity, 2020). All procedures to conduct the research involving human subjects followed the IRB ethical standards.

Data analysis

The survey data from Qualtrics were downloaded as a Microsoft Excel file with the full results. The full data was then exported from Qualtrics as an SPSS file and further analyzed in SPSS (Version 27.0, IBM, Armonk, NY, USA).

Descriptive statistical analysis was conducted for all study variables. Counts and frequencies were reported for all demographic characteristics and categorical study variables. Continuous study variables reported means and standard deviations. The demographic characteristics of race, gender, education level, religion, income, and employment status served as covariates in the multivariate data analysis plan.

A zero-order correlation matrix was conducted among the construct variables to identify if there were any significant, simple bivariate relationships between the theoretical constructs and both the initiation and sustenance for the hesitant and non-hesitant groups.

Hierarchical multiple regression was used to "control" for certain variables among different groups, to see if adding variables improved the model's capacity to predict the likelihood of getting the COVID-19 vaccine and/or second dose/booster dose (IBM, n.d.); this was used to study the hesitant and non-hesitant groups and their relationship with the two outcome variables of initiation and sustenance, which formed four models. The significance level was set at 0.05 for all data analyses, and 95% confidence intervals were reported as applicable.

Summary

The goal of chapter three was to provide the research methodology that was used to address the four research questions about COVID-19 vaccine acceptance behavior among the Hispanic and Latinx populations. Using the MTM as the theoretical framework of the survey instrument being used, this cross-sectional study design addressed if participatory dialogue, behavioral confidence, and changes in the physical environment explained the initiation of receiving the COVID-19 vaccine and if emotional transformation, practice for change, and change in the social environment explained the sustenance of receiving a second dose and/or booster dose of the COVID-19 vaccine. Because this study surveyed the Hispanic and Latinx populations, it was also important to have face and content validity to ensure that the survey was culturally appropriate. Additionally, it was important to include trusted individuals among Hispanics and Latinxs in Nevada in the recruitment process to continue that trust and encourage participation among this particular population. All study participants that contributed to this

research allowed researchers to better understand what concerns the Hispanic and Latinx populations have on the COVID-19 vaccine and provided insight on implementation strategies that may be effective in addressing these concerns. Chapter four will provide the study results of the research methodology that was mentioned in chapter three.

Chapter 4: Analysis

Introduction

The purpose of chapter four is to summarize the analyzed quantitative data from survey results within SPSS Version 27.0. The analyzed data was used to answer the research question, test the hypotheses, and infer results. There were four research questions to be addressed that assessed how MTM constructs explained and predicted the initiation and sustenance of COVID-19 vaccination acceptance among vaccine-hesitant and non-vaccine hesitant groups. Descriptive statistics, zero-order correlation, and hierarchical multiple regression were used to answer these research questions, and confirmatory factor analysis was conducted to assess construct validity in the study. Chapter four will cover the results and analysis of the study, focusing on the results of the data collection, descriptive statistics of the demographic variables, descriptive statistics of the construct variables, the zero-order correlation matrix of the construct variables, hierarchical multiple regression among the construct variables and covariates, confirmatory factor analysis for construct validity, inferential results, and testing of assumptions for the hierarchical multiple regression.

Data collection

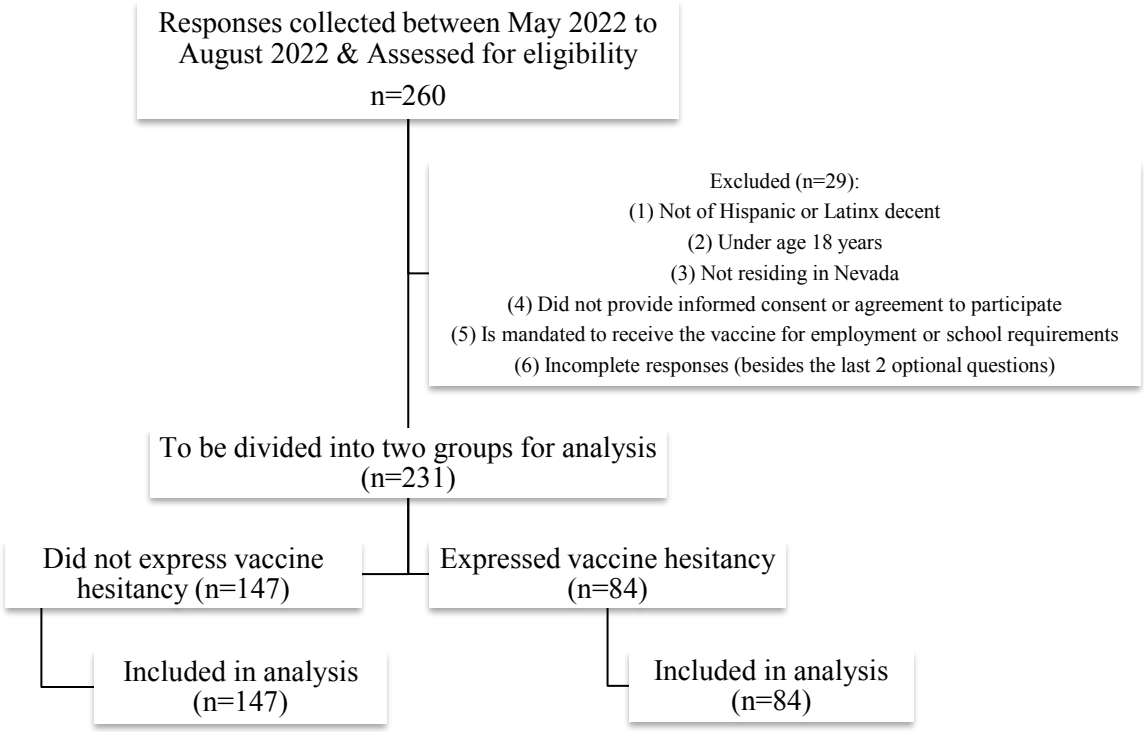
The survey instrument was first administered via Qualtrics and completed paper surveys between May 2022 and June 2022, with original exclusion criteria of those who were mandated to receive the vaccine and had not completed the vaccination series. Over the original five weeks of data collection, only 40 responses were collected. Thirty-six surveys were completed via Qualtrics and four surveys were completed in person at Immunize Nevada events. However, the 40 responses did not reach an ideal sample size of 184. Because of this, modifications to IRB

were submitted to update the exclusion criteria to only exclude those who are mandated to receive the vaccine and to employ Qualtrics sample services to perform the data collection to reach an ideal sample size of 184, in addition to the already collected 40 responses.

Upon additional modification approval from the IRB, Qualtrics was employed between July 2022 and August 2022 for data collection. A two-week proposed data collection period had extended to a nearly six-week data collection period due to challenges expressed in reaching the very narrow target population. The COVID-19 vaccine mandate screener was a question that could not be screened for by Qualtrics, which dramatically lowered response rates.

At the end of August 2022, 260 total responses had been collected. Of the 260 responses, 29 were excluded. Incomplete responses, except for the two optional demographic questions about political affiliation and citizenship status, were not included in the final analysis because construct validity and reliability testing were conducted for future use of the survey. Two hundred thirty-one complete responses were analyzed further, in which they were divided into two groups for analysis: those who did not express vaccine hesitancy and those who did express vaccine hesitancy. Of the 231 participants included in the analysis, 147 participants did not express hesitancy toward the COVID-19 vaccine and 84 participants did express hesitancy. Figure 5 displays the flow diagram of data collected and analyzed.

Figure 5: Participant flow diagram for cross-sectional study



Descriptive statistics of demographic variables

The final sample size included 231 participants. Results from the descriptive statistical analysis are displayed in Table 1. The mean age of participants was 37.83 ± 14.14 years. The majority of participants had identified as female (n=160, 69.3%). Because all participants identified as being of Hispanic or Latinx descent, the Hispanic/Latinx identity that was most associated with participants was Mexican (n=146, 63.2%). All other Hispanic or Latino, the majority identifying as Spanish (n=19, 8.2%), was the second highest Hispanic/Latinx identity. The highest level of education achieved by most participants was some college (n=94, 40.7%) and high school (n=75, 32.5%). Of all religions presented, approximately a third of participants identified as believing in Catholicism (n=79, 34.2%); unaffiliated with any religion (n=69, 29.9%) had the second highest participants. More than half of participants were employed (n=138, 59.7%), where the highest reported individual incomes were $25,000 to $49,999 (n=85,

36.8%) and $50,000 to $74,999 (n=53, 22.9%). The mean average number of people living in one household was 3.22 ± 1.57 people. In addition, the majority of participants reported their marital status as single (n=84, 36.4%) or married (n=74, 32.0%). Most participants reported possessing health insurance (n=182, 78.8%). Of the participants who had responded to the optional questions, participants reported their political affiliation as either Republican (n=46, 19.9%), Democratic (n=82, 35.5%), Independent (n=59, 25.5%), other (n=17, 7.4%), or preferred not to answer (n=21, 9.1%). The second optional question asked about current citizenship status, in which the vast majority of respondents reported being a citizen of the United States (n=206, 89.2%).

Most importantly for further data analysis, 36.4% of participants expressed hesitancy to take the COVID-19 vaccine (n=84) and 63.6% of participants did not express hesitancy to take the COVID-19 vaccine (n=147). A little over half of the participants had received at least one dose of the COVID-19 vaccine (n=136, 58.9%), where it slightly decreased in the number of participants who had completed the series of COVID-19 vaccine (n=127, 55.0%) meaning they received at least two doses of the Pfizer or Moderna vaccine or one dose of the Janssen vaccine. While 69.7% of participants reported having a trusted medical provider to provide COVID-19 vaccine information (n=161), more than half of participants reported not having been encouraged by their medical provider to take the COVID-19 vaccine (n=133, 57.6%).

Table 1: Descriptive characteristics of the study sample (n=231)

Characteristic	M (SD)	*n* (%)
Age (in years)	37.83 (14.141)	
Gender		
Male		69 (29.9)
Female		160 (69.3)
Other		0 (0.0)
Hispanic/Latinx Identity		
Argentinian		5 (2.2)
Bolivian		0 (0.0)
Chilean		2 (0.9)
Colombian		4 (1.7)
Costa Rican		2 (0.9)
Cuban		7 (3.0)
Dominican		2 (0.9)
Ecuadorian		1 (0.4)
Guatemalan		4 (1.7)
Honduran		4 (1.7)
Mexican		146 (63.2)
Nicaraguan		2 (0.9)
Panamanian		1 (0.4)
Paraguayan		0 (0.0)
Peruvian		1 (0.4)
Puerto Rican		18 (7.8)
Salvadoran		4 (1.7)
Uruguayan		0 (0.0)
Venezuelan		0 (0.0)
Other Central American		0 (0.0)
Other South American		3 (1.3)
All other Hispanic or Latino		19 (8.2)
Prefer not to answer		4 (1.7)
Highest level of education		
Less than high school		5 (2.2)
High school		75 (32.5)
Some college		94 (40.7)
Bachelor's degree or higher		53 (22.9)
Religion		
Buddhism		2 (0.9)
Catholicism		79 (34.2)
Judaism		4 (1.7)
Mormonism		3 (1.3)
Orthodox Christian		7 (3.0)
Other Christianity		39 (16.9)
Protestant		8 (3.5)
Unaffiliated with any religion		69 (29.9)
Other		17 (7.4)
Annual individual income		
$0 to $9,999		15 (6.5)
$10,000 to $24,999		33 (14.3)
$25,000 to $49,999		85 (36.8)
$50,000 to $74,999		53 (22.9)
$75,000 to $99,999		28 (12.1)
$100,000 to $149,999		14 (6.1)
Over $150,000		1 (0.4)
Current employment status		
Employed		138 (59.7)
Self-employed		26 (11.3)
Laid-off/Furloughed		0 (0.0)
Retired		12 (5.2)
Homemaker		20 (8.7)
Unreported employment		2 (0.9)
Unemployed		27 (11.7)
Other		4 (1.7)

Number of people living in household	3.22 (1.567)	
Marital status		
Single		84 (36.4)
Married		74 (32.0)
Divorced		31 (13.4)
Widowed		1 (0.4)
Separate		5 (2.2)
Never married		6 (2.6)
In a civil union or registered domestic partnership		11 (4.8)
A member of an unmarried couple		17 (7.4)
Possesses health insurance		
Yes		182 (78.8)
No		47 (20.3)
Political affiliation (optional to answer)		
Republican		46 (19.9)
Democratic		82 (35.5)
Independent		59 (25.5)
Other		17 (7.4)
Prefer not to answer		21 (9.1)
Current citizenship status (optional to answer)		
Is a citizen of the United States		206 (89.2)
Not a citizen of the United States		12 (5.2)
Prefer not to answer		6 (2.6)
Expresses Hesitancy to taking COVID-19 Vaccine		
Yes		84 (36.4)
No		147 (63.6)
Received at least 1 dose of the COVID-19 Vaccine		
Yes		136 (58.9)
No		95 (41.1)
Completed series of COVID-19 vaccine		
Yes		127 (55.0)
No		104 (45.0)
Has a trusted medical provider to provide COVID-19 vaccine information		
Yes		161 (69.7)
No		68 (29.4)
Has been encouraged by a medical provider to take COVID-19 vaccine		
Yes		96 (41.6)
No		133 (57.6)

Descriptive statistics of construct variables

Table 2 displays the descriptive statistics of the MTM constructs as the independent variables and the dependent variables of initiation and sustenance, and its significance was assessed among the participants who expressed hesitancy and did not express hesitancy toward taking the COVID-19 vaccine. The scale for each question was recoded to range between 0 to 4, where the total of each construct was determined by summing together all questions assessing that particular construct, and determining the possible range. The possible range was also further identified and explained in the questionnaire (Appendix B & Appendix C). The observed range

was determined based on the actual sum of all questions assessing each construct based on participants' responses.

All participants' scales for each question assessing each construct were added, and a mean score was determined. Mean scores are reported in Table 2. When comparing mean scores of all variables between the vaccine-hesitant and non-vaccine hesitant groups, mean values for all constructs measured significantly higher among the non-hesitant group for each variable, except for the participatory dialogue: disadvantages. Only with the participatory dialogue: disadvantages construct variable did results indicate a mean score higher among vaccine-hesitant individuals compared to non-vaccine individuals, indicating vaccine-hesitant individuals agree with more of the disadvantages of the COVID-19 vaccine over the advantages.

Cronbach's alpha was reported for all independent variables, or the MTM constructs, among all participants to determine internal consistency reliability for each MTM construct. These values are reported in Table 2. Cronbach's alpha values that were 0.70 or higher were considered acceptable (Sharma & Petosa, 2014; UCLA, n.d.). All Cronbach's alpha values for each MTM construct variable were above 0.70, where values ranged from the lowest value of 0.773 for behavioral confidence to the highest value of 0.992 for emotional transformation. Because all Cronbach's alpha values were above 0.70, these values were deemed acceptable. Behavioral confidence had the lowest Cronbach's alpha value of 0.773, which is still deemed acceptable, but a lower value compared to the other MTM constructs.

