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SURVEY OF VACCINE VIEWS IN HISPANIC PARENTS (SOVVIHP)

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A capstone project submitted for Graduation with University Honors

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ABSTRACT

During a global pandemic where COVID-19 vaccines are starting to be administered, the impact of vaccine hesitancy on vaccination rates is salient now more than ever. Previous research indicates that demographic factors like lower education and lower income predict higher levels of vaccine hesitancy (Shui et al., 2006). One goal of this study was to examine if these factors predict the vaccine views of Hispanic parents in Southern California. Another goal was to investigate if exposure to and preference of various health news/information sources would relate to vaccine hesitancy.

Mexican-Heritage, Catholic parents ($N = 79$) completed a phone interview consisting of the WHO 10-Item Vaccine Hesitancy Scale and questions inquiring about level of trust (on a scale of 1-10), exposure to, and preferred sources for health news/information.

The results indicated that parent level of education and family income did not significantly predict level of vaccine hesitancy. However, those who stated that they do not see health news/information from the government and television were more vaccine hesitant than those who said they do ($t(73) = 2.434$, $p = .017$, $\mathbf{d} = .548$; $t(75) = 2.041$, $p = .045$, $\mathbf{d} = .468$). Levels of trust in the government and television as sources for health news/information were also both significantly, negatively correlated with vaccine hesitancy scores ($r(73) = -.381$, $p = .001$; $r(76) = -.365$, $p = .001$). Exploratory analyses of views on a connection between autism and vaccines and parents' willingness for their child to receive the COVID-19 vaccine will also be discussed.

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Survey of Vaccine Views in Hispanic Parents (SOVVIHP)

A recent 30% rise of global measles cases including in countries where vaccines had already eliminated this disease exemplifies possible consequences of vaccine hesitant parents. According to the World Health Organization (WHO), vaccine hesitancy (particularly in parents) was considered one of the top ten threats to global health in 2019. Vaccine Hesitancy, as defined by the WHO, is a reluctance or refusal to vaccinate oneself or one's children. Popular discourse has suggested that not only has social media and the internet allowed the efficient spread of vaccine misinformation to occur, but its users' vaccine decisions are influenced by such information (Betsch & Sachse, 2012). As the COVID-19 pandemic spread wreaking health-related, emotional, and economic havoc across the globe, a desperate necessity for a vaccine against the highly infectious SARS-CoV-2 virus arose. Considering the recent rollout of anti-COVID-19 vaccines, previous evidence of vaccine hesitant parents existing in the U.S. may raise some concerns about the effect of vaccine hesitancy on COVID vaccination rates. The disproportionate effect of COVID-19 infections and deaths among people of color (POC), and the recent rapid Hispanic population growth also raise questions about how and if vaccine hesitancy affects the health of these communities (Wood, 2020; Center for Disease Control and Prevention, 2021; US Census Bureau Public Information Office, 2016).

Researchers have examined possible determinants of vaccine hesitancy through multiple frameworks. The SAGE Working Group model of determinants of vaccine hesitancy divides possible determinants into three categories: Individual/Social Group Influences, Contextual Influences, and Vaccine-Specific Issues (Larson, Jarrett, Eckersberger, Smith, & Paterson, 2014). Individual/Social Group Influences include perceived risks or benefits of vaccines, personal experiences with health system or vaccines, viewing immunization as a social norm vs.

viewing it as not needed/harmful, personal beliefs about health and prevention, and knowledge of what/why/where/when vaccines are needed. For the purposes of this study, the factors in this category that will be discussed are personal trust in the healthcare system/government, social group vaccine beliefs, and personal knowledge of vaccines.

