2023

Changing Vaccine Hesitant Attitudes of Parents Using Moral Persuasion

Max Vitro

LOYOLA UNIVERSITY CHICAGO

CHANGING VACCINE HESITANT ATTITUDES OF PARENTS USING MORAL PERSUASION

A THESIS SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL

IN CANDIDACY FOR THE DEGREE OF

MASTER OF SCIENCE

PROGRAM IN APPLIED SOCIAL PSYCHOLOGY

BY

MAX VITRO

CHICAGO, IL

MAY 2023

ACKNOWLEDGMENTS

I would like to express my deepest appreciation to my thesis advisor, Dr. Jeffrey Huntsinger. I am enormously grateful for his continued support, mentorship, and friendship. I would also like to thank my ESC Lab mate, Akila Raoul, as well as the other part of my committee, Dr. Victor Ottati. Without their guidance and insightful feedback and support this project would not have been successful.

This endeavor would also not have been possible without the unrelenting support of my parents who have always been there for me. I owe this to them. To my father, John Vitro, who inspired my curious mind and to my mother, Wendy Rockwell, who nurtured a caring heart.

And finally, I would like to thank those close friends who supported me both academically and socially during this project.

Although I cannot list everyone personally, thank you for all the small things that made a big difference. You gave me the courage I needed to return to school and do what I do best.

Let the beauty of what you love
be what you do.

— Rumi

PREFACE

It was at the height of a global pandemic when I joined Loyola University Chicago had begun my search for a thesis topic. Life felt as though as it had turned upside down. No time in any of our lives had we experienced something like this. We were uncertain, fearful, and isolated. Though much of our time was spent apart, there was a strange sense of solidarity; in how we collectively felt and of course wanting to escape it. We just couldn't agree how.

At first, I marveled at how the scientific and medical communities around the world came together to develop vaccines and treatments at a speed that was once thought of as impossible. But expecting a celebration of mass inoculation, I was shocked by the tepid response the vaccines got. Not just by the public but also friends, family members, peers and coworkers too. To some, the response wasn't even indifference but straight up denial or disgust.

As a student of psychology, I am naturally curious about human behavior but what is most interesting to me are those little oddities that, despite being so intrinsically human, could not be explained. Vaccines, what are perhaps the greatest public health inventions in human history (not to mention longest tenured) still raised suspicion. I could not comprehend it, nor could it really be explained. Yet, it was happening.

Wanting to do more than just collect useful numbers, I reached into my toolbox of media communication skills—those that I had acquired over a near decade working at an advertising agency—to come up with a way to study what was happening and suggest a creative solution.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

In the fight against Covid-19, overt, science-based messaging is not enough to persuade everyone to get vaccinated no matter how encouraging the data. Recent studies on attitudes toward vaccines and other health-promoting measures have provided clues as to why so many are still opposed, suggesting many who were resistant had reasons that were rooted along moral grounds. This process of moralization occurs when a belief becomes a moral matter of 'right and wrong' rather than a means to an end. Because moral beliefs are more entrenched, they've proven much more difficult to change. There is one approach that could increase the appeal of Covid-19 vaccines among those whose vaccine attitudes have become moralized. By reframing vaccine communication around the core basis of a person's moral beliefs, messages could be made into much more compelling moral arguments. In this study among parents with young children (11 years and under), we randomly assigned participants to read one of several different pro-vaccine health posters rooted in moral and non-moral arguments, then measured attitudes across several scales. We predicted and found that messages reframed along moral values of "purity" were significantly more effective at reducing vaccine hesitancy and increasing behavioral intent to be vaccinated compared to other messages. The hope is that these findings can improve health messaging targeting parents with children (11 years and under) who remain hesitant about vaccinating their children and increasing uptake of these life-saving measures.

INTRODUCTION

On December 14th, 2020, the first vaccine for Covid-19 was administered in the United States. One year later, just over half of eligible adults were fully vaccinated, according to the Centers for Disease Control and Prevention [CDC] (60% as of Dec. 14th, 2021). While this has been lauded as a triumph for science, medicine, and the collaboration of global organizations to fight the Covid-19 pandemic with such speed and concentrated effort, a large percentage of Americans remained at high risk of infection without the protection provided by a full dose of the vaccine (CDC, 2021). Even more at risk is the younger, more vulnerable population, children ages 11 years and under. Though approval for emergency use of vaccines was not available for those under 11 until much later, the rate for full vaccination remains abysmal (28% according to the American Academy of Pediatrics [AAP], 2022).[1] Despite best efforts of political leadership and public health authorities to close the gap between the vaccinated and unvaccinated—through outreach, education, big-budget marketing campaigns, incentives, home visits, and public mandates—many Americans remained vulnerable many of their own choosing. Given the nature of the virus and its ability to mutate, evolve and spread quickly over time, more deadly variants of Covid-19 have, and will continue to, threaten the country's recovery and a return to normal.

Early in the rollout of Covid-19 vaccines, the primary concern of those who were hesitant was the efficacy and safety of the vaccines. For parents, it was primarily the lower rate

[1] At the time of this writing, June 20, 2022, both Moderna and Pfizer vaccines for children under 5 years had just been approved by the FDA and the CDC with roughly 18 million eligible.

of infection among children, or the belief that the younger the child, the less vulnerable they will be to the vaccine side effects. But soon, with waves of positive, reassuring scientific data supporting the vaccine, along with the FDA's full approval, uptake of the vaccines slowly began to climb again. Yet too many adults and children remained unvaccinated. It's believed that many of those who continued to deny vaccination share attitudes that are more deeply rooted than the pharmacology alone. Much like mask-wearing had become politicized at the beginning of the Covid-19 pandemic, we believe similarly held attitudes and beliefs are linked to the decision of getting vaccinated.[2]

Early research by Nyhan, Reifler, Richey, & Freed (2014) showed that an evidence-based approach to messaging came up short on persuading parents for uptake of the measles-mumps-rubella (MMR) immunization. A few years later, research by Amin and colleagues (2017) found similar behavior among parents of unvaccinated children years before the Covid-19 pandemic. Results from Amin et al. (2017) mirrored that of Nyhan et al. (2014) showing an evidence-based approach proved little to no success in changing attitudes toward vaccines; sometimes even having the opposite effect (Amin et al., 2017). Amin et al. (2017) suggested that one possible reason for parents' hesitancy toward vaccinating their children could be explained by the moral roots of which those attitudes are based. That is, the decision to vaccinate or not vaccinate their children was not simply a means to an end (e.g., vaccination to stay healthy) but a matter of 'right' and 'wrong'. To test this, Amin et al. (2017) applied Moral

[2] A 2020 report by Pew Research showed conservatives having stronger anti-mask beliefs compared with moderates and liberals—we believe similar attitudes and moral beliefs were linked to the decision of getting vaccinated.

Foundations Theory (MFT) developed by Haidt (2012). They designed a model using predictors for all six moral foundations of MFT with degree of vaccine hesitancy as the outcome.

Moral Foundation Theory (MFT) is a framework which explains the origins of our moral values through several moral foundations or moral endorsements. It is a psychological system we use to form beliefs, attitudes, judgments, and decisions, and cross-culture evidence suggests that it is universal to all people (Haidt, 2012; Haidt & Graham, 2007). In the latest and most widely accepted framework, Haidt and colleagues outline six major foundations for which evidence best supports (Iyer et al., 2012). They are: (1) The *care/harm* foundation, which is rooted in our evolutionary attachment system, connects our ability to sense pain and suffering in others with motivations to care for, nurture and protect. (2) The *fairness/cheating* foundation captures the sensitivity toward equal-exchanges, or concerns for equality, with virtues of justice and reciprocity. (3) The *loyalty/betrayal* foundation, based upon our tribal roots, as well as our intergroup competitive nature, underlines the values of alliances or partnerships. (4) The *authority/subversion* foundation, shaped by our long social history and hierarchical structure posits those with both upward and downward relationships stand to benefit while also valuing ideas of leadership and followership. (5) The *purity* foundation (also referred to as *sanctity/degradation* foundation), is underlined by the religious-like view that 'the body is a temple' and aim to protect the body from contamination or immoral acts. (6) The *liberty/oppression* foundation values autonomy and individual freedoms which, given its nature and resistance to dominance, and can conflict with those values of authority/subversion.