Table 2: Descriptive characteristics of study variables (n=231)

Variable	Vaccine-Hesitant Individuals (*n*=84)			Vaccine Non-Hesitant Individuals (*n*=147)			All Participants (n=231)	
	Possible Range	Observed Range	Mean (SD)	Possible Range	Observed Range	Mean (SD)	Cronbach's Alpha	*p*-value
Initiation	0 – 4	0 – 4	0.843 (1.1841)	0 – 4	0 – 4	3.056 (1.378)		<0.001
Participatory Dialogue: Advantages	0 – 12	0 – 9	3.083 (2.617)	0 – 12	0 – 12	7.545 (3.440)	0.960	<0.001
Participatory Dialogue: Disadvantages	0 – 12	2 – 12	9.155 (2.659)	0 – 12	0 – 12	5.124 (2.850)	0.841	0.002
Participatory Dialogue: Advantages – Disadvantages	-12 – +12	-12 – +7	-6.071 (4.834)	-12 – +12	-12 – +12	2.421 (4.785)		<0.001
Behavioral Confidence	0 – 12	0 – 9	4.361 (1.664)	0 – 12	0 – 12	8.570 (3.351)	0.773	<0.001
Changes in the physical environment	0 – 20	0 – 20	12.928 (5.055)	0 – 20	0 – 20	14.278 (5.117)	0.870	<0.001
Sustenance	0 – 4	0 – 4	0.634 (0.988)	0 – 4	0 – 4	2.722 (1.465)		<0.001
Emotional transformation	0 – 24	0 – 23	7.277 (5.315)	0 – 24	0 – 24	16.133 (7.0653)	0.992	<0.001
Practice for change	0 – 20	0 – 20	7.634 (6.093)	0 – 20	0 – 20	13.090 (5.390)	0.901	<0.001
Changes in the social environment	0 – 12	0 – 12	5.061 (3.923)	0 – 12	0 – 12	8.069 (3.363)	0.907	<0.001

Estimates attained for significance testing are based on Independent t-tests.

Zero-order correlation matrix of construct variables

The results of the zero-order correlation matrix to describe the bivariate associations between the MTM construct variables among vaccine-hesitant and non-vaccine hesitant individuals are described in Table 3 for initiation and in Table 4 for sustenance. Based on Table 3 results, initiation was only statistically related to participatory dialogue: advantages−disadvantages ($r = 0.691$, $p < 0.001$) and behavioral confidence ($r = 0.636$, $p < 0.001$) for vaccine-hesitant individuals. The magnitude of associations between initiation, and participatory dialogue, and behavioral confidence constructs were nearly similar. Among non-vaccine hesitant individuals, initiation was statistically related to participatory dialogue: advantages−disadvantages ($r = 0.606$, $p < 0.001$), behavioral confidence ($r = 0.762$, $p < 0.001$), and changes in the physical environment ($r = 0.587$, $p < 0.001$). Initiation and behavioral confidence had the highest magnitude of association compared to the other MTM relationships among non-vaccine hesitant individuals.

Based on Table 4 results, sustenance was statistically related to emotional transformation ($r = 0.530$, $p < 0.001$), practice for change ($r = 0.382$, $p < 0.001$), and changes in the social environment ($r = 0.248$, $p = 0.025$) for vaccine-hesitant individuals. Similarly, among non-vaccine hesitant individuals, sustenance was statistically related to emotional transformation ($r = 0.816$, $p < 0.001$), practice for change ($r = 0.632$, $p < 0.001$), and changes in the social environment ($r = 0.658$, $p < 0.001$). Among both, vaccine-hesitant and non-vaccine hesitant individuals, sustenance and emotional transformation had the highest magnitude of association compared to the other MTM relationships.

Table 3: Zero-order correlation matrix of study variables for the initiation of COVID-19 vaccination behavior

Vaccine-Hesitant Individuals (*n*=84)				
Construct	**Initiation**	**Participatory dialogue**	**Behavioral confidence**	**Changes in the physical environment**
1. Initiation	–	0.691** (p<0.001)	0.636** (p<0.001)	-0.165 (p = 0.136)
2. Participatory dialogue: advantages – disadvantages		–	0.411** (p<0.001)	-0.320** (p = 0.003)
3. Behavioral confidence			–	0.202 (p = 0.067)
4. Changes in the physical environment				–
Vaccine Non-Hesitant Individuals (*n*=147)				
Construct	**Initiation**	**Participatory dialogue**	**Behavioral confidence**	**Changes in the physical environment**
1. Initiation	–	0.606** (p<0.001)	0.762** (p<0.001)	0.587** (p<0.001)
2. Participatory dialogue advantages – disadvantages		–	0.568** (p<0.001)	0.361** (p<0.001)
3. Behavioral confidence			–	0.696** (p<0.001)
4. Changes in the physical environment				–

**Correlation is significant at the 0.01 level (2-tailed)

Table 4: Zero-order correlation matrix of study variables for the sustenance of COVID-19 vaccination behavior

Vaccine-Hesitant Individuals (*n*=84)				
Construct	**Sustenance**	**Emotional Transformation**	**Practice for Change**	**Changes in the Social Environment**
1. Sustenance	–	0.530** (p<0.001)	0.382** (p<0.001)	0.248* (p = 0.025)
2. Emotional transformation		–	0.541** (p<0.001)	0.327** (p = 0.003)
3. Practice for change			–	0.687** (p<0.001)
4. Changes in the social environment				–
Vaccine Non- Hesitant Individuals (*n*=147)				
Construct	**Sustenance**	**Emotional Transformation**	**Practice for Change**	**Changes in the Social Environment**
1. Sustenance	–	0.816** (p<0.001)	0.632** (p<0.001)	0.658** (p<0.001)
2. Emotional transformation		–	0.789** (p<0.001)	0.807** (p<0.001)
3. Practice for change			–	0.859** (p<0.001)
4. Changes in the social environment				–

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Hierarchical multiple regression among construct variables and covariates

Hierarchical multiple regression was conducted to further understand the MTM's ability to predict the likelihood of getting the COVID-19 vaccine and/or second dose/booster doses among the hesitant and non-hesitant groups. The results of the multiple regression modeling among both groups are displayed in Table 5 for the initiation of the COVID-19 vaccine and Table 6 for the sustenance of the COVID-19 vaccine.

Individual characteristics of age, race, gender, education level, religion, income, and employment status were also included as covariates in the models due to their historical identification of having an effect on COVID-19 vaccination uptake.

Among vaccine-hesitant individuals, a hierarchical multiple regression model including all covariates, participatory dialogue, and behavioral confidence explained 63.0% of the variability in initiation of COVID-19 vaccine acceptance behavior (adjusted $R^2 = 0.630$, $F_{(9,73)} = 16.520$, $p < 0.001$) (Table 5). After controlling for covariates, participatory dialogue ($b = 0.113$, $p < 0.001$) and behavioral confidence ($b = 0.358$, $p < 0.001$) displayed statistically significant associations with the initiation of COVID-19 vaccine acceptance. Additionally, one individual characteristic of income, specifically an income range of $25,000 to $49,999, displayed statistically significant results as a predictor of initiation. This income range is associated with a 0.486 increase in initiation score ($b = 0.486$, $p = 0.007$) among vaccine-hesitant individuals when compared to other income ranges lower than $25,000 and higher than $49,999.

Similar to vaccine-hesitant individuals, among non-vaccine hesitant individuals, a hierarchical multiple regression model including all covariates, participatory dialogue, and behavioral confidence explained 63.2% of the variability in the initiation of COVID-19 vaccine acceptance behavior (adjusted $R^2 = 0.632$, $F_{(9,132)} = 27.959$, $p < 0.001$) (Table 5). After

controlling for covariates, similar to the model of vaccine-hesitant individuals, participatory dialogue ($b = 0.072$, $p < 0.001$) and behavioral confidence ($b = 0.206$, $p < 0.001$) displayed statistically significant associations with the initiation of COVID-19 vaccine acceptance. Another individual characteristic of age displayed statistically significant results as a predictor of initiation, whereas age was associated with a 0.017 increase in initiation score ($b = 0.017$, $p = 0.003$) among non-vaccine hesitant individuals.

In the examination of the sustenance component, a hierarchical multiple regression model including all covariates and emotional transformation explained 37.4% of the variability in sustenance of COVID-19 vaccine acceptance behavior (adjusted $R^2 = 0.374$, $F_{(8,73)} = 7.045$, $p < 0.001$) (Table 6). After controlling for covariates, emotional transformation ($b = 0.087$, $p < 0.001$) displayed a statistically significant association with the sustenance of COVID-19 vaccine acceptance. Only the individual characteristic of age among the vaccine-hesitant individuals displayed statistically significant results as a predictor of sustenance, whereas age was associated with a 0.019 decrease in sustenance score ($b = -0.019$, $p = 0.004$).

Similar to vaccine-hesitant individuals, among non-vaccine hesitant individuals, a hierarchical multiple regression model including all covariates and emotional transformation explained 66.4% of the variability in the sustenance of COVID-19 vaccine acceptance behavior (adjusted $R^2 = 0.664$, $F_{(8,133)} = 35.801$, $p < 0.001$) (Table 6). After controlling for covariates, emotional transformation ($b = 0.177$, $p < 0.001$) displayed a statistically significant association with the sustenance of COVID-19 vaccine acceptance. No other individual characteristic showed significant associations for sustenance among non-vaccine hesitant individuals.

Table 5: Multiple regression models for the initiation of COVID-19 vaccination among hesitant and non-hesitant participants

Hesitant Participants	***b***	**S.E.**	**β**	***p***	**LBCI**	**UBCI**
Age	0.003	0.006	0.035	0.623	-0.009	0.015
Mexican (reference: non-Mexican)	-0.040	0.164	-0.017	0.807	-0.367	0.287
Female (reference: male)	0.129	0.184	0.051	0.485	-0.238	0.496
Some College (reference: high school education or less, or bachelor's degree and higher)	-0.042	0.172	-0.018	0.809	-0.385	0.302
Catholicism (reference: non-Catholicism)	-0.004	0.192	-0.001	0.985	-0.387	0.379
$25,000 to $49,999 (reference: lower and higher income than $25,000 to $49,999)	0.486	0.175	0.193	0.007	0.136	0.835
Employed (reference: other employment or non-employed)	0.099	0.165	0.042	0.550	-0.230	0.428
Participatory dialogue advantages – disadvantages	0.113	0.021	0.461	<0.001	0.071	0.155
Behavioral confidence	0.358	0.059	0.503	<0.001	0.241	0.475
Changes in the physical environment	-0.032	0.019	-0.135	0.099	-0.069	0.006
Model statistics including predictors of covariates, participatory dialogue, and behavioral confidence: $R^2 = 0.671$, adjusted $R^2 = 0.630$, $F_{(9,73)} = 16.520$, $p < 0.001$						
Non-Hesitant Participants	***b***	**S.E.**	**B**	***p***	**LBCI**	**UBCI**
Age	0.017	0.006	0.172	0.003	0.006	0.028
Mexican (reference: non-Mexican)	-0.003	0.159	-0.001	0.983	-0.318	0.311
Female (reference: male)	0.093	0.159	0.031	0.557	-0.220	0.407
Some College (reference: high school education or less, or bachelor's degree and higher)	-0.017	0.159	-0.006	0.915	-0.330	0.297
Catholicism (reference: non-Catholicism)	-0.057	0.152	-0.020	0.707	-0.357	0.243
$25,000 to $49,999 (reference: lower and higher income than $25,000 to $49,999)	0.124	0.149	0.044	0.408	-0.171	0.419
Employed (reference: other employment or non-employed)	0.175	0.156	0.062	0.263	-0.133	0.483
Participatory dialogue advantages – disadvantages	0.072	0.018	0.249	<0.001	0.035	0.108
Behavioral confidence	0.206	0.034	0.502	<0.001	0.139	0.274
Changes in the physical environment	0.031	0.019	0.116	0.109	-0.007	0.069
Model statistics including predictors of covariates, participatory dialogue, and behavioral confidence: $R^2 = 0.656$, adjusted $R^2 = 0.632$, $F_{(9,132)} = 27.959$, $p <0.001$						

S.E. = standard error of the estimate; LBCI = lower bound of the 95% confidence interval; UBCI = upper bound of the 95% confidence interval.

Table 6: Multiple regression models for the sustenance of COVID-19 vaccination among hesitant and non-hesitant participants

Hesitant Participants	***b***	**S.E.**	**β**	***p***	**LBCI**	**UBCI**
Age	-0.019	0.006	-0.275	0.004	-0.032	-0.006
Mexican (reference: non-Mexican)	0.129	0.185	0.066	0.487	-0.239	0.497
Female (reference: male)	-0.212	0.209	-0.100	0.314	-0.628	0.205
Some College (reference: high school education or less, or bachelor's degree and higher)	-0.269	0.181	-0.137	0.140	-0.630	0.091
Catholicism (reference: non-Catholicism)	0.097	0.211	0.045	0.646	-0.323	0.518
$25,000 to $49,999 (reference: lower and higher income than $25,000 to $49,999)	-0.115	0.194	-0.055	0.554	-0.501	0.271
Employed (reference: other employment or non-employed)	0.079	0.189	0.040	0.679	-0.299	0.456
Emotional transformation	0.087	0.020	0.470	<0.001	0.046	0.127
Practice for change	0.018	0.023	0.114	0.416	-0.027	0.063
Changes in the social environment	-0.004	0.032	-0.017	0.890	-0.067	0.058
Model statistics including predictors of covariates and emotional transformation: $R^2 = 0.436$, adjusted $R^2 = 0.374$, $F_{(8,73)} = 7.045$, $p < 0.001$						
Non-Hesitant Participants	***b***	**S.E.**	**β**	***P***	**LBCI**	**UBCI**
Age	0.006	0.006	0.061	0.294	-0.006	0.018
Mexican (reference: non-Mexican)	-0.157	0.164	-0.048	0.341	-0.481	0.167
Female (reference: male)	-0.111	0.162	-0.035	0.492	-0.432	0.209
Some College (reference: high school education or less, or bachelor's degree and higher)	0.089	0.167	0.030	0.594	-0.241	0.419
Catholicism (reference: non-Catholicism)	0.146	0.157	0.048	0.356	-0.166	0.457
$25,000 to $49,999 (reference: lower and higher income than $25,000 to $49,999)	0.212	0.153	0.071	0.166	-0.090	0.515
Employed (reference: other employment or non-employed)	0.129	0.160	0.043	0.421	-0.187	0.446
Emotional transformation	0.177	0.019	0.850	<0.001	0.139	0.215
Practice for change	-0.015	0.028	-0.054	0.606	-0.070	0.041
Changes in the social environment	0.000	0.048	-0.001	0.994	-0.096	0.095
Model statistics including predictors of covariates and emotional transformation: $R^2 = 0.683$, adjusted $R^2 = 0.664$, $F_{(8,133)} = 35.801$, $p = <0.001$						

S.E. = standard error of the estimate; LBCI = lower bound of the 95% confidence interval; UBCI = upper bound of the 95% confidence interval.

Confirmatory factor analysis for construct validity

Confirmatory factor analysis was used to assess the construct validity, by using maximum likelihood estimation of all MTM subscales being studied, including advantages, disadvantages, behavioral confidence, changes in the physical environment, emotional transformation, practice for change, and changes in the social environment. Confirmatory factor analysis revealed that each MTM subscale generated a single-factor solution, with most factor loadings greater than 0.326 and an Eigenvalue greater than or equal to 1 (Stevens, 1996). Eigenvalues and factor loading values are reported below in Table 7. All but one item met the critical value of 0.326 for factor loadings (Stevens, 1996). Of those that met the critical value, the minimum factor loading was 0.615 and the maximum factor loading was 0.999 (Table 7). The majority of factor loadings were over double the critical value, indicating that these were high factor loadings. The item that did not meet the critical value was the question "Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?" under the behavioral confidence construct, with a factor loading of 0.308.

