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Abstract

This study investigated the relative impact of *anecdotal* and *statistical* safety evidence on the perceived likelihood of unvaccinated friends or relatives experiencing severe adverse reactions to COVID-19 vaccination. This study also investigated the relative impact of *anecdotal* and *statistical* evidence on an individual's intention to encourage unvaccinated friends and relatives to talk with healthcare providers about COVID-19 vaccination. Three hundred and fifty-nine participants were randomly assigned to one of six experimental conditions. In each condition, I manipulated the presence of base rate evidence (present, absent) that supported the safety of COVID-19 vaccination; I also manipulated the presence of anecdotal evidence (present, absent) that either challenged or supported COVID-19 vaccination. Anecdotal evidence was always presented in the form of brief videos taken from news reports and YouTube depicting a community member's personal vaccine-related experience (positive or negative). In contrast, base rate evidence was always presented in the form of written numerical safety estimates (e.g., two out of a million individuals experience heart inflammation) based on findings derived from millions of individuals. I hypothesized that watching two emotionally disturbing YouTube videos, each depicting a personal tragedy after COVID-19 vaccination, would decrease a participant's reliance on objective, base rate safety evidence when evaluating the safety of COVID-19 vaccination. I also hypothesized that watching several emotionally uplifting YouTube videos, each depicting a positive experience after COVID-19 vaccination, would decrease the impact of watching tragic YouTube videos when evaluating vaccine safety. Results did not support either hypothesis. The potential implications of these findings are discussed.

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Chapter-1: Introduction

1.1 OVERVIEW

Every day, individuals make thousands of decisions: emotional, personal, and financial. According to one estimate, an adult unconsciously makes about 35,000 decisions every day (Sahakian & Labuzetta, 2013). Researchers at Cornell University found that individuals make an average of 226.7 decisions daily just on food-related issues (Wansink & Sobal, 2017). Health-related decisions are often made after exposure to information provided by experts such as physicians, nurses, reports from medical associations, or similar entities. While making health-related decisions, individuals are also exposed to health-related information from several sources, including family, friends, traditional media, social media, and online communities.

Research suggests that online web communities help patients, and their kin, learn more about diseases and connect with patients who have the same medical conditions. These patient networks allow individuals to share their personal medical experiences (e.g., adverse effects of the COVID-19 vaccine). For example, in 2022, the American healthcare site "MedHelp" was visited by more than 14 million users monthly (Lu et al., 2022). The website provides personal accounts of medical experiences in which individuals share information about their medical conditions, symptoms, reactions to medication and procedures, and treatment experiences. These anecdotal accounts and personal narratives can be either neutral or emotional in tone and rely on established facts, personal opinions, or misinformation. Numerous health issues are addressed on these websites and associated web postings, including addiction, cancer, and vaccine hesitancy. Davies et al. (2002) note that nearly 50% of vaccination-related websites contain information that is critical of vaccines. Vaccine-critical information is also common on social media like Facebook, where people can access and share information regardless of its scientific accuracy.

Ruiz and Bell (2014) found that 43% of the Facebook pages, groups, and places they analyzed were anti-vaccine. These anti-vaccination websites present personal stories that depict adverse vaccine outcomes (such as linking vaccinations to the development of specific chronic diseases). The stories and anecdotes on these websites are presented with high emotional content. For example, photographs, pictures, and case-based stories, especially of children who had been allegedly injured by vaccines, were found on every second vaccine-critical website (Wolfe et al., 2002). Such anecdotal evidence may have a powerful impact on individuals' perceptions of a vaccine's safety.

Anecdotal evidence refers to personal stories or experiences or non-systematic personal observations shared through the media or online. Anecdotal evidence can have a significant impact on vaccine intentions (Betsch et al., 2011). Negative anecdotes have the potential to increase perceived risks and decrease trust in a vaccine, potentially undermining efforts to achieve widespread vaccination and protect public health (De Wit et al., 2008).