Moral Foundations Theory offers a useful model to examine the basis of attitudes, however, it does not offer predictions on how moral frames may affect attitudes for different people, groups, and ideologies across issues. For instance, previous research by Graham and

colleagues (2009) found that liberals tend to rely more heavily on the *harm* and *fairness* moral foundations, whereas conservatives tend to rely more on the ingroup (or *loyalty*), *authority*, and *purity* moral foundations. So perhaps it's unsurprising that liberals, concerned more with harm and fairness, see the way racial and ethnic minorities are treated by the justice system as a major issue when compared to conservatives (Pew Research Center, 2020). However, Moral Foundations Theory cannot explain why liberals still dislike their political opponents with such intense fervor. Too often in American politics do individuals view policy debates between liberals and conservatives as battles. We stop selecting policies based on actual content and matching them to our personal values, and more as a matter of Us vs. Them; a behavior that would seem more characteristic of conservatives than liberals. Case in point: when examining whether relevant moral foundations can affect attitudes, we also must consider the role of one's prior views. The present research on health decisions and moral concerns, like that by Amin et al. (2017), examines whether moral foundations may, in part, underlie this decision whether or not to be vaccinated.

In the first study of their research, Amin and colleagues (2017) recruited a thousand parent participants fill out an online survey about moral foundations and vaccine attitudes, then ran a regression model to uncover any correlation. Results showed those high in vaccine hesitancy attitudes were twice as likely as lower-hesitancy individuals to emphasize moral foundations of *purity* and *liberty*, but not others. In the second study, which was conducted independently from the first, researchers examined the relationships between moral foundations, attitudes towards vaccines as well as beliefs about vaccines taken from previous research and from anti-vaccine websites. Those individuals emphasizing moral *purity* were also more likely

to hold a variety of anti-vaccination beliefs and to have negative attitudes toward vaccination (Amin et al., 2017).

Considering the basis of those moral foundations, the results from Amin et al. (2017) study makes sense. Those high in moral *purity,* or those who hold the view that 'the body is a temple,' were more likely to believe that vaccines might contain toxins and contaminants, jeopardizing bodily integrity. Also unsurprising is that those high in moral *liberty*, or those who value autonomy and individual freedoms, view vaccine mandates as a breach of their protected civil liberties, or a violation of independence (Amin et al., 2017). These findings suggest that moral foundations do underscore the decision to not get vaccinated. However, the stubbornness and fortitude with which these individuals hold, withstanding such strong counter arguments, needs to be further investigated.

Consistent with the theory on moral roots is research on moral convictions. As Eagly & Chaiken (1993) define it, attitudes are simply positive or negative evaluations. But moral convictions are strong and absolute beliefs on morality, according to Skitka, Bauman & Sargis (2005). To make this distinction clearer, consider the long and ongoing debate over abortion legislation in the United States. No matter if they are for or against legalized abortion, not everyone agrees that their view on the matter constitutes a moral imperative. Therefore, it is not moral conviction for everyone. For example, one common moral argument against abortion is that life begins at conception and abortion is murder. "The killing of an innocent fetus is a most heinous sin." But others who are against abortion rights might take a different, non-moral stance. "Increasing access to birth control, health insurance, and sexual education would make abortion unnecessary." Although many issues could be and often are labeled a "moral issue,"

there is a full range of responses to the extent people's attitudes about the issue is rooted in their personal sense of morality or something else.

Compared to other constructs related to preference—like attitude strength or importance—attitudes that reflect moral beliefs are seen as "objectively and universally true," and, "inherently more motivating and self-justifying" than non-moral attitudes (Skitka, Bauman & Mullen, 2008). This makes people with moral conviction steadfast and inflexible in their belief, with little-to-no proof required. Not only are moral convictions are seen as strong, morally rooted attitudes, they are equally strong in moral investment. Findings from Skitka's research (2010) support this notion as well as the connection to emotional responses. More recent work by Skitka et al., (2021) showed that those with moral convictions tend to be more intolerant of change and more defensive in their position. We have seen this on display recently with behavior of those hesitant toward the Covid-19 vaccine (e.g., rejection of the vaccine, organized protests, spread of anti-vax misinformation). Moral mandates appear to go well beyond standards that allow people to evaluate fairness in an outcome. In some cases, this could motivate people to take more prosocial actions (e.g., getting vaccinated for the safety of others), or justification to take more extreme action (e.g., forgoing vaccinations to preserve sanctity even with risk of infection) to achieve some moral ending.

The process of an issue or a stance becoming "moralized" in this way is when an attitude toward an object or behavior is seen not as a means to an end but as a matter of right and wrong (Rozin, 1999). Rozin and colleagues' work on *moralization* determined that the link between health-related decisions and moral values showed up at a much higher frequency throughout American history compared to other topics like disease, smoking, or drugs (Brandt & Rozin, 1997). That is, the degree to which people view objects or behaviors can vary between

preference, convention, or moral imperative, but when it comes to health decisions, they're often cast in a moral light. As with mask-wearing during the Covid-19 pandemic, those choosing not to wear masks cited reasons that fell in line with a traditional conservative viewpoint; values like 'loyalty to party' and 'freedom of choice' (Kaplan et al., 2020). But earlier research on the association between moral values and vaccine hesitancy had uncovered a link with moral foundations of *purity* and *liberty,* introduced earlier (Amin et al., 2017).

Using correcting information to change attitudes, like evidence-based health-focused messaging may seem like a sound strategy, but it isn't enough to change a person's attitude when rooted in moral values (Amin et al., 2017). And, oftentimes, the more someone perceives a moral basis for an attitude, the stronger that attitude is; another characteristic of moral convictions (see Skitka et al., 2021). Few evidence-based interventions have effectively reduced vaccine hesitancy and increased vaccination intentions or uptake. Research by Nyhan et al. (2014), for example, showed pro-vaccination messaging that highlights facts about vaccination failed to reduce vaccine hesitancy.

Given the moral roots of vaccine hesitancy (Amin et al., 2017) it might be more fruitful to target moral values of purity and liberty in vaccine messaging to reduce hesitancy and improve vaccination intentions. A specific type of technique popular in the political sphere is that of moral reframing. In research by Feinberg & Willer (2013, 2015), they demonstrated a successful way for how to form an argument in favor of a political position that members of another group would not normally support in terms of moral concerns. In a 2013 study, Feinberg and Willer found that conservatives who were presented with a purity-based argument that emphasized how, "dirty, disgusting, and impure" environmental degradation was, they reported greater environmental concern and belief in climate change compared to response by those

conservatives who saw the typical, harm-focused argument (e.g., “devastation and dangers”) of a failing environment. Fitting a message to a particular audience in this way is persuasive because it makes the position relevant and in accordance with the audience's deeply held moral convictions (Feinberg & Willer, 2015).

Moral reframing has proven effective across a range of polarizing topics, particularly those in the political sphere. However, recent research has shown that this approach has also worked with health-related issues and decisions. Of particular relevance is research by Kaplan and colleagues (2020) who tested this approach by reframing messaging promoting mask wearing to be in line with the moral concerns of “anti-maskers.” They found that messages framed around the values of loyalty were more persuasive and more effective at encouraging actual mask wearing among their participants than messages that were evidence based (Kaplan et al., 2020). Those effects even held up when tested one week later.[3]

Consistent with this research (Kaplan et al., 2020), we want to examine whether moral framing would influence vaccine hesitancy and vaccine intentions. Given that past research found that moral purity and liberty were associated with vaccine hesitancy and negative attitudes toward vaccines, the present research will focus on those moral foundations.

The proposed research includes two studies designed to examine the effect moral reframing has on attitude change toward Covid-19 vaccines among vaccine-hesitant parents with children under 11 years of age. The research will investigate the relationship between moral foundations and attitudes toward vaccines, as well as the effectiveness of persuasive messages of different strength and qualities. In Study 1, we aim to establish the relationship

[3] The loyalty messaging used a rallying call to action, “…when America is threatened, we rise as one. Help Protect America and wear a mask” (Kaplan et al., 2020).

between moral values and vaccine hesitancy demonstrating that in fact attitudes towards the Covid-19 vaccines have become moralized. We also expect a weak relationship between a person's trust in science and their attitude towards vaccines.[4] In Study 2, will examine if moral framing will reduce parents' COVID-19 vaccine hesitancy and increase intentions to have their child get a COVID-19 vaccine booster. Based on past research showing a vaccine hesitancy is related to moral purity and liberty (Amin et al., 2017), we predict that, compared with messages emphasizing science and control messages, messages about the COVID-19 vaccine emphasizing purity and liberty will reduce vaccine hesitancy and increase vaccine booster intentions. If these results are obtained, this research will provide a better understanding of the psychology of vaccine hesitancy among parents with young children and offer insights into how to reduce hesitancy and increase vaccine uptake.