A parent's personal trust in the government could influence their beliefs about medical treatment from government related systems like healthcare. To investigate the relationship between government trust and vaccination beliefs, a survey conducted in Europe found that those who had not been vaccinated within the last 5 years because of safety concerns were more likely to have lower trust in local and national government/parliament (Miyachi et al., 2020). Another individual factor that could contribute to vaccine hesitancy is a lack of knowledge or understanding of vaccine functions. Research on this relationship has found that between two studies conducted in Switzerland knowledge of vaccines significantly correlated with willingness to vaccinate (particularly with the seasonal influenza vaccine) (Zingg & Siegrist, 2012). Studies conducted in the Americas, Europe, Taiwan, and Nigeria found that expressed pro-vaccine views from surrounding social groups including healthcare workers positively affected vaccine views/acceptance (Larson et al., 2014). Although these individual and social group determinants are influenced by numerous other societal contexts, research on these factors supports that personal knowledge of vaccines, trust in the government, and social group beliefs are related to vaccine hesitancy.

The next category, contextual influences, includes, but is not limited to, politics, religion, culture, gender, socio-economic group, and communication/media environment. The determinants that will be focused on in relevance to this study are: socio-economic status,

education levels, social media exposure, media environment, race, and acculturation levels in immigrants.

Previous research has investigated how education levels affect vaccine acceptance and has been met with contradictory results. Studies within the U.S. have found that higher education predicted higher vaccine refusal while lower education was found to be a predictor of both high and low levels of vaccine refusal (Larson et al., 2015). Studies in other countries have found just as conflicting results regarding education levels. For instance, higher education predicted higher vaccine refusal in the countries of China, Lebanon, and Israel; while it predicted lower vaccine refusal in the countries of The Netherlands, Nigeria, and Pakistan.

Investigations of the effects of socioeconomic status (SES) and income level on vaccine hesitancy have also been conducted globally and met with conflicting results. Studies conducted in the U.S. found that both low and high SES/income participants were less vaccine acceptant. A reason found to be associated with low-income participants in the U.S. being less vaccine acceptant lied in less trust of the healthcare system. In the country of Nigeria low income was related to both high and low vaccine acceptance. The reasoning associated with low vaccine acceptance for Nigerian low-income participants was lack of access and low education on vaccination in general (Larson et al., 2015).

Although social media has allowed exponential growth in global communication and access to information, it has also allowed for the rapid spread of misinformation regarding vaccines. Extreme examples of vaccine hesitant rhetoric include "anti-vax" conspiracy theories. The content of these theories varies widely, but they usually involve suppressing evidence that vaccines are harmful. A common example of these conspiracy theories is that vaccines cause Autism. 50% of tweets made in the U.S. between 2009 and 2015 that mentioned vaccines and

Autism Spectrum Disorder included anti-vaccine beliefs (Tomeny et al., 2017). Researchers Jolley and Douglas examined if there was a correlational and experimental link between belief in/exposure to anti-vaccine conspiracy theories and vaccination intentions (2014). They found that those who stated they believed in anti-vaccine conspiracy theories had less intent to vaccinate than those who did not find credibility in the conspiracy theories. With another sample of participants, they exposed one group to anti-vaccine conspiracy theories and another to media that refutes anti-vax media environment. The group exposed to anti-vax content were less likely to intend to vaccinate, and the group that was exposed to media refuting anti-vax theories were more likely to intend to vaccinate. A recent study found that those who received information regarding COVID-19 from government websites gave more correct answers on COVID related questions than those who received their information from television, alternate internet sources, and social media (Sakya et al., 2021). Internet, media, doctors, spouses, and family have also been found to be a key influence of the vaccine decision-making of Latina immigrant mothers (Painter et al., 2019). These studies provide evidence for how the vaccine hesitancy of parents (including Latina immigrant mothers) is affected by the internet and media.

Further research provides more evidence of a relationship between health information seeking practices and race/ethnicity. Moran and colleagues found in a 2016 study that adult women go to the internet, their friends/family, television, and books/magazines to seek health information. An effect of ethnicity was found such that Mexican heritage participants were less likely to talk to other people for health information than were Black participants and non-Hispanic White participants, and non-Hispanic white participants utilized the internet more often than Black participants. Participants of all ethnic groups reported that they highly valued the opinions of doctors/nurses/healthcare providers regarding health concerns (Moran et al., 2016).