Presumably, one of the key ways that negative anecdotal evidence can impact vaccine intentions is by increasing the perceived risk of vaccination. When individuals encounter stories describing negative side effects of vaccination or even just the ineffectiveness of a vaccine, then individuals may become more concerned about the potential risks of receiving the vaccine (Betsch et al., 2011). This heightened concern can lead to an increased reluctance to receive the vaccine, even if its benefits outweigh the risks of the vaccine (Coffman, 2012).

Another way that negative anecdotal evidence can impact vaccine intentions is by decreasing the perceived benefits of vaccination. When individuals hear stories of a vaccine not working or having negative side effects, they may question the effectiveness of the vaccine and may not see the need to receive it. This perceived inefficacy can lead to an increased reluctance

to get vaccinated, even if the objective benefits of the vaccine outweigh the risks (Coffman, 2012)

In addition to impacting the perceived risks and benefits of vaccination, negative anecdotal evidence can also impact vaccine intentions by decreasing trust in a vaccine and the institutions responsible for approving and distributing it (Nan et. al, 2021). When individuals hear stories of negative experiences, they may question the safety and efficacy of the vaccine and may not trust the institutions responsible for approving and distributing it. This decreased trust in vaccination can also lead to an increased reluctance to get vaccinated, even when the risk-benefits ratio is favorable (Brown et. al, 2010, Coffman, 2022).

1.2 ANECDOTAL (NARRATIVE) VERSUS STATISTICAL EVIDENCE

Anecdotal Evidence: Anecdotal (narrative) forms of evidence are characterized by a broad range of formats, including personal stories and testimonials based on an individual's personal experience (de Graaf et. al, 2016; Schulz & Meuffels, 2011). This form of storytelling is appealing to people because it weaves a compelling story that is often difficult to disagree with or dispute (Deighton et al., 1989). Anecdotal evidence may be designed to be entertaining, informational, or both, but the implicit motive for adducing anecdotal evidence is persuasion (Chen & Bell, 2022). Anecdotes engage the audience's attention with high emotive appeal, which dissuades individuals from making counterarguments (Green & Brock, 2000; Leiserowitz, 2006). These anecdotes are typically easy to process because they tell a story with a plot and characters (de Graaf et. al, 2016). For example, a meta-analysis conducted by Braddock and Dillard (2016) revealed that anecdotes could affect the beliefs, attitudes, intentions, and behaviors of individuals. The findings indicated that when individuals are exposed to anecdotes, the beliefs and attitudes, intentions, and behaviors of individuals align with the viewpoints

expressed in those anecdotes. Seventy-four studies conducted between 1983 and 2016 were included in the final analysis. Studies employed research designs in which participants read either an anecdote depicting a specific health related-belief (e.g., the importance of adopting safe sex practices) or material unrelated to the anecdote. All participants subsequently reported the degree to which they endorsed the beliefs, intentions, and behaviors depicted in the target anecdote; that is, researchers investigated if the subjects' beliefs, attitudes, and intentions were consistent with those depicted in the anecdote (Braddock & Dillard, 2016). Results suggested that exposure to anecdotes significantly influenced the participants' beliefs (*r = 0.17; k=37; N=7376*;), attitudes (*r=0.19; k=40; N=7132*), intentions (*r=0.17; k=28; N=5211*), and behaviors (*r=0.23; k=5; N=978*).

Statistical Evidence: Statistical forms of evidence are characterized by a broad range of formats for presenting numerical information (Schulz & Meuffels, 2011). Unlike narrative evidence, statistical evidence relies on numerical information as the basis for conveying information to the target audience (Hoeken & Hustinx, 2009). The numerical information can be presented in the form of percentages (e.g., 'this disinfectant kills 99.999% of bacteria in 10 seconds'), raw numbers (e.g., '9 out of 10 patients report feeling happier after using this product'), or base rate information (e.g., 2 out of every 100,000 patients experience adverse side effects). Allen and Preiss (1997) state that statistical forms of evidence typically entail summarizing numerical data from a large sample size.