[4] While trust in science and the purity foundation share associations with religiosity, we aim to demonstrate that the two measures can operate on their own (e.g., a participant with hesitancy toward vaccines can be high in purity foundation endorsement but also in trust in science).

STUDY 1: VACCINE HESITANCY AND MORAL BELIEFS

Methods

Participant Recruitment

Based on our pre-test study, we anticipated a small to moderate effect sizes (average Cohen's d = 0.2 to 0.4). Representative samples of participants were recruited through Amazon's participant recruitment platform, Mechanical Turk.[5] Random sampling will ensure any results obtained from our research should approximate what would have been obtained if the entire population had been measured (Shadish et al., 2002).

G*Power 3.1.9 (Faul et al., 2009) was used to conduct a power analysis for this study. This analysis indicated that 200 participants would be needed to detect a small to medium effect size and achieve a power of .95. The study's target population was parents (18 years or older) of children (11 years or under); half with vaccinated children and half with unvaccinated children.

Sample Demographics

Six-hundred and six participants in total were recruited through the CloudResearch platform. After excluding non-parents and parents of children already had to COVID-19 vaccine, the final sample number was n = 284 (See *Appendix A* for criteria). All participants were parents, with over 75% between the ages of 25 and 44 years. Gender was split roughly evenly between men and women (47.8% women, 47.1% men, >3.8% non-binary/gender variant or prefer not to say) and the racial/ethnic profile was close to national average with exception of

[5] Samples for online experiments are more accessible and the sizes are significantly larger, allowing for ease, efficiency, and ability to eliminate irregularity that is only natural for data collected online.

Hispanic/Latinx population (68.9% Caucasian or White; 7.8% Asian American; 2.7% Hispanic/Latinx; 13.3% African American or Black; >1% Middle Eastern; 2.7% "Other").

Materials

Participants were asked to complete an online survey asking questions that captures attitudes toward Covid-19 vaccines. We measured moral beliefs (MFQ Scale), Vaccine Hesitancy (adapted Vaccine Hesitancy Scale) and Trust in Science (TIS Scale).

Moral Foundations Questionnaire. Participants completed a shortened version of Moral Foundations Questionnaire (MFQ20) (Graham et al., 2011). Cronbach's alpha ranged between .70 and .80 across all foundations, which indicates a good level of reliability. Participants were asked to answer questions that measured their moral standings when making judgments or decisions. The first part asks, *When you decide whether something is right or wrong, to what extend are the following considerations relevant to your thinking*, using a six-point rating scale ranging from "not at all relevant" (0) "to extremely relevant" (5). The second part asks participants to indicate their agreement or disagreement with each statement on a similar six-point rating scale that ranges from strongly disagree (0) to strongly agree (5). Sample items from the sanctity subscale include "Whether or not someone violated standards of purity and decency" and "I would call some acts wrong on the grounds that they are unnatural." To create composite variables representing the moral foundations (e.g., *care/harm*, *fairness/cheating*, *loyalty/betrayal*, *authority/subversion, purity,* and *liberty/oppression*), items were averaged together following the moral foundations questionnaire scoring key. The complete moral foundation's questionnaire and scoring key can be found in *Appendix B.*

Unfortunately, due to an error in experiment coding, the liberty/oppression foundation was omitted from the survey. A similar error occurred in Study 2.

Trust in Science and Scientists Inventory. In a separate survey, participants filled out a 21-item questionnaire, the Trust in Science Survey (TIS), assessing their level of trust in science and scientists (Nadelson et al., 2014). Participants read and ranked a series of statements along a five-point rating scale that ranges from strongly disagree (1) to strongly agree (5), with the middle item on the scale serving as a neutral point. The inventory consists of a combination of items such as "I trust scientists can find solutions to our major technological problems" and reversed phrase items such as "We cannot trust scientists because they are biased in their perspectives." The scale showed good reliability (Cronbach's alpha of .91). See *Appendix C* for questions/scale.

Adapted Vaccine Hesitancy Scale. Using a version of the Vaccine Hesitancy Scale (VHS) (Shapiro et al., 2018), adapted for Covid-19, participants answered 14 questions reflecting common sentiments expressed by individuals who advocate against vaccination, as well as beliefs they do not endorse which are shared by the scientific community to determine their level support or opposition for Covid-19 vaccines. Participants read statements and ranked them across a five-point rating scale that ranges from strongly disagree (1) to strongly agree (5), with the middle item again serving as a neutral point. Sample items include "Please indicate your attitudes toward booster shots for the Covid-19 vaccine for your child" and "How likely would you be to get an annual Covid-19 shot for your child?". The scale showed good reliability (Cronbach's alpha of .95). See *Appendix D* for questions/scale.

Procedure

Participants were invited to fill out an online survey, accessible through a computer or mobile device. The survey, hosted through the third-party web-based platform, Qualtrics, began with an introduction and statement of consent. Consenting participants proceeded, first

completing a survey that asked how they determine right and wrong when making decisions. In a second survey, participants answered questions measuring their level of agreement with science and scientists. Finally, participants were asked about their views on the Covid-19 vaccines before filling in their demographic information. Once they were finished, participants were debriefed before exiting the study. Average time to complete was about ten minutes.

Predictions

Drawing from past research (Amin et al., 2017), we expected the purity and liberty foundations to predict vaccine hesitancy and that the other foundations would not predict hesitancy. We further predicted that trust in science would weakly predict vaccine hesitancy.

Results

Data Analysis

Data were analyzed using IBM SPSS Statistics, version 28 for Mac. A simple linear regression was conducted with vaccine hesitancy as the outcome, and the five Moral Foundation scores and Trust in Science score as the predictors.

Main Findings

Moral Foundation explained a significant portion of variance in Vaccine Hesitancy, $R^2 = .363$, $F\ (6, 278) = 26.41$, $p < .001$. The simple linear regression analysis indicated that Loyalty/Betrayal Endorsement positively predicted Vaccine Hesitancy scores, b = .26, $t(278) = 3.72$, $p < .001$. In other words, those high in Loyalty/Betrayal Foundation Endorsement predicted negative attitudes towards vaccines. The Purity Endorsement did not show significant results ($p > .05$). See *Table 1* for the Regression Table.

Table 1. Regression Analysis Summary for Predicting Vaccine Hesitancy

	B	Coefficients Std. Error	β	t	Sig.
(Constant)	.034	.402		.085	.932
MFQ Harm	-.039	.079	-.307	-.490	.624
MFQ Fairness	.069	.080	.065	.859	.391
MFQ Loyalty	.255	.069	.268	3.718	<.001
MFQ Authority	-.207	.077	-.208	-2.691	.008
MFQ Purity	-.010	.061	-.11	-.159	.874
Trust in Science	.909	.088	.575	10.309	<.001

Note: Vaccine Hesitancy scores across the five domains of The Moral Foundation Theory (Haidit, 2012).

Contrary to predictions, the purity foundation did not predict vaccine hesitancy. Interestingly, loyalty and authority did significantly predict vaccine hesitancy with higher loyalty predicting less hesitancy and higher authority predicting less hesitancy. Consistent with predictions, trust in science predicted vaccine hesitancy.

The failure to find that purity predicted vaccine hesitancy is curious and contradicts a growing amount of research showing a strong association between purity vaccine related attitudes and behaviors (e.g., Amin et al., 2017; Raoul & Huntsinger, 2021; Reimer et al., 2022). Despite the failure to find a relationship between moral purity and vaccine hesitancy, given the clear link between the two in many past studies, we examined the effects of moral framing on vaccine hesitancy and booster intentions in a second study.

STUDY 2: CHANGING VACCINE ATTITUDES USING MORAL PERSUASION

In this study, we directly examined the effects of moral framing on vaccine hesitancy and vaccine booster intentions among parents of children under eleven years of age. Participants first completed the moral foundations questionnaire. They next experienced the moral framing manipulation in which they were exposed to one of four messaging conditions: moral purity, moral liberty, science or control. Participants next completed the measure of Covid-19 vaccine hesitancy from Study 1 and indicated their intentions to have their child get Covid-19 vaccine booster shots. Finally, participants rated the likability of the message they saw and completed demographic questions.