Studies on the effects of race and ethnicity on vaccine hesitancy have uncovered mixed findings. Some have found that parents and adults who identify as an ethnic minority (Latinx, Black, Asian, Mixed Race), were less vaccinated in general (Linn et al., 2010), and that being a minority was associated with high levels of vaccine concern and negative attitudes toward vaccination and their child's healthcare provider (Shui et al., 2006). However, the opposing findings are that White adults are less vaccinated with certain vaccines (the first dose of the mumps, measles and rubella (MMR1) vaccination was specifically examined in this study; Mixer et al., 2007) and that White parents are more likely to refuse vaccines for their children (Gust et al., 2008).

Although race has been found to possibly relate to vaccine hesitancy, another differential factor within ethnic or racial groups is immigration generation. In a 2017 study measuring confidence in vaccine safety among Latina immigrant mothers, Moran and colleagues found that those born in Mexico were more confident in vaccine safety than those born in the United States. Since birthplace alone may not predict how exposed or entrenched the parent is into American culture, acculturation levels were also measured. It was found that those with lower U.S. acculturation were also slightly more trusting in vaccines. However, this trend is reversed when specifically examining the HPV Papillomavirus vaccine which is received as controversial in conservative/Christian circles. It was found that Latina mothers with higher U.S. acculturation levels were more likely to allow their daughters to receive the HPV Papillomavirus vaccine (Gerend et al., 2013). The HPV Papillomavirus vaccine which is given to adolescent females to prevent cervical cancer that is caused by strands of HPV that are spread through sexual contact is a vaccine that some parents do not feel comfortable letting physicians administer to their child. A common reasoning behind refusal of this specific vaccine lies in conservative beliefs on

premarital sex. Considering the context of this vaccine and the studies presented, acculturation levels may affect the vaccination decisions of parents for their children.

The final category "vaccination-specific issues" includes the scientific risks or benefits, mode of vaccine delivery, costs, reliability of vaccine supply, and vaccine schedule. Most of the research conducted in this category has been conducted in countries with less accessible healthcare. None of the determinants relevant to this study fall under this category, and therefore will not be discussed.

The goal of the current study is to investigate how individual/social group influences (trust in the government as a health information source, trust in different types of media as health information sources, and trust in friends and family as health information sources) and contextual influences (socioeconomic status, education levels, acculturation levels, social media exposure, and media environment) manifest in affecting vaccine hesitancy levels, as measured by the WHO SAGE 10 Item Vaccine Hesitancy Scale (VHS), in Mexican-Heritage parents in the Inland Empire. I hypothesize based off previous research that lower trust in/exposure to the government as a health information source, higher trust in/exposure to social media as a health information source, higher trust in/exposure to friends and family as health information sources, lower socioeconomic status, lower education, higher U.S. acculturation levels, lower Hispanic/Latino acculturation levels and higher number of years spent in an English-speaking country will predict higher vaccine hesitancy scores.

Two exploratory research questions address the frequency of Mexican-heritage parents willing to let their child receive a COVID-19 vaccine, and if Mexican-heritage parents believe there is a link between on autism and vaccines. I hypothesize that those who are more vaccine

hesitant will be more likely to not want to vaccinate their child against COVD-19 and that they will be more certain of a connection between autism and vaccines.

Methods

Participants

The participants of this study (N = 78) all identified as Mexican and Catholic (M_{age} = 36.31, SD = 7.12, 97.4% female), were all parents of at least one child who is of the ages of about 4 to 6 years old, and were recruited from the Inland Empire area of Southern California. 66.7% identified as first-generation immigrants, 30.8% identified as second-generation immigrants, and 1.3% were third generation immigrants (1 participant declined to answer). 64.1% identified Spanish as their primary language and 35.9% identified English as their primary language.

Recruitment

All participants of this study were recruited for a previous study involving views of causes and treatments of illnesses. They were recruited through in person outreach at childhood development centers in the Riverside area, through social media outreach, and at local events (e.g., Swap meets, Catholic churches). During the consent process for that study, the parents were asked if they would be interested in being contacted in the future for follow-up purposes. Those that provided consent were later contacted via phone call, text message, or Facebook message asking if they would be interested in participating in a survey about their views on vaccines.