A great deal of research has been conducted to determine if one type of evidence is more persuasive than the other type of evidence, but conflicting results have emerged. For instance, Hornikx (2005) examined the persuasiveness of statistical and anecdotal evidence in 14 studies. Eleven of the studies directly compared the persuasiveness of statistical versus narrative

evidence. These two types of evidence were presented in between-subjects designs; that is, every participant was presented with either statistical or anecdotal evidence. The results of these studies are summarized below (See Table 1).

Table 1: Results of investigations examining the persuasiveness of statistical and anecdotal evidence (Gutierrez, 2015).

Investigators	Type of Design	Outcome Variable	Results
Slater et al. (1996) n = 218	Between-Subjects	Agreement with the claim that use of alcohol is harmful	Statistical evidence more persuasive
Hoeken et al. (2003) n= 160	Between-Subjects	Agreement with twenty general claims	Statistical evidence more persuasive
Allen et al. (2000) n= 1270	Between-Subjects	Agreement with fifteen general claims	Statistical evidence more persuasive
Baesler et al. (1994) n = 292	Between-Subjects	Agreement with the claim that the majority of juvenile delinquents not become adult criminals	Statistical evidence more persuasive
Dickson (1982) n = 174	Between-Subjects	Evaluation of the breakdown rate of a household appliance	Statistical evidence more persuasive
Hoeken (2001a) n = 324	Between-Subjects	Evaluation of the likelihood that a new cultural center will be successful	Statistical evidence more persuasive
Cox et al. (2001) n = 174	Between-Subjects	Evaluation of the benefits of regular screening for breast cancer	Anecdotal evidence more persuasive
Baesler (1997) n = 100	Between-Subjects	Agreement with claims involving crime and birth control	Anecdotal and statistical evidence equally persuasive

Hoeken (2001b) n=350	Between-Subjects	Agreement with claim that taxes should be raised to reduce burglaries by increasing number of streetlights on streets	Anecdotal and statistical evidence equally persuasive
Kazoleas (1993) n = 176	Between-Subjects	Agreement with a claim about the effectiveness of using a seatbelt	Anecdotal and statistical evidence equally persuasive
Sherer et al. (1984) n = 80	Between-Subjects	Agreement with a claim stating that reducing one's use of alcohol decreases the chance of experiencing undesirable consequences	Anecdotal and statistical evidence equally persuasive

Note: adapted from Hornikx (2005); NA= not available

In a recent meta-analysis of 61studies, Freling et al. (2020) also explored the persuasiveness of anecdotal evidence versus statistical evidence on decision making. Results revealed that statistical evidence was significantly less persuasive when decisions were health-related (g = -0.06, $p<0.01$), or associated with severe outcomes (g = -0.06, $p<0.01$). However, when decisions were non-health related or associated with low threat severity, statistical evidence was significantly more persuasive than anecdotal evidence (g = 0.014, and g=0.16, respectively, $p<0.01$). These effect sizes, although significant, are very small.

The impact of evidence types (statistical versus anecdotal) has also been investigated in the context of hepatitis B vaccination. De Wit et al. (2008) examined how statistical versus anecdotal information influences the perceived risk of contracting hepatitis B Virus (HBV) and intentions to get a hepatitis B vaccine among men who have sex with men (MSM), considered a

high-risk group for contracting hepatitis B. One hundred eighteen participants were randomly assigned to one of four conditions: (1) a narrative evidence condition in which participants read general risk information about hepatitis B and one anecdote from an individual who contracted hepatitis B, (2) a statistical evidence condition in which participants read general risk information about hepatitis B and base-rate information about the prevalence of hepatitis B among MSM, (3) a mere 'assertion of increased risk' condition in which participants read general risk information about hepatitis B, and (4) a control condition in which participants read information about the consequences of contracting hepatitis B Virus. Results revealed significant group differences indicating that 'evidence type' had a significant impact on the risk perception of the participants ($F(3, 114) = 3.23$; $p < .05$). Specifically, participants who were assigned to the narrative evidence condition rated the risk of hepatitis B as significantly higher than participants assigned to the 'mere assertion of increased risk' condition ($M = 3.45$ vs. $M = 2.23$, respectively; $p < .05$). However, the participants assigned to the 'statistical evidence' condition and 'mere assertion of increased risk' condition did not differ significantly when rating the risk of hepatitis B ($M = 2.89$ *vs.* $M = 2.23$, respectively; ns). Also, participants assigned to the 'narrative evidence' condition and the 'statistical evidence' condition did not differ significantly when rating the risk of hepatitis B ($M = 3.45$ *vs.* $M = 2.89$, respectively; ns). Similarly, no significant differences were found in intentions to get a hepatitis B vaccine between participants assigned to the 'narrative evidence' condition and 'statistical evidence' condition.