Table 7 also shows the total variance of each subscale. Advantages, disadvantages, behavioral confidence, changes in the physical environment, emotional transformation, practice for change, and changes in the social environment explained 88.97%, 64.05%, 64.44%, 58.11%, 66.25%, 65.72%, 77.09% of the total variance, respectively (Table 7). The total variance shows the cumulative variability that is explained by the items in each subscale for each factor (IBM, 2021).

Table 7: Construct validity of construct variables using confirmatory factor analysis

Construct	Item	Corresponding Factor Loadings	Eigenvalue	Overall Variance Explained by the Factor
Advantages			**2.669**	**88.97%**
	I believe that taking the COVID-19 vaccine will protect me against coronavirus infection.	**0.976**		
	I believe that taking the COVID-19 vaccine will protect my family from getting coronavirus infection.	**0.952**		
	I believe that taking the COVID-19 vaccine will allow me to resume my daily activities.	**0.900**		
Disadvantages			**1.922**	**64.05%**
	I believe that taking the COVID-19 vaccine may not be safe.	**0.773**		
	I believe that not enough long-term studies have been done on the COVID-19 vaccine.	**0.821**		
	I believe that the COVID-19 vaccine may not be as effective in protecting against mutations or new variants (changes in the virus or how the virus changes).	**0.807**		
Behavioral Confidence			**1.933**	**64.44%**
	Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?	**0.308**		
	Are you confident in getting at least one dose of the COVID-19 vaccine despite worries of possible side effects?	**0.999**		
	Are you confident in getting at least one dose of the COVID-19 vaccine despite the lack of long-term studies?	**0.916**		
Changes in the Physical Environment			**2.905**	**58.11%**
	How aware are you of the accessibility of the COVID-19 vaccine at your pharmacy, physician's office, or community clinics?	**0.808**		
	How aware are you that the COVID-19 vaccines are free to get?	**0.828**		
	How sure are you that you have transportation to get the COVID-19 vaccine?	**0.651**		
	How sure are you that you have access to educational resources to answer questions about the COVID-19 vaccine?	**0.790**		
	How sure are you that you can get a COVID-19 vaccine without scheduling an appointment?	**0.719**		
Emotional Transformation			**3.975**	**66.25%**
	How confident are you in overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in order to get your 2nd dose (Pfizer or Moderna) after you completed your 1st dose?	**0.653**		
	How sure is your confidence overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in getting a booster dose of the COVID-19 vaccine?	**0.680**		
	How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting your 2nd dose (Pfizer or Moderna) after you get your 1st dose?	**0.912**		
	How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting a booster dose of the COVID-19 vaccine?	**0.862**		
	How sure are you that you can motivate yourself to get fully vaccinated (either receiving 2 doses of the Pfizer or Moderna vaccine, or 1dose of the J&J vaccine)?	**0.868**		
	How sure are you that you can motivate yourself to getting a booster dose of the vaccine?	**0.870**		

Practice for Change			**3.286**	**65.72%**
	How sure are you that you can keep your CDC COVID-19 vaccination card to monitor when a 2nd dose and/or booster is needed?	**0.773**		
	How sure are you that you can access your Nevada WebIZ public online vaccine record to monitor when a 2nd dose and/or booster is needed?	**0.615**		
	How sure are you that you can set a calendar reminder to monitor when a 2nd dose and/or booster is needed?	**0.878**		
	How sure are you that you can set an appointment or know when the next date of a vaccine clinic will be to get a 2nd dose and/or booster dose?	**0.912**		
	How sure are you that you can overcome work and/or childcare barriers to get a 2nd dose and/or booster dose?	**0.842**		
Changes in the Social Environment			**2.313**	**77.09%**
	How sure are you that you can get the help, if needed, of a family member to encourage or remind you to get the 2nd dose and/or booster when needed?	**0.873**		
	How sure are you that you can get the help, if needed, of a trusted individual to encourage or remind you to get a 2nd dose and/or booster when needed?	**0.952**		
	How sure are you that you can get the help of a medical professional to encourage or remind you to get a 2nd dose and/or booster when needed?	**0.803**		

Extraction Method: Maximum Likelihood

Inferential results

This study proposed four research questions that assessed COVID-19 vaccine intent for initiation and sustenance among two groups of participants: those who expressed hesitancy toward the COVID-19 vaccine and those who did not express hesitancy toward the COVID-19 vaccine. The covariates of age, race, gender, education level, religion, income, and employment status were controlled for in this analysis.

The first research question asked, "Among those who did not express hesitancy toward the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?" Based on the results in Table 5, among those who did not express hesitancy toward the COVID-19 vaccine, two of the three MTM constructs were significantly associated with vaccine initiation. These two constructs were participatory dialogue and behavioral confidence and accounted for 63.2% of the variance. Of the two constructs, behavioral confidence had the highest β value of 0.502, highlighting the importance of this construct. Additionally, among non-vaccine hesitant participants, age showed a significant association in predicting the initiation of COVID-19 vaccine acceptance. Based on these results, we reject part of the null hypothesis since two of the three MTM constructs significantly predicted the intent of initiating COVID-19 vaccine acceptance among non-vaccine hesitant individuals.

The second research question asked, "Among those who did not express hesitancy toward the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and changes in the social environment explain the intent of sustaining the COVID-19 vaccine among

Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?" Based on the results in Table 6, among those who did not express hesitancy towards the COVID-19 vaccine, only one of the three MTM constructs was significantly associated with vaccine sustenance, specifically emotional transformation. This accounted for 66.4% of the variance. The covariates and emotional transformation construct were the only items included in the model associated with the COVID-19 vaccine sustenance. Based on these results, we reject part of the null hypothesis since at least one of the three MTM constructs significantly predicted the intent of sustaining COVID-19 vaccine acceptance among non-vaccine hesitant individuals.

The third research question asked, "Among those who expressed hesitancy toward the COVID-19 vaccine, to what extent did participatory dialogue, behavioral confidence, and changes in the physical environment explain the intent of initiating the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?" Based on the results in Table 5, similar to their counterpart group, among those who expressed hesitancy towards the COVID-19 vaccine, two of the three MTM constructs, specifically participatory dialogue and behavioral confidence, were significantly associated with vaccine initiation. This accounted for 63.0% of the variance. Behavioral confidence had the highest β value of 0.503, highlighting the importance of this construct. Additionally, among vaccine-hesitant participants, an income of $25,000 to $49,999 showed a significant association in predicting the initiation of COVID-19 vaccine acceptance. Based on these results, we reject part of the null hypothesis since two of the three MTM constructs significantly predicted the intent of initiating COVID-19 vaccine acceptance among vaccine-hesitant individuals.

The last research question asked, "Among those who expressed hesitancy towards the COVID-19 vaccine, to what extent did emotional transformation, practice for change, and changes in the social environment explain the intent of sustaining the COVID-19 vaccine among Hispanic and Latinx participants residing in Nevada while controlling for age, race, gender, education level, religion, income, and employment status?" Based on results in Table 6, similar to their counterpart group, among those who expressed hesitancy towards the COVID-19 vaccine, only the MTM construct of emotional transformation was significantly associated with vaccine sustenance and accounted for 37.4% of the variance. Age was also identified as a significant predictor of sustenance among vaccine-hesitant individuals. Based on these results, we reject part of the null hypothesis since at least one of the three MTM constructs significantly predicted the intent of sustaining COVID-19 vaccine acceptance among vaccine-hesitant individuals.

Based on the results in Tables 3 and 4 to summarize the zero-order correlation matrix, bivariate relationships were identified between the theoretical constructs and both the initiation and sustenance for the hesitant and non-hesitant groups. Among vaccine-hesitant individuals, participatory dialogue and behavioral confidence showed a positive bivariate relationship with the initiation of COVID-19 vaccine acceptance, whereas all three MTM constructs of participatory dialogue, behavioral confidence, and changes in the physical environment displayed a positive association with the initiation of COVID-19 vaccine acceptance among non-vaccine hesitant individuals. When analyzing the bivariate relationships among the MTM constructs and sustenance, the three MTM constructs of emotional transformation, practice for change, and changes in the social environment exhibited a positive association with the sustenance of COVID-19 vaccine acceptance among both vaccine-hesitant and non-vaccine-

hesitant individuals.

Testing of assumptions of statistical tests

All eight assumptions of the hierarchical regression models were assessed and met, as displayed below:

Assumption # 1: The dependent variables of this study, which were the intent of (1) initiating and (2) completing the COVID-19 vaccination series and/or receiving booster doses, were measured on a continuous scale, as displayed on SPSS.

Assumption # 2: There were two or more independent variables (participatory dialogue, behavioral confidence, and changes in the physical environment, emotional transformation, practice for change, and change in the social environment, and all demographic variables) that were measured as either continuous or nominal.

Assumption # 3: There was the independence of residual or errors assessed by a Durbin–Watson statistic, in which the Durbin-Watson statistic was above 2 for both initiation and sustenance among vaccine-hesitant individuals and the Durbin-Watson statistic was below 2 for both initiation and sustenance among non-vaccine hesitant individuals.

Assumption # 4: There was a linear relationship displayed between all the predictor independent variables and dependent variables as displayed by the normal P-P plot of regression.

Assumption # 5: Homoscedasticity of residuals was observed by visually assessing scatterplots between the residual values and predicted values.

Assumption # 6: No multicollinearity between the independent and dependent variables were assessed, as displayed by the zero-order correlation values being well below 0.8 and the variance inflation factor values for all constructs were well below 4.

Assumption # 7: There were no significant outliers identified. Some variables had data

points above three standard deviations; however, examining boxplots did not indicate any large outliers from the data.

Assumption # 8: Q-Q plots indicated residuals were normally distributed.

Summary

Chapter four further described the results of the descriptive statistics, zero-order correlation matrix, hierarchical multiple regression, and confirmatory factor analysis. In summary, two of the three MTM initiation constructs, specifically participatory dialogue and behavioral confidence, were shown to be significant in explaining the intent of initiating the COVID-19 vaccine for both vaccine-hesitant and non-vaccine-hesitant individuals. Additionally, only one of the three MTM sustenance constructs, specifically emotional transformation, was shown to be significant in explaining the intent of sustaining the COVID-19 vaccine for both vaccine-hesitant and non-vaccine-hesitant individuals. Chapter five will further discuss the key findings of the study, as well as discuss strengths, limitations, and future recommendations for research and practice based on those findings.

Chapter 5: Discussion

Introduction

The purpose of this quantitative study was to use a theory-based approach of the MTM of health behavior change to explain the intention of initiating and sustaining COVID-19 vaccination acceptance behavior among the Hispanic and Latinx populations that expressed and did not express hesitancy towards the vaccine in Nevada. Chapter five will further elaborate on the major findings of this study discussed in chapter four as it relates to the literature discussed in chapter two. This chapter will also discuss the strengths and limitations of the study, and the reproducibility and validity of study. Based on the major findings, recommendations for research, implications for practice, and a final summary will conclude this chapter.

Summary of purpose and findings

Our results demonstrated that two of the three constructs of the MTM's initiation model were predictive of the intent to initiate COVID-19 vaccine acceptance behavior among Hispanic and Latinx individuals who both expressed and did not express vaccine hesitancy. The two MTM constructs that were significantly associated with the intent to initiate COVID-19 vaccine acceptance were participatory dialogue and behavioral confidence and accounted for 63.2% of the variance among those who did not express vaccine hesitancy and 63.0% of the variance among those who did express vaccine hesitancy. Of the two initiation MTM constructs, behavioral confidence had the highest β value of 0.502 and 0.503 among non-vaccine hesitant and vaccine-hesitant individuals, respectively, highlighting the importance of this construct.

Our results also demonstrated that one of the three constructs of the MTM's sustenance model was predictive of the intent to sustain COVID-19 vaccine acceptance behavior among

Hispanic and Latinx individuals who both expressed and did not express vaccine hesitancy. The emotional transformation was the only MTM construct that was significantly associated with the intent to sustain COVID-19 vaccine acceptance, and 63.2% of the variance among those who did not express vaccine hesitancy and 63.0% of the variance among those who did express vaccine hesitancy. The β values of emotional transformation were 0.470 and 0.850 among vaccine-hesitant and non-vaccine hesitant participants, respectively.

Interpretation of findings

Descriptive statistics

Of the 231 respondents, 36.4% (n=84) individuals expressed hesitancy to take the COVID-19 vaccine. This finding was similar to that of various studies that found approximately a third of the Hispanic population is very hesitant to get vaccinated. The literature review by Khubchandani and Macias (2021) found that 30.2% of Hispanics reported being hesitant or unwilling to get the COVID-19 vaccine when it became available, and Kearney et al. (2021) reported that a total of 26% of Hispanic adults would either probably or definitely not get the COVID-19 vaccine. In order to safely reach herd immunity against COVID-19 and significantly lower the spread of the disease throughout the population, the WHO (2020) indicates that a large percentage of the population must be vaccinated against COVID-19. Although this percentage of the population to be vaccinated against COVID-19 to reach herd immunity is unknown, polio and measles herd immunity rates are indicated to reach a threshold of 80% and 95%, respectively (WHO, 2020). A response rate of 36.4% of our sample population expressing vaccine hesitancy indicates that a little more than one-third of the Hispanic and Latinx populations may need more encouragement to get the COVID-19 vaccine to ensure we are able to reach a herd immunity threshold that will slow the spread of disease and put an end to the pandemic.

Initiation of COVID-19 vaccine acceptance behavior

When focusing on the constructs that predict the initiation of COVID-19 vaccine acceptance behavior, our study results provided further support that two of the three MTM initiation constructs, specifically participatory dialogue, and behavioral confidence, were shown to be significant in explaining the intent of initiating the COVID-19 vaccine for both vaccine-hesitant and non-vaccine hesitant individuals. Based on the results from the zero-order correlation matrix, this further supported the results of the hierarchical regression model that showed behavioral confidence and participatory dialogue are significant predictors of the initiation of COVID-19 vaccine acceptance behavior. Behavioral confidence and participatory dialogue had the highest magnitude of association with initiation as compared to the construct of changes in the physical environment in the zero-order correlation matrix, which was not found to be significant in predicting the initiation of the behavior.

The construct of participatory dialogue focused on the advantages and disadvantages of the COVID-19 vaccine acceptance behavior change and how dialoguing with a health educator can help to facilitate this change. This construct was found to be statistically significant in predicting the initiation of the COVID-19 vaccine among both the vaccine-hesitant and non-vaccine hesitant individuals. In our survey, questions about the advantages of the COVID-19 vaccine assessed the benefits of the behavior change, such as the personal and family protection against COVID-19 and the ability to resume daily activities, whereas disadvantages assessed perceived detriments of the vaccine, such as thoughts of the vaccine not being safe, lacking long-term studies, and ineffectiveness of the vaccine. As presented by the results in Table 2, the mean score for participatory dialogue among vaccine-hesitant individuals was -6.071 ± 4.834, indicating that the mean responses were predominantly “never” or “hardly ever” believing in the

advantages and “always” or “almost always” believing in the disadvantages of the COVID-19 vaccine. On the contrary, the mean score for participatory dialogue among non-vaccine hesitant individuals was +2.421 ± 4.785 indicating that these participants believed more in the advantages of the COVID-19 vaccine and less in the disadvantages. These lower mean scores are also supported by previous survey results presented by Wan (2020) in that only 34% of Latinx participants trusted the COVID-19 vaccine’s safety and nearly 40% trusted the COVID-19 vaccine’s effectiveness. With the introduction of a novel vaccine, these mean scores show that are still some hesitancies about the advantages among both vaccine-hesitant and non-vaccine-hesitant individuals; however, these mean scores highlight that there are more hesitancies among the vaccine-hesitant individuals and further highlight a need to focus on the advantages of the COVID-19 vaccine when addressing this particular construct.