Procedures

The surveys were conducted via phone call and on average took about 13 minutes. Data collection began in early March 2020 shortly before the onset of pandemic lockdown restrictions in California and was concluded in December 2020. Only two participants were surveyed before the COVID-19 related questions were inserted into the survey. Only participants who consented to having the phone call audio recorded completed the survey. The surveys were conducted in either Spanish (N = 48) or English (N = 30) depending on the preference of the parent. Participants were informed that they could stop the survey at any time or skip any question they did not want to answer.

Measures

Socioeconomic Status and Education Level

Education level and socioeconomic status measures were collected through a computer survey conducted when the participants participated in the initial study regarding illnesses. Depending on dates of participation, these demographic data were collected from a few months prior to participation in this study to as far as a year and a half prior (all participated in the initial study pre-COVID-19 pandemic). Therefore, effects of COVID-19 and other intervening circumstances on SES or education level were not measured.

The questions utilized for this study regarding SES were estimated annual income, whether the participant rents or owns a home, and material food security for the next month. Food security was measured by asking: "How certain are you that you will be able to buy or produce enough food to eat in the next month?" The responses were on a 5-point Likert-like scale: very uncertain, a little uncertain, I do not know, a little certain, and very certain.

Immigration Generation and Acculturation

The questions utilized to measure these variables were also collected during participation of the initial study. Participants were asked what most accurately reflected their immigration generation. First generation was defined as them coming to live in the United States from another country, second generation was if their parents came to live in the United States from another country, and third generation was if they and their parents were both U.S. natives.

Acculturation measures how much one identifies with a certain culture. Two items measured how strongly the parent culturally identified with either U.S./North American culture and Hispanic/Latino culture on a scale of 1(very weak) to 6(very strong) (Benet-Martínez & Haritatos, 2005).

Time spent living in an English-speaking country was also measured. Although this terminology includes other countries besides the U.S. it is likely that since participants lived and were raising their families in California the country they were referring to when answering this question was the U.S., but it is possible that parents also included time spent living in other English-speaking countries.

WHO SAGE 10 Item Vaccine Hesitancy Scale (VHS)

The WHO SAGE 10 item vaccine hesitancy scale (VHS) was used to measure vaccine hesitancy. The question order was randomized for every participant to reduce order effects. The World Health Organization (WHO) and the SAGE working group created this 10-item survey as well as a 5 item open ended survey to measure vaccine hesitancy in global settings (Larson et al., 2015). For the purposes of this study, only the 10-item survey was used. Originally, the answers to these items were on a five-point Likert scale (1= strongly disagree, 2 = disagree, 3= neutral, 4 = agree, 5 = strongly agree). However, field testing of this scale as well as another vaccine

hesitancy scale in Guatemala revealed that the Likert scale may not always translate across different cultures (Domek, et al., 2018). Considering this evidence and what would cause less confusion when conducting a phone survey, the answering scale was narrowed from five points to two (agree or disagree). A Cronbach's alpha test of the current study's VHS data revealed good internal consistency (Cronbach's α = .846) which is comparable to the internal consistency of the VHS used in a Canadian study conducted with a seven-point Likert scale (Cronbach's α = .92 for seven of the items measuring lack of confidence and Cronbach's α = .64 for two of the other items measuring perceptions of risk). Those who conducted this study excluded question 10 in their analyses due to statistical unreliability, but this question was still included for this study (Shapiro et al., 2018).

Health News and Information Sources

After the VHS, participants were asked which outlets they utilize when looking specifically for health news and health information ("From which outlets do you seek out health news or health information?"). The participants then listed each source they utilize for health news and health information. Parents were then asked how much they trust the credibility of each source they provided on a scale of 1 (no trust at all) to 10 (completely trust).