Past research found that vaccine hesitancy has roots in moral purity and liberty (Amin et al., 2017). We therefore predicted that vaccine hesitancy will be lower for liberty and purity messaging conditions compared to the science and control conditions, and that booster intentions would be higher in the purity and liberty messaging conditions compared to the science and control conditions.

Methods

Design

Participants were asked to complete a similar set of survey questionnaires related to Moral Foundations, then were exposed to one of four messaging conditions (purity, liberty, science and control), and finally completed measures of vaccine hesitancy and vaccine booster intentions. Participants then rated the likability of what they saw across four domains (e.g., compelling, informative, interesting, and enjoyable). For our statistical analyses, we ran three

separate one-way ANOVAs for each of the dependent measures with message condition as the IV. Where an ANOVA was significant, we followed up with simple effect tests to determine the patterning of means.

Sampling Plan

Drawing from the Kaplan et al. study (2020), a small effect size (average Cohen's d = 0.2) is anticipated. Representative samples of participants were recruited from Amazon's MTurk. Once more, random sampling would help generate results that correspond with the entire population if it could be measured (Shadish et al., 2002). To reach adequate statistical power to detect effect with alpha = .05 and beta = .95, we ran a G*Power 3.1.9 (Faul et al., 2009) to determine a necessary sample size of at least 400 participants (n = 400); again recruiting over the target to meet the minimum target of 50 participants per condition set. Nevertheless, to ensure proper statistical power, we recruited 100 participants per condition. As a screening tool, all participants were asked if they had unvaccinated children under the age of 11. Only parents who had unvaccinated children under the age of 11 were included in the study.

Sampling Demographics

Eight-hundred and 88 participants were recruited from CloudResearch. After exclusion of non-parents and those parents who vaccinated their children for Covid-19, the final sample was n = 503 (See *Appendix A* for criteria). All participants were parents, with over 81.1% between the ages of 25 and 44 years. Gender skewed female (52.3% women, 47.5% men, >1% non-binary/gender variant or prefer not to say) and the racial/ethnic profile was close to national average, again with exception of Hispanic/Latinx population (71.6% Caucasian or White; 6.4% Asian American; 8.4% Hispanic/Latinx; 10.8% African American or Black; >1% Middle Eastern; 2.2% "Other").

Materials

Moral Foundations Questionnaire. Identical to Study 1, participants first completed the shortened version of Moral Foundations Questionnaire (MFQ20) (Graham et al., 2011) to measure their moral standings when making judgments or decisions. The same five foundations from Study 1 were included in the survey. The results of analysis revealed a Cronbach's alpha of between .70 and .80 across all foundations, again a good level of instrument reliability. See *Appendix B* for questions/scale.

Health Messaging Conditions. Participants were randomly assigned to one of four messaging conditions: liberty, purity, science, or a control. See *Appendix G.* Messages were designed as community health posters, FDA and/or CDC logos to ensure familiarity and source credibility.

Adapted Vaccine Hesitancy Scale. Similar to our pilot study, we used the adapted Vaccine Hesitancy Scale (VHS) (Shapiro et al., 2018), to ask participants 14 questions reflecting common sentiments expressed by individuals who advocate against vaccination, as well as beliefs they do not endorse to determine their level support or opposition for Covid-19 vaccines. The results of analysis revealed a Cronbach's alpha of .96. See *Appendix C* for questions/scale.

***Booster Attitudes*.** Questions specific to vaccine boosters were also asked to measure behavioral intent for future Covid-19 vaccination (e.g., "Please indicate your attitude toward Covid-19 vaccine boosters for your child/children." and, "How likely are you to vaccinate your child/children if Covid-19 becomes an endemic, like the flu?") using a five-point rating scale (from "Positive" to "Negative"). The results of analysis revealed a Cronbach's alpha of .93. See *Appendix G* for questions/scale.

Health Messaging Ratings. Participants rated the poster along four qualities (e.g., "Was it compelling?" "Was it informative?" "Was it interesting?" "Was it enjoyable?") using a five-point scale (from "Not at all" to "Extremely"). See *Appendix E and F* for questions/scale.

Covid-19 History and Demographics. Personal history of Covid-19 (e.g., exposure, vaccine status) was also recorded (with HIPAA compliance) along with basic demographics (e.g., age, race/ethnicity, age, household income, level of education, political orientation as well as number of children and age of youngest child). See *Appendix H* for questionnaire.

Procedure

Participants were invited to fill out an online survey, accessible through a computer or mobile device. The survey, hosted through the same survey platform as Study 1, Qualtrics, again begins with an introduction and statement of consent. After indicating informed consent, participants completed an initial screening in which they were asked if they had children under eleven years of age who were not yet vaccinated for Covid-19. Only participants who answered "yes" continued on to the experiment proper. Participants then completed the moral foundation questionnaire. Next, participants were randomly assigned to one of four message conditions in the form of an informational poster. After spending at least two minutes with the poster, participants then completed the measure of Covid-19 vaccine hesitancy and indicated their intentions to have their child get a Covid-19 booster vaccination. Participants were then asked to rate the poster on its likeability along four items and briefly describe its content. Participants then filled out questions regarding their history of/exposure to Covid-19. Finally, participants were asked a series of demographic questions (same as in Study 1) before being debriefed and exiting the study. Average time to complete Study 2 was about 20 minutes.

Predictions

Drawing on the research by Kaplan et al. (2020), we expect significant results for all three outcomes of interest: Message Type & Vaccine Hesitancy, Message Type & Message Likability and Message Type & Future Covid-19 Vaccine Intentions. Specifically, we predict the following pattern of means for each DV as a function of message condition:

1. Vaccine Hesitancy will be lower for Liberty and Purity messaging conditions compared to the Science/evidence-based and control conditions.
2. Message Likability will be higher for Liberty and Purity messaging conditions compared to the Science/evidence-based and control conditions.
3. Future Covid-19 Vaccine Intentions will be higher for Liberty and Purity messaging conditions compared to the Science/evidence-based and control conditions.

Results

Data Analysis

Data again were analyzed using IBM SPSS Statistics, v28 for Mac. Three one-way analyses of variance (ANOVA) were conducted, with the four health messaging conditions (e.g., Purity, Liberty, Science, and the control) as the IV in each, and vaccine hesitancy, booster attitudes and quality metrics/attributes as DVs.

Descriptive Statistics

Based on past research for which this study was modeled (Kaplan et al., 2020), we looked at participants' political ideology given its strong correlation to vaccine attitudes (Amin et al., 2017). Of those participants who report (n = 298), 26.1% reported "Liberal" or "Very Liberal" in their views, while 24.9% reported "Conservative" or "Very Conservative." The

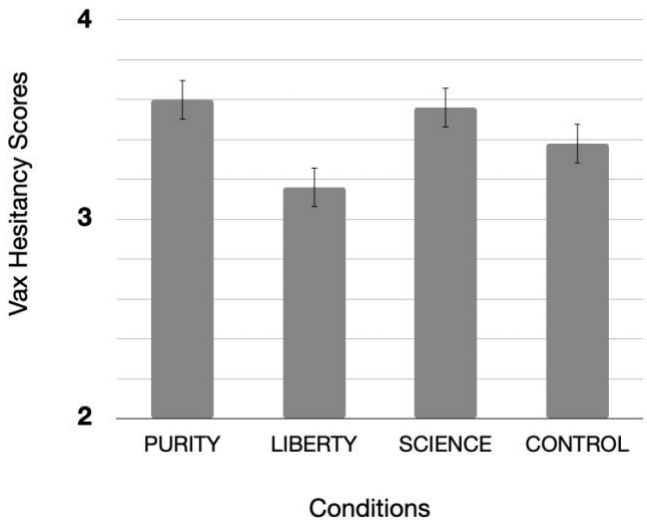
majority of participants (49%) fell somewhere in the middle, between “Somewhat Liberal” and “Somewhat Conservative” (20% reported “Moderate”).

We were also interested in participant’s Covid-19 status. Of those who reported their own vaccination status (n = 502), 72.4% of adult participants said they had at least one dose (51% of which were fully vaccinated and boosted), while the other 26.1% were unvaccinated. These numbers are in line with the national averages (CDC, 2022). Participants who reported on their children’s vaccination status (n = 503), 56.7% said their child/children had at least one dose (29.2% full vaccinated and boosted), while 43.3% said their children remained unvaccinated. Again, these numbers are in line with the national averages (AAP, 2022).