Notably, all the previous research designs only exposed participants to one type of health information: participants were either exposed to anecdotal information about the safety of a medical procedure or statistical information regarding the safety of a medical procedure. Yet most adults encounter both types of information when faced with health-related decisions,

perhaps encountering *statistical information* from their physicians when discussing the safety of a medical procedure, and encountering *anecdotal information* from friends, social media platforms, and online patient communities like HealthBoards, MedHelp, and PatientsLikeMe. For this reason, it is critical to determine the *relative impact* of anecdotal and statistical information on health-related judgments and decisions. When presented with both anecdotal and statistical evidence regarding the safety of a medical procedure, do adults pay more attention to anecdotal evidence or do they pay more attention to statistical evidence than is objectively justified by empirical evidence? Only a few studies have addressed this question (described below). The next section reviews how individuals weigh the *relative impact* of statistical and narrative evidence when both types of evidence are presented to the participants.

1.3 THE RELATIVE IMPACT OF ANECDOTAL AND STATISTICAL EVIDENCE

Ubel et al. (2001) conducted two studies investigating if the simultaneous presentation of evidence types (statistical and anecdotal) influences a hypothetical decision to undergo either angioplasty or bypass surgery. Five hundred and thirty-seven participants took part in the first study. Participants were given statistical information regarding the percentage of individuals who benefited from angioplasty and bypass surgery (50% and 75%, respectively). In addition, all participants read testimonials (narratives) from hypothetical patients who had undergone either angioplasty or bypass surgery. One-half of the participants were assigned to the "proportionate condition" in which the number of positive testimonials was consistent with base rate information regarding the benefits of the procedure. For example, if base rate data indicated that 75% of patients benefited from bypass surgery, then participants in the study read three positive testimonials from hypothetical patients regarding bypass surgery and one negative testimonial regarding bypass surgery (that is, 75% of the testimonials reported positive outcomes from

bypass surgery). In contrast, participants who were assigned to the 'disproportionate condition' read one testimonial from a patient who benefited from bypass surgery and one testimonial from a patient who did not benefit from the surgery; that is, only 50% of the testimonials (anecdotes) reported a successful outcome following bypass surgery compared to the 75% successful base rate based on population data. Participants assigned to the proportionate group "chose" bypass surgery 44% of the time, and participants in the disproportionate group "chose" bypass surgery only 30% of the time. These results suggest that exposure to a small number of testimonials (that is, anecdotal evidence) can impact decision making, even when the anecdotal evidence (testimonials) is not supported by a large amount of base rate evidence.

In a second study conducted by Ubel et al. (2001), 593 adults participated in a between-subjects design. The research design was similar to the design employed in Study 1. However, some participants in Study 2 were randomly assigned to an additional control condition in which participants only received base rate information about the percentage of patients who benefit from angioplasty and bypass surgery (50% and 75%, respectively). This condition was included so that the percentage of patients choosing bypass surgery without narrative evidence could be estimated. In addition, participants assigned to either of the groups (proportionate or disproportionate) read a total of 4 testimonials from patients who had undergone angioplasty: one-half the hypothetical patients benefitted from angioplasty, and the other half did not benefit from angioplasty). Participants assigned to the proportionate group read testimonials consistent with the base-rate information (that is, 3 of the four patient testimonials reported benefitting from the bypass surgery). In the disproportionate group, participants read two testimonials that described beneficial outcomes from bypass surgery and two additional testimonials described detrimental outcomes from bypass surgery.