The construct of behavioral confidence focused on the confidence or belief that the behavior of initiating COVID-19 vaccine acceptance is achievable with vaccine availability, understanding of side effects, and belief in the studies being conducted on the vaccine. Among both the vaccine-hesitant and non-vaccine hesitant groups, behavioral confidence was highlighted as an important construct in predicting the initiation of COVID-19 vaccine acceptance. Our study results showed that the intent to initiate the COVID-19 vaccine increased by 0.503 and 0.502 on a 0 to 4 scale for every one-unit increase in behavioral confidence, among vaccine-hesitant and non-vaccine hesitant individuals, respectively. This is further supported in that trust within the Hispanic and Latinx communities is important to address when encouraging vaccine acceptance behaviors. According to Reverby (2021), there is a lack of confidence and trust in the vaccine availability, side effects, and studies done on the COVID-19 vaccine because there are myths and misconceptions that the vaccine is used to harm or track people which can

cause more fear than confidence. This construct is particularly important to focus on when creating implementation strategies and messaging to build the behavioral confidence of Hispanics and Latinxs. Ensuring Hispanic and Latinx populations receive more proper education and information from credible sources to build confidence in receiving the vaccine will help to increase vaccination uptake.

Since the confirmatory factor analysis score for one behavioral confidence questions did not meet the critical value, more questions may be needed for the behavioral confidence variable to have an acceptable level for vaccine-hesitant individuals. This further supports the need to address fears that the Hispanic and Latinx populations may have about the COVID-19 vaccine. Hamel et al. (2021) described how misinformation, myths, citizenship status, language barriers, and a lack of understanding of technology that are used to schedule vaccine clinics may affect behavioral confidence and/or emotional transformation to getting vaccinated. Future studies could include more questions in the survey instrument that address government trust or mistrust, concerns or fears of citizenship status, and social media messaging that influence or affect behavioral confidence.

Sustenance of COVID-19 vaccine acceptance behavior

Only one of the three MTM sustenance constructs, specifically emotional transformation, was shown to be significant in explaining the intent of sustaining the COVID-19 vaccine for both vaccine-hesitant and non-vaccine-hesitant individuals. This was further supported by results of the zero-order correlation matrix that showed emotional transformation had the highest association in predicting the sustenance of COVID-19 vaccine acceptance compared to the other MTM constructs. This was also evident in that the hierarchical regression model displayed emotional transformation as the statistically significant construct in explaining the intent of

sustaining the COVID-19 vaccine among both vaccine-hesitant and non-vaccine hesitant individuals.

The construct of emotional transformation focused on the way a person can transform or convert their emotions towards completing the COVID-19 vaccination series and getting booster doses as recommended, which may include being able to overcome the challenges of scheduling, transportation, access to the vaccine, side effects, safety, long-term studies, and motivating oneself to get fully vaccinated. Similar to the study by Snyder et al. (2020), the emotional transformation could easily affect the sustenance of receiving COVID-19 vaccines and/or a routine vaccine due to fear or lack of ability to overcome these challenges. Among the Mexican men who were surveyed, a fear of needles or side effects, being lazy and irresponsible, not caring or needing to get vaccinated, and a lack of time or inconvenience to get vaccinated due to conflicting work schedules were described (Snyder et al., 2020). Additionally, Hamel et al. (2021) and Dawson et al. (2021) also highlighted challenges to not receiving a second dose of the COVID-19 vaccine may include similar challenges, as well as the cost of the vaccine and immigration status. This further supports a need to address solutions to overcoming these challenges to getting vaccinated, which may include setting up vaccination clinics at various locations convenient to the individual or advocating for policy changes that will allow for employees to take paid time out of their work schedule to getting vaccinated and recover if side effects do take a toll on their ability to continue working.

Covariates

Similar to various studies, the covariate of age was shown as a significant predictor of COVID-19 vaccine acceptance behavior, particularly for the initiation of the vaccine among non-vaccine hesitant individuals and the sustenance of the vaccine among vaccine-hesitant

individuals. A literature review by Khubchandani and Macias (2021) found that age was a predictor of vaccine hesitancy. Similarly, a flu vaccine study by Malik et al. (2020) found that in comparison to younger adults, older adults had reported higher flu vaccine uptake and higher intent to get vaccinated, which also indicated a similar response to COVID-19 vaccine uptake. This is similar to our study results in that for every one-year increase in age, there is a 0.172 unit increase in one's intent to initiate the vaccine among non-vaccine hesitant individuals and a 0.275 unit decrease in one's intent to get the second dose or booster dose among vaccine-hesitant individuals. This means that the older you are, there is the increase in initiation score among non-vaccine hesitant individuals, and if one were to start the series, younger adults are more likely to not get their second dose or booster dose if they are vaccine-hesitant. This finding is also further supported by results from the December 2020 Kaiser Family Foundation COVID-19 Vaccine Monitor that found older Hispanic adults that were older than 50 years old had more trust in the vaccine and were more likely to take the vaccine, compared to their younger counterparts who reported more vaccine hesitancy and lack of trust in government officials (Kearney et al., 2021). Another explanation as to why vaccine-hesitant, younger adults may not continue with follow-up of the second dose or booster dose may be that younger age groups believe they are healthy and do not need the vaccine. If younger adults were to start the vaccination series, they may feel like they are already protected enough and do not need to follow up for their second dose or booster doses.

Another significant finding was that income was shown as a significant predictor of initiation of the COVID-19 vaccine among vaccine-hesitant participants. Similar to the findings of a study by Malik et al. (2020), unemployed individuals were more likely to be hesitant about the COVID-19 vaccine. Employment status and income are directly related and can further

support our study results that an income range of $25,000 to $49,999 is associated with a 0.486 increase in COVID-19 vaccine initiation score (b = 0.486, p = 0.007) among vaccine-hesitant individuals when compared to other income ranges lower than $25,000 and higher than $49,999. This means that as one gets employed and income increases, there is more of an increase of a vaccine-hesitant individual to initiate the COVID-19 vaccine series. One explanation for this is that working individuals do not want to get sick and be forced to take the day off and lose out on pay. Getting the COVID-19 vaccine, lowers one's chance of getting seriously ill and hospitalized from COVID-19 and allows for one to keep working to make their income.

Overall, the results from this study are similar to that of other descriptive studies that have used the MTM framework to predict a health behavior change. As found in the scoping review conducted by Nerida et al. (2022), descriptive studies found that MTM constructs were predictive of behavior change, but not all constructs were necessarily statistically significant in predicting different behaviors. This is evident in that our study results found two of the three initiation MTM constructs (participatory dialogue and behavioral confidence) to be predictive of the initiation of COVID-19 vaccine acceptance and one of the three sustenance MTM constructs (emotional transformation) to be predictive of the sustenance of COVID-19 vaccine acceptance. This shows that although all MTM constructs were assessed, not all may need to be emphasized during implementation to create effective behavior change. Since the COVID-19 vaccine was available free to all, the construct of changes in the physical environment may not have played a significant role in our study. Perhaps in the future when COVID-19 boosters are not available for free then this construct may play a greater role. Further, for sustenance, the time period was rather limited and the other two constructs of MTM (practice for change and changes in the social environment) may play a greater role if regular boosters are necessary for protection

against COVID-19. Nonetheless, these findings can be used for future research when planning MTM-based implementation strategies to increase COVID-19 vaccine acceptance behavior specifically for Hispanic and Latinx populations.

Strengths of the study

To our knowledge, this is the first study that utilized a theory-based survey instrument to assess COVID-19 vaccine acceptance behavior among the Hispanic and Latinx populations. This study provided evidence that COVID-19 vaccine acceptance can be predicted by utilizing a theory-based research approach for future implementation strategies and messaging that is culturally appropriate. The theory-based survey that was developed also proved to be a robust, valid, and reliable instrument in assessing COVID-19 vaccine acceptance. By utilizing a theory as the framework for our study, we were able to use a structured model that has been extensively studied and proven to be predictive of the health behavior we are trying to change. This study also provided a contribution to the use of the MTM in predicting health behavior change, which can be used for future research on another vaccination uptake with other racial/ethnic groups.

While there are limitations to using a cross-sectional study design, this design was also very beneficial in providing relatively quick results, was particularly low cost, and provided the ability to easily evaluate this particular population in a short amount of time. The survey was intended to be released in January 2022; however, due to unforeseen circumstances, the survey was not released until May 2022. If another study design were chosen for this particular study, a delayed timeline would have not been able to produce results relatively quickly. Additionally, this study design allowed for flexibility in the survey instrument to ensure it reflected the most up-to-date guidelines for receiving the COVID-19 vaccine without having to change all study procedures.

Another strength of this survey was that while the survey was written in English, it was translated into Spanish and retranslated back to English to ensure the translation was an accurate reflection of the same verbiage of questions. By having the survey available in Spanish, we ensured participants had access to the predominant language that may be spoken since there are many people in the Hispanic and Latinx populations for whom English is not their first language. By back-translating the survey, we were able to reconfirm that whether the participant took the survey in English or Spanish, the survey content and verbiage was presented in a similar way.

Methodological limitations and alternatives

This study had some limitations. The study utilized a cross-sectional study which may be more susceptible to biases. As with any self-reported survey study design, one limitation was response bias, particularly recall bias and unacceptability or desirability bias (Wang & Cheng, 2020). With recall bias, participants were aware that we were asking about their beliefs about COVID-19 vaccine acceptance as well as their current vaccination status and vaccine hesitancy status. Because these items are being assessed simultaneously, responses or beliefs from before getting vaccinated may be different from their current status. With unacceptability or desirability bias, participants may have answered questions in a way that they thought would be viewed favorably by others, rather than what they truly believe. No matter one's beliefs about vaccines, it may be possible that responses could be strongly skewed to vaccine-hesitant or non-vaccine hesitant if one was unsure about their feelings towards the COVID-19 vaccine.

Selection bias is another limitation of this study. Recruitment bias may have occurred due to the difficulty of getting participants early in the recruitment stages. When the survey was being offered at Immunize Nevada events or among partners of Immunize Nevada, many people were encouraged to take the survey, but most did not want to participate. This also limited our

participants to those who were non-vaccine hesitant, as they were more willing to share their responses. Upon employing Qualtrics to help with the data collection, we were able to receive more responses from vaccine-hesitant individuals. This particular sample population also proved to be challenging in getting participation. Although the population for the study was open to all Hispanic/Latinx people residing in Nevada and only excluded those who were mandated to receive the vaccine, the inclusion criteria showed to be a very narrow target making it very difficult to gather data. Although we had planned to inflate our sample size to accommodate for potential nonresponse, the recruitment strategies from Qualtrics helped to reach our ideal sample size without overcollection of data and thus providing us with optimum power. Since the survey was administered nearly a year and a half after the introduction of the COVID-19 vaccine, over half of the population had already received at least one dose of the vaccine. This is evident in that among our survey respondents, 58.9% of participants had received at least 1 dose of the COVID-19 vaccine and 55.0% of participants had completed the full series of the COVID-19 vaccine (not including receiving booster doses). Future studies may want to examine the initiation of COVID-19 vaccine acceptance among those who had not started the vaccination series and the sustenance of COVID-19 vaccine acceptance among those who completed the vaccination series but have not yet received their booster doses.

Another limitation was that the survey instrument had a Flesch Reading Ease score of 52.3 and a Flesch-Kincaid Grade Level of 9.9. As previously stated, a Flesch Reading Ease score of 52.3 indicated that the survey is fairly difficult to read, and a Flesch-Kincaid Grade Level of 9.9 indicated a reading grade level of almost tenth grade. This may have also introduced a selection bias because a little less than half of our respondents had a high school education or lower, which has historically been associated with not getting vaccinated. If a person is unable to

read the survey, they may not respond appropriately or may choose not to participate and causing bias in the results. This is a form of selection bias because those who have less than a high school education may not want to participate if they are unable to read and/or comprehend the survey. Initial drafts of the survey were written at a sixth-grade reading level to ensure that participants were able to understand and partake in answering the questions; however, after review and validation by experts, the necessary additions and changes to the survey increased the reading ease score. Future studies should edit the survey to be easier to read and at a reasonable grade reading level to ensure more people are able to understand and take the survey, especially if participants are not native English speakers or have lower education levels.

The sample collected contained responses from predominantly females (69%) and of Mexican identity (63.2%) all of whom resided in Nevada. This limits the generalizability of the study findings to all genders and other Hispanic/Latinx identities outside of Nevada. However, despite the limitations, this study provided a foundation for theory-based research among the Hispanic and Latinx communities to understand what factors would predict COVID-19 vaccine acceptance behaviors and can be tailored in future research and interventions.

Reproducibility and validity of the study:

All steps to reproduce the survey instrument with validity and reliability, and data collection and analysis are thoroughly described in Chapter 3. However, some additional suggestions are suggested for the future reproducibility of the study. Face and content validity of the survey instrument was conducted by validating the survey with experts in public health and the Hispanic and Latinx population, and with community members of the Hispanic and Latinx populations. Construct validity was also conducted through confirmatory factor analysis and reliability was assessed using Cronbach's alpha.

With the face and content validity of the instrument assessed by experts on the topic and population, construct validity and reliability of the survey instrument would determine the reproducibility of the study. Based on the results of the confirmatory factor analysis, all but one survey question was considered valid in assessing the appropriate construct, by generating factor loadings greater than 0.326 and an Eigenvalue greater than or equal to 1. The item that did not meet the critical value was the question "Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?" under the behavioral confidence construct, with a factor loading of 0.308. The factor loading value was very close to 0.326, which suggests that maybe the question was confusing and needs to be rewritten for future studies to fit the construct of behavioral confidence.

Based on the results of Cronbach's alpha values, all Cronbach's alphas for each MTM construct were above the acceptable value of 0.70 or higher. Because these values were well above the acceptable threshold, this further supports the reliability of the instrument that was developed to measure what we intended to measure. Overall, this valid and reliable instrument that was developed can be used in future public health interventions when designing and implementing a theory-based study.

Recommendations for research

Based on the study results, there are several recommendations for future research. One recommendation would be to change the survey instrument would be to edit the survey for a lower readability score and lower grade level score to ensure more people are able to understand and take the survey, especially if participants are not native English speakers. Because the instrument had a Flesch Reading Ease score of 52.3 and a Flesch-Kincaid Grade Level of 9.9 overall, this could have contributed to confusion in the understanding of questions. If these

scores were lower, participants might have answered differently, which could have an effect on which MTM constructs predict COVID-19 vaccine acceptance behavior.

The current survey assesses vaccine acceptance for the COVID-19 vaccine; however, the survey instrument can be further edited to assess the prediction of other routine immunizations, such as influenza; measles, mumps, and rubella (MMR); and human papillomavirus (HPV). Hesitancy and barriers to accessing vaccines across all vaccines have some similarities, including concerns about side effects, trust in the government, follow-up for multiple doses, and knowledge about their importance. Therefore, this survey could still be used to assess the vaccine acceptance behaviors among the Hispanic and Latinx populations, but for other vaccines that may cause some concerns.

A quantitative study design was still an ideal choice to collect timely and relevant data about COVID-19 vaccine acceptance; however, if the COVID-19 vaccine requires a yearly booster, such as the influenza vaccine, more research is needed to see how this would affect vaccine acceptance. Therefore, a qualitative study design utilizing interviews and focus groups may help to gain a deeper understanding of the participatory dialogue and behavioral confidence that would affect the initiation of the vaccine, and the emotional transformation of the sustenance of the vaccine. In addition, employing non-U.S. citizens to help conduct this research may be essential in garnering participation from more non-U.S. citizens. This study did not get a lot of participation from non-U.S. citizens, who have been historically found to be vaccine-hesitant. Therefore, recruiting participation should be done in person and led by groups of people who have historically done boots-on-the-ground work with the Hispanic and Latinx communities to lead these conversations and conduct the research. While this may also introduce some biases that must be addressed, this will enhance the trust within the Hispanic and Latinx populations

and increase participation and feedback.