Parents were then asked about their exposure to specific sources for health news and health information (e.g., Do you see health news or health information from ____?). The specific sources measured were Facebook/other social media, television (including news programs and TV shows), friends and relatives, general online sources (including online news articles, websites, blogs), the government (including the CDC and the president), and their religious community (including a priest, a church, or religious text). After measuring exposure to these outlets as health resources, parents were asked about their level of trust in the truth of the

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information seen from each source on a scale of 1 to 10 (e.g., On a scale of 1 (do not trust at all) to 10 (trust completely), how much do you trust the news/health information you see from the government to be true?).

Exploratory Measures: COVID-19 and Autism

Parents were asked to list from which sources they seek out information about COVID-19. They were then asked how much they trust the credibility of each of the sources they listed on a scale of 1 (no trust at all) to 10 (trust completely). Next, participants were asked if they would let their child receive a vaccine for COVID-19 if it became available. Participants answered yes, no, or that they were unsure. If they expressed vaccine hesitant responses (no or I don't know) they were asked to elaborate on their reasoning.

Finally, parents were asked how certain they were that there is a link between autism and vaccines on a scale of 1 (not certain at all that there is a link) to 10 (absolutely certain that there is a link).

Data Analysis

Of the 78 survey responses only two of the participants did not complete the questions on COVID-19, use of the government as a health information source, and use of the religious community as a health information source; as these questions were added after their participation date at the onset of pandemic restrictions in California. For the trust scale questions, if parents responded with half values (i.e., 7.5 or 9.5) they were rounded up to the nearest whole number before analysis.

VHS scores were such that 10 = vaccine hesitant and 0 = not vaccine hesitant. Seven of the items were reverse coded to maintain this scoring (Shapiro et al., 2018). If a parent answered

"I do not know" to these questions they were coded as a half score (i.e., if a parent received a VHS score of 3 and answered "I don't know" on one question, their VHS score would be 3.5). To maintain uniformity of weighting when conducting analyses all scores were measured from 0-1 (0 = 0, 1 = .1, 2 = .2… 10 = 1).

The three variables utilized to measure SES (estimated yearly income, whether participant owned or rented their home, and food material security for the next month) were coded from 0-1 such that scores closer to 1 indicate higher SES. Estimated yearly income was coded ordinally according to the income levels provided by the participants. Income categories were coded as 0 = 0-23,999$, .25 = 24,000-35,999$, .5 = 36,000-41,759$, .75 = 41,760-53,999$, and 1 = 54,000-192,000$. Home ownership was coded dichotomously with renting as 0 and owning as 1. The 6 possible answers to food material security for the next month were coded as follows: very uncertain = 0, a little uncertain = .25, I do not know = .50, a little certain = .75, and very certain = 1. Education was ordinally coded according to the levels reported by participants. Kindergarten through fifth grade was coded in the lowest category (0), 6th grade as .1, 8th grade as .2, 9th grade as .3, 10th grade as .4, 11th grade as .5, High School Graduate/GED as .6, Some college with no degree as .7, Associate's degree or Vocational school degree as .8, Bachelor's degree as .9, and any postgraduate degree (i.e., MA, PhD, DDS, MD) as 1. A regression model was conducted with the three SES variables and the education variable as independent variables and VHS scores as the dependent variable.

To measure how exposure to health news/information from different sources is related to vaccine hesitancy, independent samples T-tests between each "yes" and "no" group were conducted for each source/social partner (social media, television, friends and relatives, general

online sources, the government, and the religious community) with VHS scores as the dependent variable.

To analyze how participants' trust levels of various information sources is related to vaccine hesitancy, a correlation analysis was run for each source with the continuous trust scale score as the independent variable and VHS scores as the dependent variable.

A correlation analysis was conducted between the continuous variable of number of years spent in an English-speaking country and VHS scores. The number of years spent in the U.S. was coded from 0-20 with 0 = less than year, 1 = year all the way up to 20 = 20 years or more.

Acculturation for each culture (Hispanic and U.S.) was coded ordinally as: very weak = .167, weak = .334, somewhat weak = .501, somewhat strong = .668, strong = .835, very strong = 1). In a regression analysis Hispanic acculturation levels and American acculturation levels were independent variables and VHS scores were the dependent variable.