Results of Study 2 are similar to the results of Study 1; that is, mere presence of anecdotal evidence (personal testimonials) decreases reliance on base-rate information when evaluating treatment options. Participants in the control condition chose bypass surgery 58% of the time; in contrast, participants assigned to the 'disproportionate condition' chose bypass surgery only 34% of the time. However, participants in the 'proportionate condition' only chose bypass surgery 37% of the time, suggesting that the presence of one or two 'negative' testimonials (that is, bits of anecdotal evidence) may decrease an individual's reliance on base rate information when making health-related decisions.

Betsch et al. (2013) also investigated how statistical evidence and anecdotal evidence about vaccine adverse events (VAEs) impacts an individual's vaccine-related intentions when both evidence types (anecdotal and statistical) are presented simultaneously. Four hundred and fifty-eight participants received detailed information about a fictitious disease: Dysomerie. The disease was described as highly infectious, transmittable via droplets, and associated with severe symptoms (fever, emesis, meningitis) and long-term risks (palsy). The participants were informed that vaccination was recommended against the disease. Base-rate information regarding adverse events was also presented to all the participants (e.g., '20 out of 100 patients who get vaccinated experienced an adverse reaction'). Participants were subsequently randomly assigned to one of three conditions: (1) a 'narrative evidence' condition in which participants read about the VAEs on a social network website with VAEs displayed as single narratives, (2) a 'statistical evidence' condition in which the number of VAEs were summarized in the form of a pie chart depicting their relative frequency of occurrence: 5%, 35%, or 85%, and (3) a 'narrative evidence' and 'statistical evidence' condition in which participants viewed both types of information described above. Responses to four dependent measures were subsequently

assessed: perceived risk of experiencing an VAE, perceived probability of VAEs following vaccinations against Dysomerie, perceived severity of VAEs, and intention to get vaccinated against Dysomerie if the participants had the chance to do so in the upcoming week.

Results revealed that the perceived risk of Dysomerie vaccination increased as the frequency of reported VAEs increased. When risk information was presented in the form of narratives, the association between the relative frequency of VAEs and perceived risk appeared to be stronger when both types of evidence was presented ($r = 0.48, p < 0.001$) compared to the condition when only statistical evidence was presented ($r = 0.27, p< 0.001$). However, a test of the significance of the difference between these two sample correlations was not conducted by the authors. The above studies investigated the relative impact of evidence type (statistical and narrative) on decision making, risk perceptions, and behavioral intentions when both types of evidence are presented in combination.

Only a few studies have examined how individuals weigh the relative importance of statistical and narrative evidence when evaluating the risk of drug use. For instance, Gutierrez (2015) investigated if exposure to anecdotal evidence that contradicts base-rate safety information impacts the perceived likelihood of harm associated with novel drug use. Participants were randomly assigned to one of three evidence type conditions: (1) a *base-rate information only* condition in which participants were provided with a single web-posting from a medical doctor reporting the base-rate for experiencing an adverse reaction after using a target drug (e.g., *"400 in 500 individuals who try synthetic marijuana will experience an adverse reaction"*, (2) a *base rate information plus positive web-postings* condition in which participants were provided with l web-posting from a medical doctor (described above) plus five additional web-postings in which four web-postings reported positive experiences and one web-posting

reported a negative experience (e.g., adverse drug reactions), and 3) a *base rate information plus negative web-postings* condition in which participants were provided with l web-posting from a medical doctor (described above) plus five additional web-postings in which four web-postings reported negative experiences (e.g., adverse drug reactions) and one web-posting reported a positive experience . The web-postings were presented in the form of hypothetical personal experiences that were posted on a simulated bulletin board on the internet.