Another quantitative study design that would help to generalize the study's findings would be to use a larger population sample, such as Hispanics and Latinxs across the United States. Mexicans were shown to be the predominant Hispanic identity of our study participants in Nevada; however, the United States has a diverse number of Hispanics and Latinxs that could help to provide more insight into culturally specific factors that affect vaccine uptake, using the MTM constructs.

Utilizing Qualtrics to recruit participants in the survey was very helpful to meet the ideal sample size, especially because many participants had already received the COVID-19 vaccine. Future studies may want to examine the initiation of COVID-19 vaccine acceptance of those who had not started the vaccination series and the sustenance of COVID-19 vaccine acceptance among those who completed the vaccination series but have not yet received their booster doses. When studying initiation alone, it would be beneficial to limit study participants to those who had not started the vaccination series, even though this may cause difficulty in recruitment and participation, because it would provide more insight as to what has really caused hesitancy to start the vaccination series. Conversely, in a research study of the sustenance of COVID-19 vaccine acceptance and limiting participation to those who had completed the series but not yet taken booster doses, results would provide insight as to why people who have started the vaccination series may be hesitant in receiving additional booster doses, especially if it becomes a yearly need.

To determine the efficacy and effectiveness of MTM on COVID-19 vaccine acceptance behaviors, future studies should first implement interventions in smaller settings such as a medical provider's office that works with the Hispanic and Latinx populations to determine its

efficacy. In this research, a medical provider could educate and encourage COVID-19 vaccine uptake using the MTM constructs while also having the vaccine readily available, should the person want to get it. If this research demonstrates higher vaccine acceptance and uptake, a larger-scale effectiveness study should take place where public health professionals educate and encourage COVID-19 vaccine uptake using the MTM constructs in a church setting or statewide messaging, and determine how the intervention strategy affects overall vaccine uptake.

Implications for practice

Based on study results, it is evident there is a need for theory-based interventions and messaging to address vaccine hesitancy and barriers that affect COVID-19 vaccine acceptance among the Hispanic and Latinx populations. As described by Salmon et al. (2021), trusted voices within their communities provide a heavy influence on decision-making among Hispanic and Latinx communities. Therefore, hosting group interventions that are led by trusted community members and/or leaders in public health, and in trusted locations such as a school or community center will encourage participation in the study. It may also be beneficial to employ non-U.S. citizens to conduct research or lead intervention strategies to gain trust among the non-U.S. citizen communities. Many of the Hispanic and Latinx communities have had negative historical experiences with racism and medical exclusions; therefore, emphasizing the need for a trusted resource to lead the intervention. The intervention would address the MTM constructs of participatory dialogue and behavioral confidence for those who have not yet started the vaccination series, and emotional transformation for those who have received at least one dose of the vaccine and need to complete the series and/or need to receive booster doses.

To influence the MTM construct of participatory dialogue for initiation, a trusted health educator such as a medical professional of Hispanic/Latinx descent may lead an individual and

group discussion to go over the advantages of receiving the COVID-19 vaccine, and address any concerns or beliefs of disadvantages of the COVID-19 vaccine participants may have.

To influence behavioral confidence for initiation, small group discussions may occur to discuss steps to build confidence to perform the behavior of getting vaccinated. This may also help to have people who have been previously vaccinated discuss their personal experiences with receiving the vaccine and answer questions others may have to help to build confidence in their own ability to get the vaccine themselves. This may also include demonstrations of researching credible sources so that participants may be able to find answers to the concerns they have and build confidence in the knowledge they find.

To influence emotional transformation for sustenance, there is a need to address solutions to overcoming the challenges of getting vaccinated, which may include setting up vaccination clinics at intervention locations for easy accessibility or encouraging employers in leadership roles to advocate for policy changes that will allow for employees to take paid time out of their work schedule to getting vaccinated and recover if side effects do take a toll on their ability to continue working. Participants should also be taught how to motivate themselves and redirect their emotions to overcome the challenges of getting the vaccine. This may also be done with one-on-one counseling or group discussions to address specific challenges participants may face when receiving their second dose or booster doses. Conducting group discussions or one-on-one counseling to address these constructs allows for the Hispanic and Latinx participants to have transparent, honest, respectful, and open conversations with community members and healthcare professionals while specifically addressing the MTM constructs that have shown to be effective in creating effective behavior change (Khubchandani & Macias, 2021; Khubchandani et al., 2021; Quinn & Andrasik, 2021).

These interventions should also be available in the Spanish language, whether it be a Spanish speaker or with Spanish-translated resources to ensure that communication is continuous and in the participant's native language. Additionally, using a multimodal approach, such as using technology and social media, would help to continue the discussions started in the intervention to address additional concerns participants may have.

In regard to messaging that specifically addresses vaccine hesitancy and encourages vaccine uptake among the Hispanic and Latinx populations, having messaging written in both English and Spanish will ensure equity to credible resources that all Hispanic and Latinx populations can understand. Messaging should also address the MTM constructs, such as: 1) the advantages of receiving a COVID-19 vaccine for participatory dialogue; 2) messages that build confidence in the COVID-19 vaccine for behavioral confidence (i.e., discussing how side effects are possible when getting the vaccine, but are not nearly as bad compared to actually getting COVID-19 symptoms if diagnosed with the diseases); and 3) boosting confidence and motivating one to overcome challenges to getting vaccinated for emotional transformation (i.e., marketing vaccine availability in pharmacies within grocery stores so that people can get their vaccine while they are doing their grocery shopping and do not have to take extra time out of their day).

Conclusions

The COVID-19 pandemic has had a significantly disproportionate negative impact on the Hispanic and Latinx populations. Vaccine hesitancy and access to vaccines have prevented the rapid uptake of the COVID-19 vaccine. This study aimed to assess the MTM's ability to predict COVID-19 vaccine acceptance behavior among the Hispanic and Latinx populations in Nevada. Results from this study provided evidence that the MTM is a useful tool in predicting COVID-19

vaccine acceptance behavior among Hispanics and Latinxs in Nevada and can be used to influence vaccine uptake behaviors. Interventions and messaging to encourage vaccine uptake are crucial to address COVID-19 vaccine hesitancy to promote its rapid uptake, and the use of MTM can be effective in this development to ensure Hispanics and Latinxs are protected against the spread of COVID-19.

Appendix A: Letter to Experts

Dear Expert,

This letter is also attached. I am validating an instrument on the multi theory model (MTM) for measuring the change in COVID-19 vaccination acceptance behavior in a sample drawn from the Hispanic and Latinx population. I have chosen you as an expert based on your familiarity with MTM, or expertise with instrument development, the Hispanic and Latinx population, or COVID-19 vaccination. I hope you will be able to find time to help me.

The multi-theory model of health behavior change is a fourth-generation model (see attached diagrams) and I have provided definitions of its constructs in this email. Attached please find the draft instrument with all the subscales and with scoring instructions on the last page. Please read the operational definitions and look at the corresponding items on the subscales, and then determine the following:

Face validity: Does each item appear to measure the intended construct as operationally defined?

Content validity: Do the items in each subscale adequately assess the construct within the universe of content as operationally defined?

Readability: Is the meaning of each item clear and language appropriate for the Hispanic and Latinx population? Present Flesch-Kincaid Reading Ease is 63.1 & Flesch-Kincaid Grade level is 7.9 (or below 8th grade)

Kindly respond to all aspects and return the instrument with your valuable comments to me by **August 1, 2021**. **You can kindly provide your input on the instrument using comments and tracking on the attached instrument**. After receiving your inputs and inputs from other experts I will revise the instrument and send it to you again on **August 22, 2021,** for a second review. The comments on the second review would be expected by **August 30, 2021**. If you have any questions I can be reached at 808-387-9077 (phone), or wongt9@unlv.nevada.edu (email).

Operational definitions:

Hispanic or Latino: According to the United States Census Bureau (202), the United States Office of Management and Budget (OMB) defines Hispanic or Latino as "a person of Cuban, Mexican, Puerto Rican, South Central American, or other Spanish culture or origin regardless of race." The standards of the OMB also define that race and Hispanic ethnicity, or origin are two different and distinctive concepts; this is why a person may be of any race, but report themselves as Hispanic or Latino for their ethnicity.

Latinx: Latinx has been commonly understood as the Latino/a (or Hispanic) population (Trujillo-Pagán, 2018). The x is added to show the growth in Latinx movements while addressing the concerns of issues of gender and queerness (Padilla, 2016; Milian, 2017). In this study, it has been operationalized as the terminology used to describe all individuals of the Latin ethnicity, regardless of gender identity; this includes Latino, Latina, and all other sexual and gender minorities (SGM).

Advantages of COVID-19 vaccination: This construct has been taken from the multi-theory model of health behavior change in which it means the benefits of behavior change (Sharma, 2022). In this study, it has been operationalized as personal protection against coronavirus, protection of family against coronavirus, and ability to resume daily activities and measured on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) with the scores summed and a possible range of 0-12 units.

Disadvantages to COVID-19 vaccination: This construct has been taken from the multi-theory model of health behavior change in which it means the detriments of behavior change (Sharma, 2022). In this study, it has been operationalized as idealistic reasoning that the COVID-19 vaccine may not be safe, the lack of long-term studies that have been done on the COVID-19 vaccine, and the ineffectiveness of the vaccine due to mutation of the virus and measured on a scale of never (0), hardly ever (1), sometimes (2), almost always (3), always (4) with the scores summed and a possible range of 0-12 units.

Participatory dialogue: This component of the initiation construct has been taken from the multi-theory model of health behavior and focuses the dialogue that is used to create change when facilitated by a health educator (Sharma, 2015). In this study, it has been operationalized as the advantages and disadvantages of health behavior change and measured by subtracting the disadvantage score from the advantage score to derive a possible score of -12 to +12 units.

Behavioral confidence: This component of the initiation construct has been taken from the multi-theory model of health behavior and focuses on the confidence or belief that the person is capable of initiating and achieving the desired behavior change (Sharma, 2015). In this study, it has been operationalized as confidence to getting the COVID-19 vaccine based on vaccine availability, understanding the side effects, and worries about long term studies available and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0-12 units.

Changes in the physical environment: This component of the initiation construct has been taken from the multi-theory model of health behavior and focuses on the physical surroundings that provide resources for the person to initiate the behavior change (Sharma, 2015). In this study, it has been operationalized as access to and cost of the COVID-19 vaccine and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0-12 units.

Construct of initiation intention: This is one of the two constructs that has been taken from the multi-theory model of health behavior change in which it means the one-time or short-term change that progresses a person from one behavior to another (Sharma, 2015). In this study, it has been operationalized as the likelihood of taking the COVID-19 vaccine and measured on a scale of not at all (0), somewhat likely (1), moderately likely (2), very likely (3), completely likely (4) with the scores deriving a possible range of 0-4 units.

Emotional transformation: This component of the sustenance construct has been taken from the multi-theory model of health behavior and focuses on when a person transforms or converts their

emotions towards the health behavior change they are trying to sustain (Sharma, 2015). In this study, it has been operationalized as directing emotions and feelings to taking the second dose and/or booster dose of the COVID-19 vaccine and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0-12 units.

Practice for change: This component of the sustenance construct has been taken from the multi-theory model of health behavior and focuses on the person's thoughts about the health behavior change that was made, and continuously evaluates and adjusts the strategies, overcoming the barriers, remaining focused on maintaining that behavior change (Sharma, 2015). In this study, it has been operationalized as the ability to access online immunization records and/or keep the CDC COVID-19 vaccination card to monitor when a second dose or booster is needed and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0-12 units.

Changes in the social environment: This component of the sustenance construct has been taken from the multi-theory model of health behavior and focuses on the social support from the environment that creates a positive relationship with sustained behavior change (Sharma, 2015). In this study, it has been operationalized as getting a family member, doctor, or other trusted individual to help ensure one follows up with a second dose or booster dose and measured on a scale of not at all (0), slightly sure (1), moderately sure (2), very sure (3), completely sure (4) with the scores summed and a possible range of 0-12 units.

Construct of intention of sustenance: This is the second of the two constructs that has been taken from the multi-theory model of health behavior change in which it means the long-term change that continues after initiation is enacted (Sharma, 2015). In this study, it has been operationalized as the likelihood of taking the second dose of the vaccine and/or taking a booster dose if it is recommended and becomes available and measured on a scale of not at all (0), somewhat likely (1), moderately likely (2), very likely (3), completely likely (4) with the scores deriving a possible range of 0-4 units.

I am extremely thankful for your time and would like to convey my anticipatory gratitude for your valuable comments on the instrument.

Kindest regards and love to all of you.

Sincerely,

Tara Nerida

enc. This letter, Instrument draft & diagram of the multi-theory model

Appendix B: Measuring COVID-19 Vaccine Acceptance Behavior in Hispanics/Latinxs Instrument – English

UNLV | SCHOOL OF PUBLIC HEALTH

EXEMPT RESEARCH STUDY

INFORMATION SHEET

Department of Social and Behavioral Health

TITLE OF STUDY: COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis

INVESTIGATOR(S) AND CONTACT INFORMATION:

PI: Dr. Manoj Sharma at manoj.sharma@unlv.edu,702-895-2687
Co-PI: Tara Nerida at wongt9@unlv.nevada.edu, 775-624-7113

The purpose of this study is to examine the intention of initiating and sustaining COVID-19 vaccine acceptance among the Hispanic and Latinx population that express and do not express hesitancy towards the vaccine in Nevada.

You are being asked to participate in this study because you meet the following criteria: (1) of Hispanic or Latinx descent; (2) age 18 years or older; and (3) currently residing in the state of Nevada in the United States

If you volunteer and provide consent to participate in this study, you will be asked to complete an online survey.

This study includes only minimal risks. Some questions may make you feel a little uncomfortable. The study will take approximately 10-15 minutes of your time and you will not be compensated for your time.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office of Research Integrity – Human Subjects at 702-895-0020 or via email at IRB@unlv.edu.**

Your participation in this study is completely voluntary and you may withdraw at any time.
If you have any questions, you are encouraged to ask questions about this study at the beginning or any time during the research study.

Do you provide consent to participate in this study?
o Yes
o No

Directions: Please answer the following questions to the best of your ability.