Main Findings

First, results of the ANOVA with vaccine hesitancy as a DV revealed there was a significant difference across messaging conditions, F (3, 499) = 5.34, p = .001, η^2 = .031. This ANOVA was followed up with three Fisher’s LSD post-hoc tests for multiple comparisons. The difference in vaccine hesitancy scores between the Purity condition (M = 3.60, SD = 1.04) and the Liberty condition (M = 3.16, SD = 1.12), were statistically significant, t(499) = 3.11, p = .002, 95% C.I. = [.161, .716]). The difference in vaccine hesitancy scores between the Purity condition and the control (M = 3.20, SD = 1.15) were also statistically significant, t(499) = 2.84, p = .005, 95% C.I. = [.124, .677]). Vaccine hesitancy scores were significantly higher for Purity when compared to both Liberty condition and control (higher scores represent more positive vaccine attitudes, or lower hesitancy). There was no statistical difference between the Purity condition and the Science condition (M = 3.55, SD = 1.16) (p > .05). See *Figure 1.*

Figure 1. Effectiveness of Messaging Conditions on Vaccine Hesitancy Scores

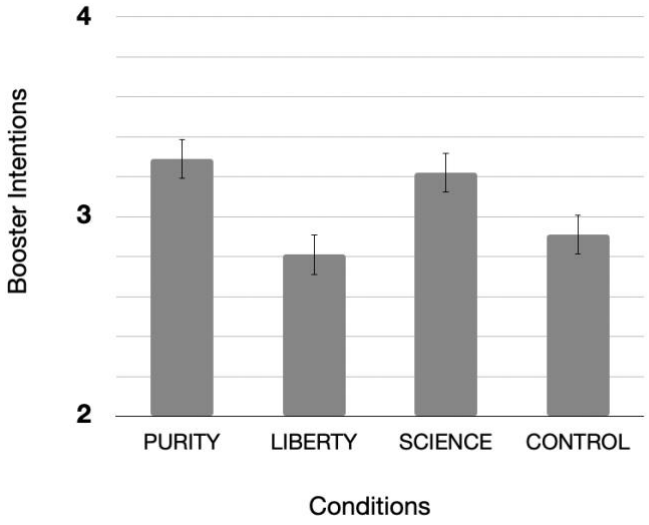


Note: Mean scores (with error) for vaccine hesitancy scale across messaging conditions. Significant difference between Purity (M = 3.60, SD = 1.04), Liberty condition (M = 3.16, SD = 1.12), and control (M = 3.20, SD = 1.15). There was no statistical difference between the Purity condition and the Science condition (M = 3.55, SD = 1.16).

Second, results of the ANOVA with booster intentions as the DV showed there was also a significant difference across messaging conditions, F (3, 498) = 3.09, p = .027, η^2 = .018. Again, the ANOVA was followed up with three Fisher's LSD post-hoc tests for multiple comparisons. The difference in booster intentions between the Purity condition (M = 3.29, SD = 1.46) and the Liberty condition (M = 2.81), SD = 1.46) were statistically significant, t(498) = 2.56, p = .011, 95% C.I. = [.111, .851]). The difference in booster intentions between the Purity condition and the control (M = 2.91, SD = 1.51), were also statistically significant, t(498) = 2.02, p = .044, 95% C.I. = [.010, .747]). Booster intentions were significantly higher for Purity when compared to both Liberty condition and control (higher scores represent greater intention to get vaccine boosters in the future, another measure of vaccine positivity). There was

no statistical difference between the Purity condition and the Science condition (M = 3.22, SD = 1.53) (p > .05). See *Figure 2.*

Figure 2. Effectiveness of Messaging Conditions on Booster Intentions

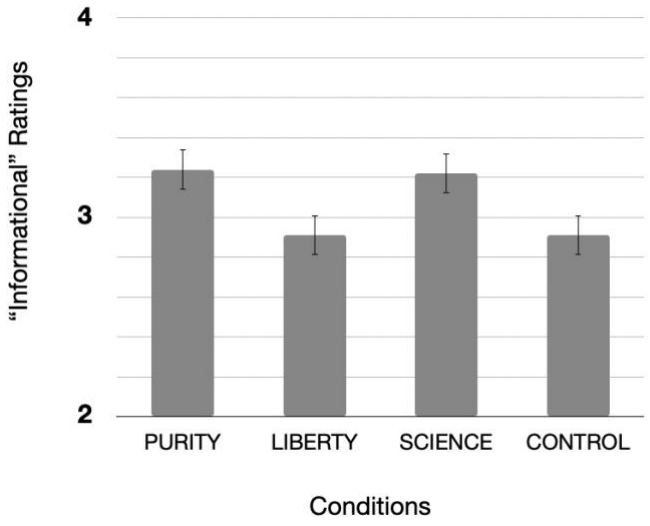


Note: Mean scores (with error) for booster intentions across messaging conditions. Significant difference between Purity (M = 3.29, SD = 1.46), Liberty condition (M = 2.81, SD = 1.46), and control (M = 2.91, SD = 1.51). There was no statistical difference between the Purity condition and the Science condition (M = 3.22, SD = 1.53).

Finally, results of the ANOVA with the quality metric "Informative" as the DV also showed a significant difference across messaging conditions, F (3, 503) = 4.01, p = .008, η^2 = .023. Again, the ANOVA was followed up with three Fisher's LSD post-hoc tests for multiple comparisons. The difference in ratings for "Informative" between the Purity condition (M = 3.24, SD = 1.31) and the Liberty condition (M = 2.91, SD = 1.32), were statistically significant, t(3) = 2.05, p = .042, 95% C.I. = [.012, .635]). Participants found the message or content of the Purity condition to be more informative than that of the Liberty condition. There was no statistical difference between the Purity condition and the Science condition (M = 3.46, SD = 1.30) (p > .05). Nor was there a difference detected between Purity condition and with the

control (M = 3.24, SD = 1.01) (p > .05). This was the only quality metric for which Purity demonstrated any advantage. Separate one-way ANOVAs did indicate significant differences across conditions for quality metrics "Interesting" and "Enjoyable," revealing the Control condition to be rated significantly higher than the other three, Purity, Liberty and Science. This could be explained by the fatigue participants feel about Covid-related content. For the final "Compelling" quality there was no significant difference found. See *Figure 3.*

Figure 3. Effectiveness of Messaging Conditions on "Informative" Quality



Note: Mean scores (with error) for the quality metric "Informative" across messaging conditions. Significant difference between Purity (M = 3.24, SD = 1.31) and Liberty condition (M = 2.91, SD = 1.32). and control (M = 2.91, SD = 1.51). There was no statistical difference between Purity and Science (M = 3.46, SD = 1.30) nor between Purity and the control (M = 3.24, SD = 1.01).

DISCUSSION

Implications

We set out to determine if moral reframing could effectively change attitudes towards Covid-19 vaccines. Using a similar approach to past research on anti-mask wearing and social distancing attitudes (Kaplan et al., 2021), we demonstrate the effectiveness of moral reframing through health messaging on Covid-19 vaccine hesitancy and booster vaccine intentions among parents.

In a first study, participants completed measures of moral foundations and vaccine hesitancy. Unlike past research (Amin et al., 2017) moral purity was not associated with vaccine hesitancy. However, those who scored higher in loyalty and authority tended to have stronger vaccine hesitancy than those who scored lower in loyalty. While we did not predict this, the results can be explained. Similar to research by Kaplan et al., (2020), concerns for Loyalty were associated with negative beliefs toward health-related issues or decisions (e.g., negative beliefs towards mask wearing). And, considering the basis of the Liberty foundation, which is about feelings of reactance and resentment people feel toward those who dominate them and restrict their liberty, those intuitions are often in tension with those of the authority foundation and perhaps mistrusting of those in charge (Graham et al., 2011). Finally, the absence of harm and fairness as significant predictors, which are often considered in more traditional vaccine-focused messages, is meaningful evidence supported by the study conducted by Amin et al. (2017). This is consistent with the existing research that decisions around the Covid-19 vaccination have become moralized.