A One-way ANOVA analysis and Tukey test were run on the VHS scores between those who said yes, no, or I don't know. This analysis allowed to measure the relationship between COVID vaccine uncertainty and refusal with vaccine hesitancy.

To find mean differences in the VHS scores of parents who were more than 50% sure that autism and vaccines were linked versus those who were less than 50% sure that autism and vaccines were linked, an independent samples t-test was conducted between those two groups.

Results

The mean of all VHS scores was low (M = 1.9, SD = 2.2). 91% of participants scored less than .5 out of 1 meaning that most parents were not vaccine hesitant. Education levels and

the SES variables did not account for any variance in vaccine hesitancy scores (R^2 = .077, p = .233, see tables 6 and 7 for correlations and regression coefficients, respectively). No differences were found in mean VHS scores between those who reported being exposed to health news/information from social media, friends and family, general online sources, or their religious community and those who reported not being exposed to health news/information from those sources. However, those who said they are not exposed to health news/information from the government and television were more vaccine hesitant than people who said they are exposed (Government: $t(73)$ = 2.434, p = .017, **d** = .548; Television: $t(75)$ = 2.041, p = .045, **d** = .468; for means and standard deviations see table 3). No relationship was found between levels of trust in social media, friends and family, general online sources, or their religious community as credible health news/information sources and vaccine hesitancy. Although, those who trust the government and television more as health news/information sources were less vaccine hesitant (Government: $r(73)$ = -.381, p = .001; Television: $r(76)$ = -.365, p = .001, for more correlations see table 4).

The number of years on average parents spent in an English-speaking country was not significantly related to their vaccine hesitancy ($r(76)$ = .103, p = .367; see table 12). Levels of American and Hispanic acculturation did not account for any variance in the vaccine hesitancy score (R^2 = .005, p = .858; see tables 10 and 11 for correlations and regression coefficients, respectively)

Differences in vaccine hesitancy were found based on if a parent answered yes, no, or I don't know to whether they would allow their child to be given a COVID-19 vaccine $F (2, 74)$ = 4.010, p = .022. Post hoc tests revealed that those who would refuse a COVID vaccine for their child were more vaccine hesitant (M = .255, SD = .26141) than those who said they would allow

a COVID vaccine for their child ($M = .112$, $SD = .14597$). No differences in vaccine hesitancy were found between those who were unsure and those who said yes or no (for frequency, ANOVA, and Post hoc see tables 1, 8, and 9, respectively). Those who are more than 50% certain that there is a connection between autism and vaccines have a higher mean of vaccine hesitancy score than those who are less than 50% sure there is a connection ($t(71) = 3.697$, p $<.01$, **d** $= .82$, see table 5).

Discussion

Investigating vaccine hesitancy among a sample of Mexican-heritage and Catholic parents yielded results that replicate and conflict with various other findings from vaccine hesitancy literature. For one, variables that have historically been associated with vaccine hesitancy including SES and education were not found to be related with vaccine hesitancy (Larson et al., 2015). Level of trust and exposure in social media and friends/family was not found to be related with vaccine hesitancy which also conflicts with previous findings in other samples (Moran et al., 2016). Contrasting previous findings on the relationship between immigration status and acculturation and vaccine hesitancy, acculturation levels and years spent living in an English-speaking country were not related to vaccine hesitancy (Gerend et al., 2013; Moran et al., 2017). However, the findings that exposure to and trust in government are related to vaccine hesitancy support results from other studies (Miyachi et al., 2020; Sakya et al., 2021). The relationship between vaccine hesitancy and television as a health news/information source has not been identified in previous literature, and may speak to how Hispanic parents view the credibility of television as a news source. The exploratory results of this study provide evidence (that should be approached cautiously for reasons explained in the limitations section) that vaccine hesitancy levels are related to parent willingness in allowing their child to receive a

vaccine that might affect the gravity of an ongoing pandemic. This is compelling because while other vaccine refusals (measles, HPV papillomavirus, flu) may not reflect immediate negative consequences to one's daily life, not receiving a COVID vaccine could immediately impact a child's ability to return to in person schooling or public gatherings safely. This evidence points to a poignant need to address vaccine hesitancy regarding the COVID vaccine specifically to ensure that parents feel secure in vaccinating their children against the SARS-CoV-2 virus.