1. Do you currently have any hesitancy in taking the COVID-19 vaccine?
   - Yes
   - No

……

2. Have you received at least one dose of the COVID-19 vaccine?
   - Yes
   - No

……

3. Have you already completed the COVID-19 vaccine series (2 doses for Pfizer or Moderna, or 1 dose for J&J)?
   - Yes
   - No

……

4. How old are you today? _____ (in years)

……

5. Do you currently reside in the state of Nevada?
   - Yes
   - No (End survey)

……

6. What is your gender?
   - Male
   - Female
   - Other _____

……

7. What is your ethnicity?
   - Hispanic or Latinx/Latino/Latina (Jump to Q8)
   - Non-Hispanic or Non-Latinx/Latino/Latina (End of survey)

……

8. With which Hispanic/Latinx identity do you associate yourself? (Skip jump question dependent on Q6. If Q6 is yes, this will not be asked.)
   - Argentinian
   - Bolivian
   - Chilean
   - Colombian
   - Costa Rican
   - Cuban
   - Dominican
   - Ecuadorian

- Guatemalan
- Honduran
- Mexican
- Nicaraguan
- Panamanian
- Paraguayan
- Peruvian
- Puerto Rican
- Salvadoran
- Uruguayan
- Venezuelan
- Other Central American
- Other South American
- All other Hispanic or Latino:_____
- Prefer not to answer

……

9. What is your highest education level achieved?
    - Less than high school
    - High school
    - Some college
    - Bachelor's degree or higher

……

10. What is your religion?
    - Buddhism
    - Catholicism
    - Judaism
    - Mormonism
    - Orthodox Christian
    - Other Christianity
    - Protestant
    - Unaffiliated with any religion
    - Other:_____

……

11. What is your current annual individual income?
    - $0 to $9,999
    - $10,000 to $24,999
    - $25,000 to $49,999
    - $50,000 to $74,999
    - $75,000 to $99,999
    - $100,000 to $149,999
    - Over $150,000

……

12. What is your current employment status?
    - Employed
    - Self-employed
    - Laid-off/Furloughed
    - Retired
    - Homemaker
    - Unreported employment (such as working under the table, off the books, etc.)
    - Unemployed
    - Other:___

……

13. How many people live in your household? _____

……

14. What is your marital status?
    - Single
    - Married
    - Divorced
    - Widowed
    - Separated
    - Never married
    - In a civil union or registered domestic partnership
    - A member of an unmarried couple

……

15. Do you have health insurance?
    - Yes
    - No
    - Not sure

……

16. Are you mandated to take the COVID-19 vaccine?
    - Yes (End of survey)
    - No

……

17. Do you have a medical provider you trust to provide you with information about the COVID-19 vaccine?
    - Yes
    - No

……

18. Have you been encouraged by a medical provider to take the COVID-19 vaccine?
    - Yes
    - No

……

The following questions will ask about beliefs on the COVID-19 vaccine.

……

19. I believe that taking the COVID-19 vaccine will protect me against coronavirus infection.

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

20. I believe that taking the COVID-19 vaccine will protect my family from getting coronavirus infection.

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

21. I believe that taking the COVID-19 vaccine will allow me to resume my daily activities.

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

22. I believe that taking the COVID-19 vaccine may not be safe.

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

23. I believe that not enough long-term studies have been done on the COVID-19 vaccine.

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

24. I believe that the COVID-19 vaccine may not be as effective in protecting against mutations or new variants (changes in the virus or how the virus changes).

0. Never
1. Hardly ever
2. Sometimes
3. Almost always
4. Always

……

25. Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

26. Are you confident in getting at least one dose of the COVID-19 vaccine despite worries of possible side effects?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

27. Are you confident in getting at least one dose of the COVID-19 vaccine despite the lack of long-term studies?

0. Not at all
1. Slightly sure

2. Moderately sure
3. Very sure
4. Completely sure

……

28. How aware are you of the accessibility of the COVID-19 vaccine at your pharmacy, physician's office, or community clinics?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

29. How aware are you that the COVID-19 vaccines are free to get?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

30. How sure are you that you have transportation to get the COVID-19 vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

31. How sure are you that you have access to educational resources to answer questions about the COVID-19 vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

32. How sure are you that you can get a COVID-19 vaccine without scheduling an appointment?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

33. How likely are you to take at least one dose of the COVID-19 vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

34. How confident are you in overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in order to get your 2nd dose (Pfizer or Moderna) after you completed your 1st dose?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

35. How sure is your confidence overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in getting a booster dose of the COVID-19 vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

36. How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting your 2nd dose (Pfizer or Moderna) after you get your 1st dose?

0. Not at all
1. Slightly sure
2. Moderately sure

3. Very sure
4. Completely sure

……

37. How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting a booster dose of the COVID-19 vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

38. How sure are you that you can motivate yourself to get fully vaccinated (either receiving 2 doses of the Pfizer or Moderna vaccine, or 1dose of the J&J vaccine)?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

39. How sure are you that you can motivate yourself to getting a booster dose of the vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

40. How sure are you that you can keep your CDC COVID-19 vaccination card to monitor when a 2nd dose and/or booster is needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

41. How sure are you that you can access your Nevada WebIZ public online vaccine record to monitor when a 2nd dose and/or booster is needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

42. How sure are you that you can set a calendar reminder to monitor when a 2nd dose and/or booster is needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

43. How sure are you that you can set an appointment or know when the next date of a vaccine clinic will be to get a 2nd dose and/or booster dose?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

44. How sure are you that you can overcome work and/or childcare barriers to get a 2nd dose and/or booster dose?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

45. How sure are you that you can get the help, if needed, of a family member to encourage or remind you to get the 2nd dose and/or booster when needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

46. How sure are you that you can get the help, if needed, of a trusted individual to encourage or remind you to get a 2nd dose and/or booster when needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

47. How sure are you that you can get the help of a medical professional to encourage or remind you to get a 2nd dose and/or booster when needed?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

48. How likely are you to take the second dose and/or a booster dose of the vaccine?

0. Not at all
1. Slightly sure
2. Moderately sure
3. Very sure
4. Completely sure

……

49. What is your political affiliation? (Optional to answer)

- Republican
- Democratic
- Independent
- Other
- Prefer not to answer

……

50. What is your current citizenship status? (Optional to answer)

- I am a citizen of the United States
- I am not a citizen of the United States
- Prefer not to answer

……

Thank you for your time!

SCORING GUIDE

Construct of advantages: Rate items 19-21 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of disadvantages: Rate items 22-24 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of participatory dialogue: Subtract disadvantages from advantages score to derive a possible score of -12 to + 12 units.

Construct of behavioral confidence: Rate items 25-27 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of changes in the physical environment: Rate items 28-32 on a scale of 0-4 and then sum to derive a possible score of 0-20 units.

Construct of initiation intention: Rate items 33 on a scale of 0-4 and derive a possible score of 0-4 units.

Construct of emotional transformation: Rate items 34-39 on a scale of 0-4 and then sum to derive a possible score of 0-24 units.

Construct of practice for change: Rate items 40-44 on a scale of 0-4 and then sum to derive a possible score of 0-20 units.

Construct of changes in the social environment: Rate items 45-47 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of sustenance intention: Rate items 48 on a scale of 0-4 and derive a possible score of 0-4 units.

Flesch Reading Ease: 52.3
Flesch-Kincaid Grade Level: 9.9

Appendix C: Measuring COVID-19 Vaccine Acceptance Behavior in Hispanics/Latinxs Instrument – Spanish

UNLV | SCHOOL OF PUBLIC HEALTH

STUDIO DE INVESTIGACIÓN EXTENTO
PÁGINA INFORMATIVA

Departamento de Salud y Comportamiento Social

TÍTULO DEL ESTUDIO: Comportamiento de aceptación de la vacuna COVID-19 entre hispanos/latinos en Nevada: Un análisis basado en la teoría

INVESTIGADOR(ES) E INFORMACIÓN DE CONTACTO:

PI: Dr. Manoj Sharma at manoj.sharma@unlv.edu,702-895-2687
Co-PI: Tara Nerida at wongt9@unlv.nevada.edu, 775-624-7113

El propósito de este estudio es examinar la intención de iniciar y mantener aceptación de vacunas COVID-19 entre la población hispana y latina que expresan y no expresan vacilación hacia la vacuna en Nevada.

Se le pide que participe en este estudio porque cumple con los siguientes criterios: (1) de Ascendencia hispana o latina; (2) edad 18 años o más; y (3) residiendo actualmente en el estado de Nevada en los Estados Unidos.

Si es voluntario y da su consentimiento para participar en este estudio, se le pedirá que complete una encuesta en línea.

Este estudio incluye solo riesgos mínimos. Algunas preguntas pueden hacerlo sentir un poco incómodo. El estudio tomará aproximadamente 10-15 minutos de su tiempo y no lo hará ser compensado por su tiempo.

Para preguntas sobre los derechos de los sujetos de investigación, cualquier queja o comentario con respecto a la forma en que se está llevando a cabo el estudio puede ponerse en contacto con **la Oficina de UNLV - Integridad de Investigación – Sujetos Humanos al 702-895-0020 o a través de correo electrónico a IRB@unlv.edu.**

Su participación en este estudio es completamente voluntaria y puede retirarse en cualquier momento. Si tiene alguna pregunta, se le anima a hacer preguntas sobre este estudio al principio o en cualquier momento durante el estudio de investigación.

¿Da su consentimiento para participar en este estudio?
o Sí
o No

Instrucciones: Por favor, responda a las siguientes preguntas lo mejor que pueda.

1. ¿Tiene alguna duda en tomar la vacuna contra COVID-19?
   - Sí
   - No

……

2. ¿Ha recibido al menos una dosis de la vacuna contra el COVID-19?
   - Sí
   - No

……

3. ¿Ya ha completado la serie de vacunas contra el COVID-19 (2 dosis para Pfizer o Moderna, o una dosis para J&J)?
   - Sí (End survey)
   - No

……

4. ¿Cuál es su edad? _____ (en años)

……

5. En este momento, ¿resides en el estado de Nevada?
   - Sí
   - No (End survey)

……

6. ¿Cuál es su género?
   - Hombre
   - Mujer
   - Otra respuesta _____

……

7.¿A qué grupo étnico pertenece?
   - Hispano o Latinx/Latino/Latina (Jump to Q8)
   - No soy Hispano ni Latinx/Latino/Latina (End of survey)

……

8. ¿Con qué identidad hispana/latinx se asocia usted mismo? (Skip jump question dependent on Q6. If Q6 is yes, this will not be asked.)
   - Argentino
   - Boliviano
   - Chileno
   - Colombiano
   - Costarricense
   - Cubano
   - Dominicano
   - Ecuatoriano

- Guatemalteco
- Hondureño
- Mexicano
- Nicaragüense
- Panameño
- Paraguayo
- Peruano
- Puertorriqueño
- Salvadoreño
- Uruguayo
- Venezolano
- Otros centroamericanos
- Otros países sudamericanos
- Todos los demás hispanos o latinos:_____
- Prefiero no responder

……

9. ¿Cuál es el título o nivel escolar más alto que usted ha completado?
    - Menos que la escuela secundaria
    - La escuela secundaria o preparatoria
    - Estudios universitarios incompletos
    - Título de licenciatura universitaria o superior

……

10. ¿Cuál es su religión?
    - Budismo
    - Católico
    - Judaísmo
    - Mormonismo
    - Cristiano ortodoxo
    - Otro tipo de cristianismo
    - Protestante
    - No está afiliado a ninguna religión
    - Otra respuesta:_____

……

11. ¿Cuál es su ingreso anual individual?
    - $0 to $9,999
    - $10,000 to $24,999
    - $25,000 to $49,999
    - $50,000 to $74,999
    - $75,000 to $99,999
    - $100,000 to $149,999
    - Over $150,000

……

12. ¿Cuál es su situación laboral?
    - Empleado
    - Trabajador autónomo
    - Despedido/Suspendido
    - Jubilado
    - Ama de casa
    - Empleo no reportado (Como trabajar debajo de la mesa, fuera de los libros, etc.)
    - Desempleado
    - Otra respuesta:___

……

13. ¿Cuántas personas viven en su casa? _____

……

14. ¿Cuál es su estado civil?
    - Soltero
    - Casado
    - Divorciado
    - Viudo
    - Separado
    - Nunca casado
    - En una unión civil o sociedad doméstica registrada
    - Un miembro de una pareja soltera

……

15. ¿Tienes seguro médico?
    - Sí
    - No
    - No está seguro

……

16. ¿Tiene el mandato de recibirla vacuna contra el COVID-19?
    - Sí (End of survey)
    - No

……

17. ¿Tiene un proveedor médico en el que confíe para proporcionarle información sobre la vacuna contra el COVID-19?
    - Sí
    - No

……

18. ¿Le ha animado un proveedor médico a tomar la vacuna contra el COVID-19?
    - Sí
    - No

……

Las siguientes preguntas harán acerca de las creencias sobre la vacuna COVID-19.

……

19. Creo que tomando la vacuna contra el COVID-19 me protegerá de contraer una infección por coronavirus.

5. Nunca
6. Casi Nunca
7. A veces
8. Casi siempre
9. Siempre

……

20. Creo que tomar la vacuna contra el covid-19 protegerá a mi familia de contraer una infección por coronavirus.

0. Nunca
1. Casi Nunca
2. A veces
3. Casi siempre
4. Siempre

……

21. Creo que tomar la vacuna contra el COVID-19 me permitiría reanudar mis actividades diarias.

0. Nunca
1. Casi Nunca
2. A veces
3. Casi siempre
4. Siempre

……

22. Creo que tomar la vacuna contra el COVID-19 no es seguro.

0. Nunca
1. Casi Nunca
2. A veces
3. Casi siempre
4. Siempre

……

23. Creo que no se han hecho suficientes estudios a largo plazo sobre la vacuna contra el COVID-19.

0. Nunca
1. Casi Nunca
2. A veces
3. Casi siempre
4. Siempre

……

24. Creo que la vacuna contra el COVID-19 no sea tan efectiva en proteger contra mutaciones o nuevas variantes (cambios en el virus o cómo cambia el virus).

0. Nunca
1. Casi Nunca
2. A veces
3. Casi siempre
4. Siempre

……

25. ¿Cree que la vacuna contra el COVID-19 es accesible para obtener si la desea?

5. Para Nada
6. Ligeramente Seguro
7. Moderadamente seguro
8. Muy seguro
9. Completamente seguro

……

26. ¿Confía en recibir al menos una dosis de la vacuna contra el COVID-19 a pesar de las preocupaciones de posibles efectos secundarios?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

27. ¿Confía en recibir al menos una dosis de la vacuna contra el COVID-19 a pesar de la falta de estudios a largo plazo?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

28. ¿Qué tan consciente es a la accesibilidad de la vacuna contra el COVID-19 en su farmacia, consultorio médico o clínicas comunitarias?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

29. ¿Qué tan consciente es usted de que las vacunas contra el COVID-19 son gratuitas?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

30. ¿Qué tan seguro está que tiene transporte para recibir la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

31. ¿Qué tan seguro está de tener acceso a recursos educativos para responder a preguntas sobre la vacuna COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro

3. Muy seguro
4. Completamente seguro

……

32. ¿Qué tan seguro está de que puede recibir una vacuna contra el COVID-19 sin tener una cita?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

33. ¿Qué probabilidad hay de que tome al menos una dosis de la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

34. ¿Qué grado de confianza tiene en superar desafíos, como la programación, el transporte y el acceso a una clínica de vacunas, para obtener su segunda dosis (Pfizer o Moderna) después de completar su primera dosis?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

35. ¿Qué tan segura está su confianza al superar los desafíos, como la programación, el transporte y el acceso a una clínica de vacunas, para obtener una dosis de refuerzo de la vacuna COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

36. ¿Qué tan segura está su confianza superando las preocupaciones, como los efectos secundarios, la seguridad y los estudios a largo plazo, al recibir su segunda dosis (Pfizer o Moderna) después de recibir su primera dosis?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

37. ¿Qué tan segura está su confianza superando las preocupaciones, como los efectos secundarios, la seguridad y los estudios a largo plazo, al recibir una dosis de refuerzo de la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

38. ¿Qué tan seguro está de que puede motivarse a vacunarse completamente (recibir 2 dosis de la vacuna Pfizer o Moderna, o una dosis de la vacuna J&J)?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

39. ¿Qué tan seguro está de que puede motivarse a recibir una dosis de refuerzo de la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

40. ¿Qué tan seguro está de que puede mantener su tarjeta de vacunación contra el COVID-19 de el CDC para monitorear cuándo se necesita una segunda dosis y / o refuerzo?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

41. ¿Qué tan seguro está accediendo a su registro público de vacunas en línea en Nevada WebIZ para monitorear cuándo se necesita una segunda dosis y / o refuerzo?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

42. ¿Qué tan seguro está de hacer un recordatorio de calendario para monitorear cuándo se necesita una segunda dosis y / o refuerzo de la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

43. ¿Qué tan seguro está de hacer una cita o saber cuándo será la próxima fecha de una clínica de vacunas para recibir una segunda dosis y / o dosis de refuerzo?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

44. ¿Qué tan seguro está de que usted supera las barreras del trabajo y / o el cuidado de los niños para obtener una segunda dosis y / o una dosis de refuerzo?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

45. ¿Qué tan seguro está de que puede obtener la ayuda, si es necesario, de un miembro de la familia para animarle o recordarle que debe recibir la segunda dosis y/o refuerzo cuando sea necesario?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

46. ¿Qué tan seguro está de que puede obtener la ayuda, si es necesario, de una persona de confianza para animarle o recordarle que debe recibir una segunda dosis y/o refuerzo cuando sea necesario?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

47. ¿Qué tan seguro está de que puede obtener la ayuda de un profesional médico para animarle o recordarle que debe recibir una segunda dosis y/o refuerzo cuando sea necesario?