In Study 2, we constructed messages about vaccines framed to specifically target moral concerns. Consistent with other research (Kaplan et al., 2021), we found that moral reframing of messages was successful at changing vaccine hesitancy. Health promotion messages framed in terms of moral purity led to a decrease in Covid-19 vaccine hesitancy compared to both the liberty and control conditions. A similar pattern was found for Covid-19 vaccine booster intentions with such intentions being higher in the purity condition than the liberty and control condition. For both outcomes, the purity and science conditions showed similar levels of hesitancy and booster intentions.

In our analyses of ratings, we found that participants in the Purity condition rated messaging to be more "Informative" than those participants in the Liberty condition. Considering cognitive theories of persuasion, this might suggest deeper levels of thinking or responding to message relevant information and prove useful (Eagly & Chaiken, 1984). However, this was not true of the quality ratings "Compelling" or "Enjoyable." The ratings for "Interesting" showed significance, with a difference reported for the control. It is possible that the control condition, which was written on space tourism and included no mention of Covid-19 or vaccines, scored highest in "Interesting" less because of the content and more because of participants' Covid-19 news fatigue or apathy (Guan et al., 2022). However, given message fatigue-evoked resistance to persuasion has been found, it makes the small effect sizes all the more remarkable. Ratings for "Enjoyable" and "Compelling" showed no significance.

In sum, this investigation provides further evidence that moral reframing is an effective persuasion technique in the area of health communication. In this case, messages framed

around moral purity successfully reduced parents' hesitancy about the Covid-19 vaccine for their children and increased intentions to have their child get a Covid-19 vaccine booster.

Limitations

We believe our design and analysis of data were sound; however, no study is without its limitations. First, our sampling method was an online-only survey, which does not ensure equal representativeness across the country (not everyone has access to a computer or the internet). This limits the generalizability of the results of this study with a wider population. To improve the representativeness of the data and broaden the sample, we would suggest adding alternate ways to access the surveys and gather data. Second, as mentioned previously there was a coding error in the experiment program that narrowed our focus to just the five original moral foundations: *harm, fairness, loyalty, authority*, and *purity*. Due to a clerical error, items measuring the liberty foundation were not included in these studies. Finally, we must acknowledge the fact that health guidelines and regulations were fluid and changing throughout this study. Both Moderna and Pfizer vaccines had been approved by the FDA and the CDC for children under 5 years old in June 2022 (four months before our study), the FDA hadn't yet authorized vaccine boosters for this population. While our study introduced the very likely scenario that boosters could eventually receive approval, and become widely available, participants were still, to some extent, responding to a hypothetical scenario. Therefore, it is unclear whether vaccine booster intentions translate into actual behavior.

Future Directions

Future research could explore if messages targeting moral purity would lead to changes in actual behavior. This could be done with a follow-up survey of participants in the study to see if parents had their child vaccinated with the Covid-19 booster shot. Another avenue for

future research would be to include political ideology as a potential predictor of vaccine hesitancy as during the pandemic vaccines became highly politicized.

Although messages targeting moral purity had immediate effects on vaccine hesitancy and booster intentions, it is unclear how durable these shifts in attitudes are. Follow up testing with participants three to six months after initial exposure would test the robustness of these findings. Finally, as discussed above, it would be useful to demonstrate that these changes in hesitancy and intentions translate into actual behavioral change.

Conclusion

The world has changed drastically in the last few decades. So too has science and medicine's place in it. What hasn't changed are people's values. We believe the results of this study can offer new insight into vaccine advocacy campaigns and perhaps communication that promotes life-saving measures more broadly. We hope this research will show that moral reframing can be an effective communication tool used to change attitudes among those hesitant to the Covid-19 vaccine, more so than the evidence-based, counter information approach that has been the used to date. Similar to past research on promoting other health measures, we seek to, a) determine those moral values among vaccine hesitant parents with children under 11 years, and b) demonstrate effectiveness of moral reframing in health messaging as a way to increase vaccination intentions or uptake.

Fortunately, much social psychological research has examined methods to promote behavior change and can provide guidance for making Covid-19-related persuasive messaging more effective. This research is important given the evolving nature of the Covid-19 pandemic and the emergence of more transmissible and deadly variants. Perhaps it will be even more beneficial in preparation for any future pandemics.

Strengthening immunity for everyone, even among those vaccinated, has been crucial in the continued fight against Covid-19. Understanding reasons for persistent vaccine hesitancy among parents, as well as measures to overcome it, can be the difference between a prolonged global pandemic or a more manageable level of disease akin to the seasonal flu where life can feel ‘normal’ again.

APPENDIX A

PRE-REGISTRATION/EXCLUSION CRITERIA

We excluded participants if any of the following applied:

1) If participants answered engagement questions incorrectly (Study 1: attention check, Study 2: content question).

2) If participants spent less than 2 minutes on the message stimulus.

3) If participants were not adult parents (18 yrs or older)

APPENDIX B

MORAL FOUNDATIONS QUESTIONNAIRE (MFQ20)

Part 1. When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? Please rate each statement using this scale:

[0] = Not at all relevant (This consideration has nothing to do with my judgments of right and wrong)

[1] = Not very relevant

[2] = Slightly relevant

[3] = Somewhat relevant

[4] = Very relevant

[5] = Extremely relevant (This is one of the most important factors when I judge right and wrong)

_____Whether or not someone suffered emotionally

_____Whether or not some people were treated differently than others

_____Whether or not someone's action showed love for his or her country

_____Whether or not someone showed a lack of respect for authority

_____Whether or not someone violated standards of purity and decency

_____Whether or not someone was good at math

_____Whether or not someone cared for someone weak or vulnerable

_____Whether or not someone acted unfairly

_____Whether or not someone did something to betray his or her group

_____Whether or not someone conformed to the traditions of society

_____Whether or not someone did something disgusting

Part 2. Please read the following sentences and indicate your agreement or disagreement:

_____When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.

_____I am proud of my country's history.

_____Respect for authority is something all children need to learn.

_____People should not do things that are disgusting, even if no one is harmed.

_____It is better to do good than to do bad.

_____One of the worst things a person could do is hurt a defenseless animal.

_____Justice is the most important requirement for a society.

_____People should be loyal to their family members, even when they have done something wrong.

_____Men and women each have different roles to play in society.

_____I would call some acts wrong on the grounds that they are unnatural.

The Moral Foundations Questionnaire (short version, July 2008) by Jesse Graham, Jonathan Haidt, and Brian Nosek. For more information about Moral Foundations Theory and scoring this form, see: www.MoralFoundations.org

APPENDIX C

TRUST IN SCIENE INVENTORY (TIS)

Rank your level of agreement to each of these statements on the scale provided.

[1] Strongly disagree (I do not trust or believe in science at all)

[2] Disagree

[3] Neutral

[4] Agree

[5] Strongly agree (I fully trust and believe in science)

1. When scientists change their mind about a scientific idea it diminishes my trust in their work.*

2. Scientists ignore evidence that contradicts their work.*

3. Scientific theories are weak explanations.*

4. Scientists intentionally keep their work secret.*

5. We can trust scientists to share their discoveries even if they don't like their findings.

6. Scientists don't value the ideas of others.*

7. I trust that the work of scientists to make life better for people.

8. Scientists don't care if laypersons understand their work.*

9. We should trust the work of scientists.

10. We should trust that scientists are being honest in their work.

11. We should trust that scientists are being ethical in their work.

12. Scientific theories are trustworthy.

13. When scientists form a hypothesis they are just guessing.*

14. People who understand science more have more trust in science.

15. We can trust science to find the answers that explain the natural world.

16. I trust scientists can find solutions to our major technological problems.

17. We cannot trust scientists because they are biased in their perspectives.*

18. Scientist will protect each other even when they are wrong.*

19. We cannot trust scientists to consider ideas that contradict their own.*

20. Today's scientists will sacrifice the well being of others to advance their research.*

21. We cannot trust science because it moves too slowly.*

** Reverse coded item*

The Trust in Science Inventory (2014) by Louis Nadelson, Cheryl Jorcyk, Dazhi Yang, Mary Jarratt Smith, Sam Matson, Ken Cornell, Virginia Husting.

APPENDIX D

ADAPTED VACCINE HESITANCY SCALE (VHS)

The Vaccine Hesitancy Scale (Shapiro et al., 2018), 14-items adapted for Covid-19, captures common sentiments expressed by individuals who advocate against vaccination, and beliefs they do not endorse which are shared by the scientific community and those who advocate for vaccines. Responds across five-point scale from 1 (“strongly disagree”) to 5 (“strongly agree”).