Four hundred fifty-three undergraduate students participated in this study. Each participant was presented with two hypothetical web discussion scenarios: one scenario focused on synthetic marijuana, and the other scenario centered around kratom. Specifically, in each of the three experimental groups (base-rate information only, base-rate information plus positive web-postings, and base-rate information plus negative web-postings), the base rates concerning the likelihood of experiencing an adverse event were counter-balanced. Half of the participants were provided with information indicating that the base rate for a negative reaction to synthetic marijuana was 80% (400 out of 500), while the base rate for a negative reaction to kratom was 50% (250 out of 500). Conversely, the other half of the participants received information stating that the base rate for a negative reaction to synthetic marijuana was 50% (250 out of 500), while the base rate for a negative reaction to kratom was 80% (400 out of 500). The presentation of these scenarios was counterbalanced to account for potential order effects. Half of the participants responded to web postings related to the synthetic marijuana scenario, followed by web postings related to kratom, while the other half experienced the scenarios in reverse order.

After reading each scenario, participants rated their perceived likelihood of experiencing an adverse reaction (for experimental use and occasional use), perceived harmfulness (for experimental use and occasional use), and intentions to use target drug (marijuana and kratom).

Results revealed a significant main effect of base rate information (80% vs. 50%) on the "likelihood" of experiencing an adverse event for experimental use of kratom. Specifically, participants who were given the base-rate information stating that there was an 80% likelihood of experiencing an adverse event rated the likelihood of experiencing such an event as 44.1% (for experimental use). On the other hand, participants who received base-rate information stating a 50% likelihood of experiencing an adverse event rated the likelihood as 35.8% ($p = .003$).

Coffman (2022) evaluated the *relative importance* of anecdotal safety information (i.e., personal web postings) and base rate safety information when individuals evaluate the safety of the Human Papillomavirus Vaccine (HPV). One hundred and eighty-eight university students participated in the between-subjects design. She predicted that exposure to anecdotal information that contradicted base rate information regarding HPV vaccine safety would increase the perceived harmfulness of HPV vaccination.

The participants were provided with base rate information regarding the risks associated with HPV vaccination (e.g., 105 out of 600,558 patients experienced minor side effects after vaccination). Anecdotal evidence regarding vaccine risk was presented in the form of web postings. Some web postings described the positive consequences of HPV vaccination, and other web postings described the adverse side effects of HPV vaccination. Participants were randomly assigned to one of four experimental groups. Participants assigned to Group I only read base rate information regarding the HPV vaccine's side effects. Participants assigned to Group II read the same base rate information and five web postings (anecdotes) describing positive vaccine effects and one negative web posting (anecdote) describing adverse vaccine side effects. Participants assigned to Group III read the same base rate information as well as five negative web postings and one positive web posting about the HPV vaccine and its side effects. Participants assigned to

Group IV read the same base rate information as well as five positive web postings about HPV vaccination. After exposure to the above information, all participants indicated their own likelihood of getting vaccinated against HPV during the following year. Results from Coffman's study revealed a significant impact of experimental condition on the perceived likelihood of developing HPV-related cancer for individuals who were not vaccinated, $F=8.41, p>0.01$. Participants who received only base-rate information about HPV-related cancers perceived significantly lower likelihood of developing HPV-related cancer as compared to the individuals who received the same base-rate information (described above) and five positive anecdotal reports. Participants who received five negative anecdotal reports in addition to the base rate information about HPV-related cancers perceived significantly lower likelihood of developing HPV-related cancer compared to the participant who received five positive anecdotal reports in addition to the base rate information. These findings indicate that inclusion of positive anecdotes with the base rate information maximized the perceived risk of developing HPV-related cancers, whereas including negative anecdotal reports with the base rate information minimized the perceived risk associated with developing HPV-related cancers.

The above studies suggest that anecdotal information has an exaggerated impact on the vaccination intentions of individuals. My thesis research evaluates the relative importance of base rate safety information and anecdotal safety information when both types of evidence are considered simultaneously in the context of COVID-19 vaccination.