0. Para Nada
1. Ligeramente Seguro
2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

48. ¿Qué probabilidad hay en que tomes la segunda dosis y/o una dosis de refuerzo de la vacuna contra el COVID-19?

0. Para Nada
1. Ligeramente Seguro

2. Moderadamente seguro
3. Muy seguro
4. Completamente seguro

……

49. ¿Cuál es su afiliación política? (Opcional para responder)

- Republicano
- Demócrata
- Independiente
- Otra respuesta
- Prefiere no responder

……

50. ¿Cuál es su estado de ciudadanía en este momento? (Opcional para responder)

- Soy ciudadano de los Estados Unidos
- No soy ciudadano de los Estados Unidos
- Prefiere no responder

……

¡Gracias por tu tiempo!

SCORING GUIDE

Construct of advantages: Rate items 19-21 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of disadvantages: Rate items 22-24 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of participatory dialogue: Subtract disadvantages from advantages score to derive a possible score of -12 to + 12 units.

Construct of behavioral confidence: Rate items 25-27 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of changes in the physical environment: Rate items 28-32 on a scale of 0-4 and then sum to derive a possible score of 0-20 units.

Construct of initiation intention: Rate items 33 on a scale of 0-4 and derive a possible score of 0-4 units.

Construct of emotional transformation: Rate items 34-39 on a scale of 0-4 and then sum to derive a possible score of 0-24 units.

Construct of practice for change: Rate items 40-44 on a scale of 0-4 and then sum to derive a possible score of 0-20 units.

Construct of changes in the social environment: Rate items 45-47 on a scale of 0-4 and then sum to derive a possible score of 0-12 units.

Construct of sustenance intention: Rate items 48 on a scale of 0-4 and derive a possible score of 0-4 units.

Flesch Reading Ease: 52.3
Flesch-Kincaid Grade Level: 9.9

Appendix D: Recruitment Email - English

DATE

Dear NAME:

The COVID-19 pandemic has impacted many lives around the world, leaving negative repercussions including health effects, economic downturns, and social and physical restrictions. The pandemic has also revealed many disproportionate health impacts on vulnerable populations, especially among the Hispanic and Latinx populations. The introduction of the three COVID-19 vaccines in the United States has presented a form of protection for additional negative impacts; however, hesitancy towards the COVID-19 vaccine has delayed its rapid uptake. This research aims to examine the intention of initiating and sustaining COVID-19 vaccine acceptance among the Hispanic and Latinx population that express and do not express hesitancy towards the vaccine in Nevada.

You are being asked to participate in this study because you meet the following criteria: (1) of Hispanic or Latinx descent; (2) age 18 years or older; and (3) currently residing in the state of Nevada in the United States. Participants will be excluded if they are mandated to receive the vaccine for employment or school requirements.

If you volunteer and provide consent to participate in this study, you will be asked to complete an online survey. Your participation in this study is completely voluntary and you may withdraw at any time.

This study includes only minimal risks. Some questions may make you feel a little uncomfortable. No information will be gathered that could personally identify you, and we are not asking you to put your name on the survey. The survey is available in both the English and Spanish language for accessibility and you will not be compensated for your time.

Please click on the link attached to complete the survey:
https://unlv.co1.qualtrics.com/jfe/form/SV_8ldRDdNGkZzLIXk

This survey should not take you more than 10-15 minutes.

Thank you for your time and consideration in participating in this survey. If you have any questions, please do not hesitate to call Tara Nerida at 808-387-9077.

Sincerely,
Dr. Manoj Sharma
Professor & Chair

Department of Social & Behavioral Health
School of Public Health
University of Nevada, Las Vegas
4700 S. Maryland Parkway, Suite #335
Las Vegas, NV 89119-3063
manoj.sharma@unlv.edu
Office: 702-895-2687

Tara Nerida
Ph.D. Graduate Student
Department of Social & Behavioral Health
School of Public Health
University of Nevada, Las Vegas
4505 S Maryland Pkwy
Las Vegas, NV 89154
wongt9@unlv.nevada.edu
808-387-9077

Appendix E: Recruitment Email – Spanish

FECHA

Estimado NOMBRE:

La pandemia de COVID-19 ha impactado muchas vidas en todo el mundo, dejando repercusiones negativas que incluyen efectos en la salud, recesiones económicas y restricciones sociales y físicas. La pandemia también ha revelado muchos impactos desproporcionados en la salud de las poblaciones vulnerables, especialmente entre las poblaciones hispanas y latinas.La introducción de las tres vacunas contra la COVID-19 en los Estados Unidos ha presentado una forma de protección para impactos negativos adicionales; sin embargo, la vacilación hacia la vacuna COVID-19 ha retrasado su rápida adopción. Esta investigación tiene como objetivo examinar la intención de iniciar y mantener la aceptación de la vacuna COVID-19 entre la población hispana y latina que expresa y no expresa dudas hacia la vacuna en Nevada.

Se le pide que participe en este estudio porque cumple con los siguientes criterios: (1) de ascendencia hispana o latina; (2) edad 18 años o más; y (3) residiendo actualmente en el estado de Nevada en los Estados Unidos. Los participantes serán excluidos si se les exigió que recibieran la vacuna por requisitos de empleo o escuela.

Si se ofrece como voluntario y da su consentimiento para participar en este estudio, se le pedirá que complete un encuesta en línea. Su participación en este estudio es completamente voluntaria y puede retirarse en cualquier momento.

Este estudio incluye solo riesgos mínimos. Algunas preguntas pueden hacer que se sienta un poco incómodo. No se usara información que pueda identificarlo personalmente, y no le estamos pidiendo que ponga su nombre en el encuesta. El encuesta está disponible tanto en inglés como en español para accesibilidad y no se le compensará por su tiempo.

Haga clic aqui para completar la encuesta:
https://unlv.co1.qualtrics.com/jfe/form/SV_8ldRDdNGkZzLIXk

Este encuesta no debe tomarle más de 10-15 minutos.

Gracias por su tiempo y consideración al participar en este encuesta. Si tiene alguna pregunta, no dude en llamar a Tara Nerida al 808-387-9077.

Sinceramente,
Dr. Manoj Sharma
Profesor y Catedrático

Departamento de Salud Social y del Comportamiento
Escuela de Salud Pública
Universidad de Nevada, Las Vegas
4700 S. Maryland Parkway, Suite #335
Las Vegas, NV 89119-3063
manoj.sharma@unlv.edu
Office: 702-895-2687

Tara Nerida
Ph.D. Estudiante de Posgrado
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4505 S Maryland Pkwy
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808-387-9077

Appendix F: Recruitment Flyer – English

UNLV | SCHOOL OF PUBLIC HEALTH

COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis

Please complete this survey about your intent to initiate and sustain COVID-19 vaccine acceptance. Your responses will be used to consider vaccine implementation programs and messaging that address vaccine hesitancy among Hispanics and Latinxs in Nevada. This online survey should not take more than 10-15 minutes.

Eligibility Criteria:

1. Hispanic or Latinx descent
2. Age 18 years or older
3. Currently residing in the state of Nevada in the United States

Excluded:
Those mandated to receive the vaccine for employment or school requirements.

Questions? Please contact:
Dr. Manoj Sharma at 702-895-2687 or manoj.sharma@unlv.edu
Tara Nerida at 808-387-9077 or wongt9@unlv.Nevada.edu

Survey Link:
https://unlv.co1.qualtrics.com/jfe/form/SV_8ldRDdNGkZzLIXk

Appendix G: Recruitment Flyer – Spanish

UNLV | SCHOOL OF PUBLIC HEALTH

Comportamiento de aceptación de la vacuna COVID-19 entre Hispanos/Latinos en Nevada: Un Análisis Basado en la Teoría

Por favor, complete este encuesta sobre su intención de iniciar y mantener la aceptación de la vacuna contra la COVID-19.Sus respuestas se utilizarán para considerar programas de implementación de la vacuna que abordar la reticencia a las vacunas entre los hispanos y Latinos en Nevada. Está encuesta en línea no debería tomar más de 10-15 minutos.

Criterios de elegibilidad: 1. Ascendencia hispana o latina 2. Edad 18 años o más 3. Actualmente reside en el estado de Nevada en los Estados Unidos.

Excluidos: Personas obligadas a recibir la vacuna por requisitos de empleo o escuela.

¿Preguntas? Póngase en contacto con:
Dr. Manoj Sharma al 702-895-2687 o manoj.sharma@unlv.edu
Tara Nerida al 808-387-9077 o wongt9@unlv.Nevada.edu

Encuesta Aqui:
https://unlv.co1.qualtrics.com/jfe/form/SV_8ldRDdNGkZzLIXk

Appendix H: Description of data elements [Code book]

NOTE: Numbers in parentheses indicate codes

New Variable name: Consent_Recoded
Do you provide consent to participate in this study?
o Yes (1)
o No (2)
……

New Variable name: Hesitancy_Recoded
1. Do you currently have any hesitancy in taking the COVID-19 vaccine?
- Yes (1)
- No (2)

……

New Variable name: OneDose_Recoded
2. Have you received at least one dose of the COVID-19 vaccine?
- Yes (1)
- No (2)

……

New Variable name: CompletedDose_Recoded
3. Have you already completed the COVID-19 vaccine series (2 doses for Pfizer or Moderna, or 1 dose for J&J)?
- Yes (1)
- No (2)

……

Variable name: Age
4. How old are you today? _____ (in years)
……

New Variable name: NVResident_Recoded
5. Do you currently reside in the state of Nevada?
- Yes (1)
- No (2)

……

New Variable name: Gender_Recoded
6. What is your gender?
- Male (1)
- Female (2)
- Other (3)

……

New Variable name: Ethnicity_Recoded
7. What is your ethnicity?
- Hispanic or Latinx/Latino/Latina (1)
- Non-Hispanic or Non-Latinx/Latino/Latina (2)

……

New Variable name: HispanicAssociation_Recoded
8. With which Hispanic/Latinx identity do you associate yourself? (Skip jump question dependent on Q6. If Q6 is yes, this will not be asked.)
- Argentinian **(1)**
- Bolivian **(2)**
- Chilean **(3)**
- Colombian **(4)**
- Costa Rican (5)
- Cuban **(6)**
- Dominican **(7)**
- Ecuadorian **(8)**
- Guatemalan **(9)**
- Honduran **(10)**
- Mexican **(11)**
- Nicaraguan **(12)**
- Panamanian **(13)**
- Paraguayan **(14)**
- Peruvian **(15)**
- Puerto Rican **(16)**
- Salvadoran **(17)**
- Uruguayan **(18)**
- Venezuelan **(19)**
- Other Central American **(20)**
- Other South American **(21)**
- All other Hispanic or Latino **(22)**
- Prefer not to answer **(23)**

……

New Variable name: Education_Recoded
9. What is your highest education level achieved?
- Less than high school **(1)**
- High school **(2)**
- Some college **(3)**
- Bachelor's degree or higher **(4)**

……

New Variable name: Religion_Recoded
10. What is your religion?
- Buddhism **(1)**
- Catholicism **(2)**

- Judaism **(3)**
- Mormonism **(4)**
- Orthodox Christian **(5)**
- Other Christianity **(6)**
- Protestant **(7)**
- Unaffiliated with any religion **(8)**
- Other **(9)**

……

New Variable name: Income_Recoded

11. What is your current annual individual income?
    - $0 to $9,999 **(1)**
    - $10,000 to $24,999 **(2)**
    - $25,000 to $49,999 **(3)**
    - $50,000 to $74,999 **(4)**
    - $75,000 to $99,999 **(5)**
    - $100,000 to $149,999 **(6)**
    - Over $150,000 **(7)**

……

New Variable name: Employment_Recoded

12. What is your current employment status?
    - Employed **(1)**
    - Self-employed **(2)**
    - Laid-off/Furloughed **(3)**
    - Retired **(4)**
    - Homemaker **(5)**
    - Unreported employment (such as working under the table, off the books, etc.) **(6)**
    - Unemployed **(7)**
    - Other **(8)**

……

Variable name: Household

13. How many people live in your household? _____

……

New Variable name: MaritalStatus_Recoded

14. What is your marital status?
    - Single **(1)**
    - Married **(2)**
    - Divorced **(3)**
    - Widowed **(4)**
    - Separated **(5)**
    - Never married **(6)**
    - In a civil union or registered domestic partnership **(7)**
    - A member of an unmarried couple **(8)**

……

New Variable name: HealthInsurance_Recoded
15. Do you have health insurance?
- Yes **(1)**
- No **(2)**
- Not sure **(3)**

……

New Variable name: COVIDMandate_Recoded
16. Are you mandated to take the COVID-19 vaccine?
- Yes **(1)**
- No **(2)**

……

New Variable name: MedicalTrust_Recoded
17. Do you have a medical provider you trust to provide you with information about the COVID-19 vaccine?
- Yes **(1)**
- No **(2)**

……

New Variable name: MedicalEncouragement_Recoded
18. Have you been encouraged by a medical provider to take the COVID-19 vaccine?
- Yes **(1)**
- No **(2)**

……

New Variable name: Q19_Recoded
19. I believe that taking the COVID-19 vaccine will protect me against coronavirus infection.
1. Never **(0)**
2. Hardly ever **(1)**
3. Sometimes **(2)**
4. Almost always **(3)**
5. Always **(4)**

……

New Variable name: Q20_Recoded
20. I believe that taking the COVID-19 vaccine will protect my family from getting coronavirus infection.
1. Never **(0)**
2. Hardly ever **(1)**
3. Sometimes **(2)**
4. Almost always **(3)**
5. Always **(4)**

……

New Variable name: Q21_Recoded
21. I believe that taking the COVID-19 vaccine will allow me to resume my daily activities.
    1. Never **(0)**
    2. Hardly ever **(1)**
    3. Sometimes **(2)**
    4. Almost always **(3)**
    5. Always **(4)**

……

New Variable name: Q22_Recoded
22. I believe that taking the COVID-19 vaccine may not be safe.
    1. Never **(0)**
    2. Hardly ever **(1)**
    3. Sometimes **(2)**
    4. Almost always **(3)**
    5. Always **(4)**

……

New Variable name: Q23_Recoded
23. I believe that not enough long-term studies have been done on the COVID-19 vaccine.
    1. Never **(0)**
    2. Hardly ever **(1)**
    3. Sometimes **(2)**
    4. Almost always **(3)**
    5. Always **(4)**

……

New Variable name: Q24_Recoded
24. I believe that the COVID-19 vaccine may not be as effective in protecting against mutations or new variants (changes in the virus or how the virus changes).
    1. Never **(0)**
    2. Hardly ever **(1)**
    3. Sometimes **(2)**
    4. Almost always **(3)**
    5. Always **(4)**

……

New Variable name: Q25_Recoded
25. Do you believe the COVID-19 vaccine is accessible for you to get it if you wanted it?
    1. Not at all **(0)**
    2. Slightly sure **(1)**
    3. Moderately sure **(2)**
    4. Very sure **(3)**
    5. Completely sure **(4)**

……

New Variable name: Q26_Recoded

26. Are you confident in getting at least one dose of the COVID-19 vaccine despite worries of possible side effects?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q27_Recoded

27. Are you confident in getting at least one dose of the COVID-19 vaccine despite the lack of long-term studies?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q28_Recoded

28. How aware are you of the accessibility of the COVID-19 vaccine at your pharmacy, physician's office, or community clinics?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q29_Recoded

29. How aware are you that the COVID-19 vaccines are free to get?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q30_Recoded

30. How sure are you that you have transportation to get the COVID-19 vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**

5. Completely sure **(4)**

……

New Variable name: Q31_Recoded

31. How sure are you that you have access to educational resources to answer questions about the COVID-19 vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q32_Recoded

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Initiation_Recoded

33. How likely are you to take at least one dose of the COVID-19 vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q34_Recoded

34. How confident are you in overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in order to get your 2nd dose (Pfizer or Moderna) after you completed your 1st dose?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q35_Recoded

35. How sure is your confidence overcoming challenges, such as scheduling, transportation, and access to a vaccine clinic, in getting a booster dose of the COVID-19 vaccine?