The Covid-19 vaccine is important for my health.

Getting the Covid-19 vaccine is a good way to protect me from Covid-19.

Covid-19 vaccines are effective.

Being vaccinated is important for the health of others in my community.

Covid-19 vaccines offered by the government program in my community are beneficial.

The information I receive about Covid-19 vaccines from the government and other agencies is reliable and trustworthy.

Generally I do what my doctor or health care provider recommends about the Covid-19 vaccine.

Because Covid-19 vaccines are new, they carry more risks than older vaccines.*

I am concerned about serious adverse effects of the Covid-19 vaccines.*

I do not need Covid-19 vaccines because it will disappear soon.*

I do not need the Covid-19 vaccines because Covid-19 is not a real risk.*

I do not need the Covid-19 vaccines because I don’t think they work.*

I will not get the Covid-19 vaccines because it’s my right not to.*

I will not get the Covid-19 vaccine because my friends and/or family aren’t getting them.*

** Reverse coded item*

APPENDIX E

HEALTH MESSAGING CONDITIONS/STIMULI

Participants will be exposed to one of four messaging conditions using random assignment.

MESSAGE 1: CONTROL (V2) – Space Tourism

Headline: The future of space tourism is now (at least in this century)

Text: A year after Bezos, Branson and Musk kicked off a commercial space race by blasting into the upper atmosphere last summer, the race to global space tourism race is off and the market is skyrocketing, with dozens of companies offering reservations on future space flights. Right now, it's high-net-worth individuals who are traveling to space, with the number completed space tourist launches still only counted on two hands. But it seems it's only a matter of time before us "regular travelers" will take to space. Through-out history, humankind has shared an innate trait – the desire to explore. From discovering new land, navigating the seas, conquering the skies and eventually, the exploration of space. 60 years after the edge of space was breached by Soviet cosmonaut Yuri Gagarin, today we all dream of visiting new worlds beyond this one.

Call to Action (CTA): Discoveries are made when you travel outside your comfort zone. Consider private space travel for your next trip. Launching 2050.

MESSAGE 2: SCIENCE

Headline: Vaccines are the #1 defense, just look to the science.

Text: Scientific data collected over the last two years have demonstrate the high effectiveness of all three vaccines (e.g., Pfizer, Moderna, and Johnson & Johnson) at reducing death and hospitalization from the Covid-19 virus. And more options like that from Novavax are on their way. This should come as no surprise because vaccines have been strengthening our immunity

from viral infection for hundreds of years. Covid-19 isn't even the first vaccine to use the "new" mRNA technology, which has often come into question. mRNA vaccine development began in the 1990s and proved successful with SARS and MERS outbreaks more than twenty years ago. The success of vaccines continue to be a triumph for science to fight this global pandemic. That's why public health officials and medical experts urge those who are eligible for Covid-19 vaccination to get vaccinated.

CTA: The scientific evidence is clear and irrefutable. The Covid-19 is safe and effective. Trust the data and get vaccinated.

MESSAGE 3: LIBERTY

Headline: When freedom is threatened, America always fight back.

Text: The United States of America was founded on the principles of life, liberty, and the pursuit of happiness. But the Covid-19 pandemic has disrupted that way of life, seemingly forever. We've been locked inside our homes, we've been forced to adhere to strict mask and distancing rules, and we've even faced ridicule and reprimand at our places of work and worship. Almost one hundred million Americans have been infected with Covid-19. One million Americans have lost their lives. And the deluge of losses continues. Our economy struggles from the fallout of Covid-19 pandemic, affecting food, housing, medical care, and employment. But we can stop the bleeding and retake our freedom once and for all if we come together. The Covid-19 vaccine gives us a weapon to fight back against this common, but invisible, enemy and take back what's rightfully ours.

CTA: When our liberties are threatened, as Americans, we rise as one. Help restore American freedom and liberty and get vaccinated.

MESSAGE 4: PURITY

Headline: For them, the best medicine is prevention.

Text: We have come under attack by a foreign and invisible agent: the Covid-19 virus. Covid-19 has not only invaded our country and degraded our society, but it has also violated our homes. Infection has spread to the bodies of men, women, and children of all ages. Today, almost one hundred million Americans have contracted the Covid-19 disease, with over one million having lost their lives already. That's one million fathers, mothers, parents, grandparents, children, siblings and friends, lost forever. Two years into this pandemic and this unnatural virus continues to plague us, seemingly a never-ending scourge on our way of life. But now, we have the resources and ability to protect ourselves from this disease and restore the integrity our homes and purity of our bodies. The Covid-19 vaccine offers a protection against such a horrible disease.

CTA: If we all get vaccinated, we can stop this contaminate from continuing. Protect yourself and your loved ones and get vaccinated.

APPENDIX F

HEALTH MESSAGING RATINGS

Participants will be asked to rate on a scale from 1 (“not at all”) to 5 (“extremely”) to what extent they found the communication to have of the following qualities: compelling, informative, interesting, enjoyable.

APPENDIX G

COVID-19 VACCINE BOOSTER ATTITUDE

This series of questions was designed to gauge attitudes towards Covid-19 booster vaccines. A booster will be considered a third shot of the Pfizer or Moderna vaccine, and a second shot of the Johnson & Johnson vaccine.

Emerging data suggest that vaccine effectiveness against COVID-19 wanes after the second dose of the vaccine in all authorized populations (CDC, 2022). This reduced protection is cause for concern, especially with new variants. For that reason, authorities recommend a booster shot to maximize vaccine protection from Covid-19 and its variants.

1) Please indicate your attitudes toward booster shots for the Covid-19 vaccine for yourself.
2) Please indicate your attitudes toward booster shots for the Covid-19 vaccine for your child.

    [1] Positive

    [2] Slightly positive

    [3] Neutral

    [4] Slightly Negative

    [5] Negative

As of May 19, 2022, the CDC has approved boosters for those 5 and older.[6]

3) Now that boosters have emergency use authorization for populations 5 and older and are widely available, how likely are you to get a booster shot for yourself?

[6] The CDC now recommends that children ages 5 through 11 years receive a booster shot 5 months after their initial Pfizer-BioNTech vaccination series.

4) Now that boosters have emergency use authorization for populations 5 and older and are widely available, how likely are you to get a booster shot for your child?

    [0] = Extremely unlikely ("there is no chance")

    [1] = Somewhat unlikely ("less likely that I do")

    [2] = Neither likely or unlikely ("undecided")

    [3] = Somewhat likely ("more likely that I do")

    [4] = Extremely likely ("as soon as it's available")

Imagine a year from now (Fall 2023) we're dealing with another new Covid-19 variant. Despite our best efforts to rid ourselves of Covid-19 over the past three years, it's stuck around for yet another season. In this hypothetical scenario, health officials and medical experts are predicting that Covid-19 becomes an endemic, much like the seasonal flu (or Influenza), and recommends people get a Covid-19 booster much like they do the seasonal flu vaccine.

5) How likely would you be to get an annual Covid-19 shot for yourself?

6) How likely would you be to get an annual Covid-19 shot for child?

    [0] = Extremely unlikely

    [1] = Somewhat unlikely

    [2] = Neither likely or unlikely

    [3] = Somewhat likely

    [4] = Extremely likely

APPENDIX H

COVID-19 HISTORY AND DEMOGRAPHICS

A measure of history of Covid-19 infection/exposure, vaccination status, and demographic questions (e.g., age, child's age, gender, income, education, ethnicity) and political orientation.

"Have you or your child contracted COVID-19 and/or return a positive test result?"

"What is the current COVID-19 vaccination status for your child?"

"What is the current COVID-19 vaccination status for yourself?"

Please indicated your gender.

What is your age?

Please indicate your ethnicity.

Please indicate your political status.

Please indicate your political affiliation.

Please indicate your highest level of education.

What is your total house income?

REFERENCE LIST

Akel, K. B., Masters, N. B., Shih, S. F., Lu, Y., & Wagner, A. L. (2021). Modification of a vaccine hesitancy scale for use in adult vaccinations in the United States and China. *Human vaccines & immunotherapeutics*, *17*(8), 2639–2646.