Limitations

Although this study provides insight into the vaccine hesitancy and information scanning practices of Hispanic parents, there are limitations to the methodology. Due to the small sample size, there was not a sizeable amount of vaccine hesitant parents in the sample which may have skewed the impact of comparing non-vaccine hesitant and vaccine hesitant parents in this study. For instance, the mean vaccine hesitancy score for parents who said they would not allow their child to receive a vaccine was 2 (10 being the highest) and the mean VH scores for parents who said they would was 1. Due to this small mean difference, parents who refuse the COVID vaccine for their children may not be vaccine hesitant relative to the highest point of this scale. Despite this limitation, considering that 62% of this sample that scored predominantly low on the VHS answered "no" or were unsure about whether they would allow their child to receive a COVID vaccine is revealing. If non-vaccine hesitant parents are not confident in the safety of the vaccine, then this speaks to the unique societal context of the COVID-19 vaccine and the necessity of accurately informing the public on the safety of the vaccine.

Other limitations brought on by the small sample size include uneven comparison groups in some conducted analyses. Specifically, the Hispanic and U.S. acculturation groups were uneven such that 87.2% identified either strongly or very strongly with Hispanic culture while

42% identified either very weakly, weakly, or somewhat weakly with U.S. culture. Due to these limitations, drawing conclusions about generalizability to parents or Hispanic parents must be done so cautiously.

Another limitation of this methodology lies in the socioeconomic measures. Due to the varying amounts of time between when the participants participated in the first study and this study, ability to gauge the impact of COVID-19 on the SES of participants was lacking. Although measure of yearly income, ownership status of home, and food security for the next month capture the material and resource-based aspects of SES, they do not measure for the subjective aspects; such as occupational prestige, poverty measures, or subjective social status (Diemer et al., 2013). Therefore, the SES measures of this study should not be considered as measuring a participant's wholistic SES but rather their resource-based SES pre-COVID.

Future Directions

Future research should delve deeper into the relationship between trust in government and television as health sources. This could be done by examining which individual, social group, or contextual influences contribute to government trust in Hispanic parents and which types of television programming may contribute to scientifically correct views on vaccines or other health aspects. To address the immediate concerns of vaccine hesitancy's impacts on COVID vaccination rates, researchers should investigate parents' apprehension regarding the COVID-19 vaccine specifically. Understanding their reasoning could aid public health officials in crafting vaccine PSAs to specifically address parents' concerns.

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Table 1

Participant Demographics

Characteristic	N (%)
Gender	
Female	76 (97.4)
Male	2 (2.6)
Race/Ethnicity	
Hispanic/Latino	66 (84.6)
White	1 (1.3)
Hispanic/Latino & White	11 (14.1)
Immigration Generation	
First Generation	52 (66.7)
Second Generation	24 (30.8)
Third Generation	1 (1.3)
Primary Language	
Spanish	50 (64.1)
English	28 (35.9)

Table 2

Frequencies for Categorical Measures

Source Exposure Measures	Yes (%)	No (%)
Social Media	51.3	48.7
Television	48.1	51.9

Friends and Relatives		67.1	32.9
General Online Sources		63.6	36.4
Government		58.7	41.3
Religious Community		36	64

COVID-19 Vaccine Willingness Measure	Yes (%)	No (%)	Not sure (%)
Would you be willing to give your child a COVID-19 vaccine if available?	37	40	23

Table 3

Using t-test for Vaccine Hesitancy differences based on Source exposure and certainty in Autism connection with vaccines