1. Not at all **(0)**

2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q36_Recoded

36. How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting your 2nd dose (Pfizer or Moderna) after you get your 1st dose?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q37_Recoded

37. How sure is your confidence overcoming concerns, such as side effects, safety, and long-term studies, in getting a booster dose of the COVID-19 vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q38_Recoded

38. How sure are you that you can motivate yourself to get fully vaccinated (either receiving 2 doses of the Pfizer or Moderna vaccine, or 1dose of the J&J vaccine)?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q39_Recoded

39. How sure are you that you can motivate yourself to getting a booster dose of the vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q40_Recoded

40. How sure are you that you can keep your CDC COVID-19 vaccination card to monitor when a 2nd dose and/or booster is needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q41_Recoded

41. How sure are you that you can access your Nevada WebIZ public online vaccine record to monitor when a 2nd dose and/or booster is needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q42_Recoded

42. How sure are you that you can set a calendar reminder to monitor when a 2nd dose and/or booster is needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q43_Recoded

43. How sure are you that you can set an appointment or know when the next date of a vaccine clinic will be to get a 2nd dose and/or booster dose?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q44_Recoded

44. How sure are you that you can overcome work and/or childcare barriers to get a 2nd dose and/or booster dose?

1. Not at all **(0)**
2. Slightly sure **(1)**

3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q45_Recoded
45. How sure are you that you can get the help, if needed, of a family member to encourage or remind you to get the 2nd dose and/or booster when needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q46_Recoded
46. How sure are you that you can get the help, if needed, of a trusted individual to encourage or remind you to get a 2nd dose and/or booster when needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Q47_Recoded
47. How sure are you that you can get the help of a medical professional to encourage or remind you to get a 2nd dose and/or booster when needed?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: Sustenance_Recoded
48. How likely are you to take the second dose and/or a booster dose of the vaccine?

1. Not at all **(0)**
2. Slightly sure **(1)**
3. Moderately sure **(2)**
4. Very sure **(3)**
5. Completely sure **(4)**

……

New Variable name: PoliticalAffiliation_Recoded

49. What is your political affiliation? (Optional to answer)

- Republican **(1)**
- Democratic **(2)**
- Independent **(3)**
- Other **(4)**
- Prefer not to answer **(5)**

……

New Variable name: Citizenship_Recoded

50. What is your current citizenship status? (Optional to answer)

- I am a citizen of the United States **(1)**
- I am not a citizen of the United States **(2)**
- Prefer not to answer **(3)**

……

Appendix I: IRB Approval Letter

ORI-HS, Exempt Review
Exempt Notice

DATE: May 3, 2022

TO: Manoj Sharma
FROM: Office of Research Integrity - Human Subjects

PROTOCOL TITLE: UNLV-2022-192 COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis
SUBMISSION TYPE: Initial

ACTION: Exempt
REVIEW DATE: May 3, 2022
REVIEW TYPE: EXEMPT
REVIEW CATEGORY: Category 2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

This memorandum is notification that the protocol referenced above has been reviewed as indicated in Federal regulatory statutes 45 CFR 46 and deemed exempt under category 2(i) as stated in the "Review Category."

PLEASE NOTE:

- **Prior to distributing the Information Sheet both in English and Spanish, please update the ORI-HS phone number from 702-895-3784 to 702-895-0020 and remove toll free at 888-581-2794. After this is modified you can begin your study.**

Upon final determination of exempt status, the research team is responsible for conducting the research as stated in the exempt application reviewed by the ORI – HS, which shall include using the most recently submitted Informed Consent/Assent and recruitment materials.

If your project involves paying research participants, it is recommended to contact HSComp@unlv.edu to ensure compliance with the Policy for Incentives for Human Research Subjects.

Any changes to the application may cause this study to require a different level of review. Should there be any change to the study, it will be necessary to submit a **Modification** request for review. No changes may be made to the existing study until modifications have been approved/acknowledged.

All **unanticipated problems** involving risk to subjects or others, and/or **serious and unexpected adverse events** must be reported promptly to this office.

Any **non-compliance** issues or **complaints** regarding this protocol must be reported promptly to this office.

Please remember that all approvals regarding this research must be sought prior to initiation of this study (e.g., IBC, COI, Export Control, OSP, Radiation Safety, Clinical Trials Office, etc.).

If you have questions, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 702-895-2794. Please include your study title and study ID in all correspondence.

Office of Research Integrity - Human Subjects
4505 Maryland Parkway . Box 451047 . Las Vegas, Nevada 89154-1047
(702) 895-2794 . FAX: (702) 895-0805 . IRB@unlv.edu

Appendix J: IRB First Modification Approval Letter

ORI-HS, Administrative Review
Modification Acknowledgment

DATE: June 17, 2022

TO: Manoj Sharma
FROM: Office of Research Integrity – Human Subjects

PROTOCOL TITLE: UNLV-2022-192 COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis
SUBMISSION TYPE: Modification

ACTION: Exempt
EFFECTIVE DATE: June 17, 2022
REVIEW TYPE: ADMINISTRATIVE REVIEW

Thank you for submission of amendment/modification materials for this proposal. ORI-HS has acknowledged your submission. No additional action is required at this time prior to moving forward with the acknowledged changes.

The following changes are acknowledged:

Modification made to the Protocol, Informed Consent form, and Recruitment Materials including change to the exclusion criteria and timeline of data collection

PLEASE NOTE:
Should there be any change to the proposal, it will be necessary to submit a modification for review. No changes may be made to the existing proposal until modifications have been approved/acknowledged.

Any non-compliance issues or complaints regarding this proposal must be reported promptly to this office.

If you have questions, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 702-895-0020. Please include your proposal title and proposal ID in all correspondence.

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Appendix K: IRB Second Modification Approval Letter

ORI-HS, Administrative Review
Modification Acknowledgment

DATE: July 20, 2022

TO: Manoj Sharma
FROM: Office of Research Integrity – Human Subjects

PROTOCOL TITLE: UNLV-2022-192 COVID-19 Vaccine Acceptance Behavior among Hispanics/Latinxs in Nevada: A Theory-Based Analysis
SUBMISSION TYPE: Modification

ACTION: Exempt
EFFECTIVE DATE: July 20, 2022
REVIEW TYPE: ADMINISTRATIVE REVIEW

Thank you for submission of amendment/modification materials for this proposal. ORI-HS has acknowledged your submission. No additional action is required at this time prior to moving forward with the acknowledged changes.

The following changes are acknowledged:

Update to the initial submission form including addition to the recruitment and data collection strategy.

PLEASE NOTE:
Should there be any change to the proposal, it will be necessary to submit a modification for review. No changes may be made to the existing proposal until modifications have been approved/acknowledged.

Any non-compliance issues or complaints regarding this proposal must be reported promptly to this office.

If you have questions, please contact the Office of Research Integrity - Human Subjects

at IRB@unlv.edu or call 702-895-2794. Please include your proposal title and proposal ID in all correspondence.

Office of Research Integrity - Human Subjects
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Curriculum Vitae

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Education

University of Nevada, Las Vegas **January 2015- current**

Current: Doctor of Philosophy - Public Health student, Concentration in Social and Behavioral Health, GPA: 3.97

Master's in Public Health, Concentration in Environmental and Occupational Health; GPA: 3.957, Graduated May 2017

Northern Arizona University **August 2010-May 2014**

Bachelor of Science in Biomedical Sciences, Minor in Chemistry; GPA: 3.61; Dean's List 2010-2014

Punahou School **August 2006-May 2010**

Honolulu, Hawaii; High School Diploma; GPA 3.8

Work Experience

Program Director **October 2017- current**

Immunize Nevada

- Volunteer Coordinator: October 2017 – June 2019; Community Outreach Manager: June 2019 – October 2021; Community Impact Director: October 2021 - current
- Recruit, manage, supervise, and retain volunteers and interns for Immunize Nevada to engage in outreach and education. Serve as the Internship Preceptor for interns. Provide guidance and support to intern projects.
- Coordinate, plan, implement, and evaluate outreach events and programs around the state of Nevada to ensure Nevadan's have access to accurate information regarding vaccines.
- Analyze data and evaluation of programs to improve program implementation.
- Create and document processes of clinic planning, outreach strategies, and best practices.
- Connect with community partners and build coalition members through facilitation of monthly community meetings
- Analyze data, monitor budgets, and conduct grant reporting analysis in fulfillment of grant requirements
- Manage the success various programs including but not limited to, PINK Packets, Internship program, routine immunization clinic planning, and day-to-day tasks of staff

Research Assistant **June 2017- September 2017**

Nevada Institute for Children's Research and Policy

- Assisted with the Partnerships to Improve Community Health (PICH) project, in collaboration with the Southern Nevada Health District, to implement a program of services designed to address tobacco use and exposure, among other health topics.
- Made calls and visited properties to complete surveys and gather data for the PICH Project specific to tobacco use and exposure.

- Wrote article drafts of completed data to submit for publication.

Graduate Assistant for Wellness Promotion **August 2015- May 2017**

University of Nevada, Las Vegas: Rebel Wellness Zone; Las Vegas, NV

- Planned, implemented, and assessed multidimensional health and wellness primary prevention and early detection programming.
- Partnered with campus departments, student organizations, and community organizations to develop programming.
- Created traditional and multimedia marketing for programs and campaigns for resources and educational events.
- Managed 8 social media accounts and created social media campaigns reaching 5,000+ students and community members.
- Trained and managed interns and volunteers to create and implement health education presentations and marketing programs.
- Restructured programs and processes within the Rebel Wellness Zone in accordance with best practices and created strategic plans to promote program sustainability.
- Prepared evidence-based, written educational materials to distribute to the UNLV community at presentations and programs.

Intern for Summerlin Hospital Medical Center **June 2016- August 2016**

Summerlin Hospital Medical Center; Las Vegas, NV

- Developed a Community Health Needs Assessment (CHNA) for the Oncology program to achieve accreditation as a Commission on Cancer Program by the American College of Surgeons. Upon completion, communicated program needs orally and in writing.
- Organized, facilitated, and analyzed a focus group with community members for the CHNA.
- Assessed community needs by obtaining and analyzing data from hospital records.

Teacher's Assistant, Chemistry Department **August 2012- May 2014**

Northern Arizona University, Flagstaff, AZ

- Taught Chemistry 151 Labs: General Chemistry I, under instructor supervision. Created quizzes, graded lab reports, formulated weekly lesson presentations, and taught students to safely use chemistry lab equipment to ensure accuracy.

AVID Tutor **September 2014- December 2014**

Henry J. Kaiser High School, Honolulu, HI

- Facilitated sessions for high school students of all grades in Math and Science.
- Academically at-risk students were enrolled in the AVID to support them in achieving their academic potential.

Teacher's Aide, PUEO Program **June 2010- August 2014**

Punahou School, Honolulu, HI

- Developed lesson plans for 5th grade students in reading, math, and science, to motivate them to pursue higher education.

- Read and provided edits for final papers in summer classes for students' Senior Projects. Acted as a resource to Senior high school students for college guidance and provided help on college researching, essays, and applications.

Achievements & Certifications

- **UNLV Delta Omega Honorary Society in Public Health, Delta Theta Chapter at UNLV**
  - Member, induced in December 2019
- **UNLV Rebel Award: Student Commitment to Health and Wellness 2017**
  - Outstanding contribution to UNLV through to health and wellness.
- **BACCHUS Outstanding Student Award 2016**
  - Outstanding contribution to campus peer education leadership while maintaining strong academics.
- **Northern Arizona University Golden Axe Award Recipient 2014**
  - Outstanding contributor to the university through academic performance, service, and leadership.
- **BACCHUS Initiatives of NASPA**
  - Certified Peer Educator Trainer (2015-present): Certified 37 BACCHUS Initiatives of NASPA Certified Peer Educators

Other Leadership

- **Healthy Rebels: Certified Peer Educators** **2015-2017**
  - President (2015-2017)
- **Delta Chi Lambda Sorority, Inc.** **2010-2014**
  - President (2013-2014); Internal Vice President/Academics Chair (2012-2013); Treasurer/Fundraising Chair (2011-2012)
- **NAU HAPA Hawaiian Club** **2010-2014**
  - President (2013-2014); Vice President (2012-2013); Treasurer/ Fundraising Chair (2011-2012)

Publications

- **Wong, Tara,** Pharr, Jennifer R, Bungum, Tim, Coughenour, Courtney, & Lough, Nancy L. (2019). Effects of Peer Sexual Health Education on College Campuses: A Systematic Review. *Health Promotion Practice, 20*(5), 652–666. https://doi.org/10.1177/1524839918794632

Presentations

- **Nerida, Tara**. (2019, November 13-15). *Cultivating the Next Generation of Vaccine Advocates: The Value of Building a Robust Volunteer and Internship Program* [Conference presentation]. National Conference for Immunization Coalitions and Partnerships 2019, Honolulu, HI, United States.
- **Nerida, Tara.** (2019, October 14-15). *Cultivating the Next Generation of Vaccine Advocates: The Value of Building a Robust Volunteer and Internship Program* [Conference presentation]. Nevada Health Conference, Las Vegas, NV, United States.

- **Wong, Tara.** (2016, November 17-19). *Managing Your Wellness Wheel* [Conference presentation]. 2016 BACCHUS Initiatives of NASPA General Assembly, Kansas City, MO, United States.
- Temm, Ashley & **Wong, Tara.** (2015, November 14). *Beauty Isn't Measured in Pounds* [Conference presentation]. 2015 BACCHUS Initiatives of NASPA General Assembly, Reston, VA, United States.
- Temm, Ashley & **Wong, Tara.** (2015, November 13). *Marketing to a Diverse Community* [Conference presentation]. 2015 BACCHUS Initiatives of NASPA General Assembly, Reston, VA, United States.