Amin, A.B., Bednarczyk, R.A., Ray, C.E., Melchiori, K. J., Graham, J., Huntsinger, J. R., Omer, S. B. (2017). Association of moral values with vaccine hesitancy. *Natural Human Behavior*, 1, 873–880.

Andrew Luttrell, Richard E. Petty, Pablo Briñol, Benjamin C. Wagner (2016). Making it moral: Merely labeling an attitude as moral increases its strength, *Journal of Experimental Social Psychology.* 65, 82-93.

Bauman, C. W., & Skitka, L. J. (2009). In the mind of the perceiver: Psychological implications of moral conviction. *Psychology of learning and motivation*, *50*, 339-362.

Center for Disease Control and Prevention (2021; 2022). *COVID-19 Data Tracker*. CDC. Retrieved from https://covid.cdc.gov/covid-data-tracker/#datatracker-home

Dunn, A. (2020). *As the U.S. copes with multiple crises, partisans disagree sharply on severity of problems facing the nation.* Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2020/07/14/as-the-u-s-copes-with-multiple-crises-partisans-disagree-sharply-on-severity-of-problems-facing-the-nation/

Eagly, A. H., & Chaiken, S. (1984). Cognitive theories of persuasion. In *Advances in experimental social psychology* (Vol. 17, pp. 267-359). Academic Press.

Eagly, A. H., & Chaiken, S. (1993). *Cognitive Theories of Persuasion*. Fort Worth, TX: Harcourt Brace Jovanovich.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160.

Feinberg, M., & Willer, R. (2013). The moral roots of environmental attitudes. *Psychological Science*, *24*(1), 56–62.

Feinberg, M., & Willer, R. (2015). From Gulf to Bridge: When Do Moral Arguments Facilitate Political Influence? *Personality and Social Psychology Bulletin*, *41*(12), 1665–1681.

Feinberg, M., Willer, R. (2019). Moral reframing: A technique for effective and persuasive communication across political divides. *Social and Personality Psychology Compass*, *13*(12), 1-12.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behavior research methods*, *41*(4).

Funk, C., Gramlich, J. (2021). *10 Facts about Americans and coronavirus vaccines*. Pew Research Center. Retrieved from https://www.pewresearch.org/fact-tank/2021/09/20/10-facts-about-americans-and-coronavirus-vaccines/

Gamson, W. A., & Modigliani, A. (1987). The changing culture of affirmative action. *Research in Political Sociology*, 3, 137–177.

Graham, J., Haidt, J., Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology,* 96, 1029-1046.

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of personality and social psychology*, *101*(2), 366–385.

Guan, M., Li, Y., Scoles, J. D., & Zhu, Y. (2022). COVID-19 message fatigue: How does it predict preventive behavioral intentions and what types of information are people tired of hearing about?. *Health Communication*, 1-10.

Haidt, J. (2012). *The righteous mind: Why good people are divided by politics and religion*. New York, NY: Pantheon Books.

Haidt, J. & Graham, J. (2007). When morality opposes justice: Conservatives have moral intuitions that liberals may not recognize. *Social Justice Research*, 20, 98-116.

Haidt, J., & Joseph, C. (2004). Intuitive ethics: How innately prepared intuitions generate culturally variable virtues. *Daedalus*, *133*(4), 55-66.

Iyer, R., Koleva, S., Graham, J., Ditto, P., & Haidt, J. (2012). Understanding libertarian morality: The psychological dispositions of self-identified libertarians. Iyer, Ravi et al. "Understanding libertarian morality: the psychological dispositions of self-identified libertarians." *Public Library of Science, 7*(8), e42366.

Kaplan, J., Vaccaro, A., Henning, M., & Christov-Moore, L. (2021). Moral reframing of messages about mask-wearing during the COVID-19 pandemic.

Karimi-Malekabadi, F., Trager, J., Kennedy, B., Graham, J., & Dehghani, M. (2022). Moral values predict county-level COVID-19 vaccination rates in the United States. *American Psychologist, 77*(6), 743–759.

Litman, L., Robinson, J., & Abberbock, T. (2017). TurkPrime.com: A versatile crowdsourcing data acquisition platform for the behavioral sciences. Behavior Research Methods, 49(2), 433-442.

Luttrell, A., & Petty, R. E. (2021). Evaluations of self-focused versus other-focused arguments for social distancing: An extension of moral matching effects. *Social Psychological and Personality Science, 12*(6), 946–854.

Luttrell, A., Philipp-Muller, A., & Petty, R. E. (2019). Challenging Moral Attitudes With Moral Messages. *Psychological Science*, *30*(8), 1136–1150.

Luttrell, A., Teeny, J., & Petty, R. E. (2021). Morality matters in the marketplace: The role of moral meta-cognition on consumer purchasing. *Social Cognition, 39*(3), 328–351.

Mark W. Susmann, Mengran Xu, Jason K. Clark, Laura E. Wallace, Kevin L. Blankenship, Aviva Z. Philipp-Muller, Andrew Luttrell, Duane T. Wegener & Richard E. Petty (2021): Persuasion amidst a pandemic: Insights from the Elaboration Likelihood Model, *European Review of Social Psychology.*

Nadelson, L., Jorcyk, C., Yang, D., Jarratt Smith, M., Matson, S., Cornell, K., & Husting, V. (2014). I Just Don't Trust Them: The Development and Validation of an Assessment Instrument to Measure Trust in Science and Scientists *School Science and Mathematics, 114* (2), 76-86.

Nyhan, B., Reifler, J., Richey, S., & Freed, G. L. (2014). Effective messages in vaccine promotion: a randomized trial. *Pediatrics*, *133*(4), 835-842.

Petty, R. E., & Briñol, P. (2012). The Elaboration Likelihood Model. In P. A. M. Van Lange, A. Kruglanski, & E. T. Higgins (Eds.), Handbook of theories of social psychology (Vol. 1, pp. 224–245). London, England: Sage.

Petty, R. E., & Cacioppo, J. T. (1986). The Elaboration Likelihood Model of persuasion. Advances in *Experimental Social Psychology*, 19, 123–205.

Raoul, A., & Huntsinger, J. R. (2021). *Moral values predict COVID-19 vaccine hesitancy and uptake: Evidence at the state level.* [Unpublished manuscript]. Department of Psychology, Loyola University Chicago.

Rossi, J., & Yudell, M. (2012). The use of persuasion in public health communication: an ethical critique. *Public Health Ethics*, *5*(2), 192-205.

Rozin, P. (1997). Moralization. In A. M. Brandt & P. Rozin (Eds.), *Morality and health.* 379–401. New York, NY: Taylor & Frances/Routledge.

Rozin, P. (1999). The Process of Moralization. *Psychological Science*, *10*(3), 218–221.

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Cengage Learning: Boston, MA.

Shapiro, G. K., Tatar, O., Dube, E., Amsel, R., Knauper, B., Naz, A., Perez, S., & Rosberger, Z. (2018). The vaccine hesitancy scale: Psychometric properties and validation. *Vaccine*, *36*(5), 660–667.

Skitka, L. (2010). The Psychology of Moral Conviction. Social and Personality *Psychology Compass*, *4*(4), 267–281.

Skitka, L. J., Bauman, C. W., & Mullen, E. (2008). Morality and justice: An expanded theoretical perspective and review. In K. A. Hedgvedt & J. Clay-Warner (Eds.), *Advances in Group Processes*, 25, 1–27. Bingley, UK: Emerald Group Publishing Limited.

Skitka, L. J., Bauman, C. W., & Sargis, E. G. (2005). Moral Conviction: Another Contributor to Attitude Strength or Something More? *Journal of Personality and Social Psychology, 88*(6), 895–917.

Skitka, L. J., Hanson, B. E., Morgan, G. S., & Wisneski, D. C. (2021). The psychology of moral conviction. *Annual Review of Psychology, 72*(1), 347–366.

VITA

Max F. Vitro was born in San Diego, California, on December 11, 1987. He attended elementary and high school in San Diego, graduating from Francis W. Parker High School in June 2006. The following August he attended Loyola Marymount University in Los Angeles, and in December 2010 received the degree of Bachelor of Science in Biology, pre-med track. In 2011, after a brief stint working in a medical office, he switched industries and began a near decade long professional career in advertising. At the end of 2020, Mr. Vitro entered Loyola University Chicago's psychology program, receiving a Bachelor of Science in Psychology in Spring 2022, and then a Master of Science Degree in Applied Social Psychology in May 2023.