Source	Yes		No			
	M	*SD*	*M*	*SD*	*t-test*	*d*
Social Media	.1500	.16291	.2358	.25820	1.765	-.40
Television	.142	.179	.242	.242	2.041*	.468
Friends and Relatives	.186	.214	.128	.215	-.150	.037
General Online Sources	.1747	.21980	.2196	.21830	.865	.205

Government	.144	.166	.267	.268	2.434*	.548		
Religious Community	.204	.204	.186	.233	-.337	.083		

Table 4
Correlations of trust in health news/info sources and vaccine hesitancy

	1	2	3	4	5	6	7	*M*	*SD*
1.VHS	-							.1917	.21758
2. Social Media	-.101	-						4.64	2.444
3. Television	-.365**	.600**	-					5.38	2.539
4.Friends and Relatives	-.020	.517**	.538**	-				5.83	2.319
5. General Online Sources	-.063	.588**	.446**	.581**	-			5.91	2.170
6.Government	-.381**	.407**	.463**	.323**	.409**	-		6.09	2.548
7.Religious Community	-.122	.484**	.486**	.624**	.492**	.330**	-	6.10	2.709

Table 5

t-tests comparing vaccine hesitancy based on parent certainty of autism and vaccine connection

	Overall		50% certain or less		More than 50% certain			
	M	*SD*	*M*	*SD*	*M*	*SD*	*t-test*	*d*
How certain are you that there is a connection between autism and vaccines?	2.73	2.673	.1477	.14650	.3731	.35975	3.697**	.82

*p<0.05
**p<0.01

Table 6
Correlation Analyses for Income and Education

Pearson Correlation	VHS Scores	Education Level	Renting or Owning Home	Income Level	Food Security (1 month)	*M*	*SD*
VHS Scores	-					.1866	.21405
Education Level	-.013	-				.6419	.24662
Renting or Owning Home	.115	.108	-			.4595	.50176
Income Level	.233	.356	.471	-		.5101	.34233
Food Security (1 month)	.147	.239	.213	.257	-	.9088	.20513

Table 7
Coefficients for Income and Education Regression

	Unstandardized Beta	95% Confidence Interval		Significance
		Lower	Upper	

Education Level	-.113	-.331	.105	.306
Food Security (1 month)	.121	-.134	.375	.347
Income Level	.161	-.015	.336	.072
Rent or Own Home	-.007	-.120	.106	.903

Table 8

ANOVA Used to analyze Vaccine Hesitancy differences between COVID vaccine willingness groups

	Sum of squares	df	Mean Square	F	Significance
Between Groups	.298	2	.149	4.010	.022*
Within Groups	2.678	72	.037		
Total	2.977	74			

Table 9

Tukey HSD Post Hoc Tests for ANOVA on COVID willingness and vaccine hesitancy

		Mean Difference	Std Error	Significance	95% Confidence Interval	
					Lower Bound	Upper Bound
No	I don't know	.08670	.05855	.306	-.0534	.2268
	Yes	.14250*	.05068	.017	.0212	.2638
I don't know	No	-.08670	.05855	.306	-.2268	.0534
	Yes	.05580	.05930	.616	-.0861	.1977
Yes	No	-.14250*	.05068	.017	-.2638	-.0212
	I don't know	-.05580	.05930	.616	-.1977	.0861

Table 10

Correlation Analyses for Hispanic and American Acculturation

	VHS Scores	American Acculturation	Hispanic Acculturation	*M*	*SD*
VHS Scores	-			.1828	.21273
American Acculturation	.064	-		.60503	.288774
Hispanic Acculturation	-.026	.064	-	.89908	.152735

Table 11

Coefficients for Acculturation and Vaccine Hesitancy Regression

	Unstandardized Beta	95% Confidence Interval		Significance
		Lower	Upper	
American Acculturation	.049	-.140	.237	.608
Hispanic Acculturation	-.043	-.399	.314	.812

Table 12

Correlation between years spent living in an English-speaking country and vaccine hesitancy

	VHS Scores	Years spent living English-Speaking Country	*M*	*SD*
VHS Scores	-		.1828	.21273
Years spent living English-Speaking Country	.103	-	16.2875	5.36560