1.4 METHOD OF PRESENTATION

Much of the prior research examined the impact of anecdotal and statistical evidence on decision-making when the evidence (anecdotal or statistical) was presented in text or written format. In a meta-analysis conducted by Shen et al. (2015) investigated the impact of narratives in health communication. The researchers found that overall, narratives had a small but significant impact on persuasion ($r=0.06$, $p<.01$). Further, the researchers also found that narratives delivered via audio/video medium had a significant effect on persuasion ($r = .09$, $p < .01$) while narratives delivered via print medium had a small and insignificant effect on persuasion($r = .05$, $p > .05$). .In a study conducted by Witus and Larson (2022), the authors used an animated educational YouTube video to investigate its impact on the vaccination intentions. The YouTube video explained how COVID-19 mRNA vaccines worked. The participants were randomly assigned to one of four experimental conditions: 1) watching the video with a male narrator; 2) watching the same video with a female narrator; 3) reading the text of the transcript of the video; or 4) receiving no information (control group). The results demonstrated that exposure to the YouTube video significantly increased the vaccination intention compared to the control group ($r= 0.440$, $p = 0.005$). These findings highlight the potential importance of using YouTube videos to increase vaccination intentions.

1.5 YOUTUBE VIDEOS

YouTube is a widely recognized and popular form of social media. It is the world's largest video-sharing platform (Zhou et al, 2016) and has more than 2.6 billion users, and this number is estimated to reach 2.85 billion by 2025 (Ruby, D., 2023). YouTube has become the go-to destination for entertainment, education, and information. From funny cat videos to informative tutorials, YouTube has something for everyone. Its global reach and influence have

made it a powerful tool for communication and expression. Every sixty seconds, more than 500 hours of video content are uploaded on YouTube, and a single day viewership of videos on YouTube is over 1 billion hours (Barnhart, 2023; Wildwood, 2023). Every day, people upload, share, and watch videos on YouTube, and this platform has been identified as a major source of health information (Madathil et al., 2015). According to one estimate, every day, approximately 30 million health-related videos are watched on YouTube (Haslam et al., 2019; Zaila et al., 2020), rendering it a primary resource for people seeking information about health and wellness. According to Pew Research Center (2021), 81% of US adults use YouTube, a significant increase from 73% in 2019. However, studies have shown that the quality of health information on YouTube can vary greatly, and misinformation about vaccines is widespread. In one study, Basch et al. analyzed 87 videos on YouTube. Videos were retrieved by using the keywords "vaccine safety" and "vaccines and children" in 2017. The authors found that 65% of these videos expressed an anti-vaccine sentiment, and 36.8% provided no scientific evidence. Such findings suggest that YouTube promotes vaccine hesitancy. Li et al. (2020) conducted a search on YouTube using the terms "coronavirus" and "COVID-19". They analyzed the top 69 most viewed videos and found that 27.5% of these YouTube videos contained inaccurate information and had accumulated over 60 million views. In a systematic review conducted by Osman et al. (2022), the researchers evaluated 22,300 videos to assess the content quality of healthcare information on YouTube. The authors found that YouTube cannot be trusted as a credible source for medical and health information due to its reliance on popularity-based measures, like number of views and like counts. Despite these findings, it is clear that YouTube has become an important resource for those seeking health-related information, and there is a growing trend

among people to utilize YouTube videos as a means to share and acquire information regarding health-related topics.

With the growing popularity of YouTube, the platform has the potential to be a powerful tool for changing attitudes and beliefs on a wide range of topics. My thesis research uses video clips downloaded from YouTube to investigate: 1) if exposure to a small number of videos depicting individual adverse experiences after COVID-19 vaccination reduces attention to base rate safety data derived from thousands of individuals; 2) if exposure to videos depicting positive experiences after COVID-19 vaccination reduces the impact of two videos depicting negative experiences after COVID-19 vaccination?

1.6 HYPOTHESES AND PREDICTIONS

Hypothesis 1: When evaluating the safety of a vaccine, reliance on base rate information **decreases** after participants are exposed to a small number of anecdotal reports describing rare adverse vaccine reactions.

Predictions

1a. Participants who read base rate information regarding the safety of the COVID-19 vaccine and who also watch two brief videos depicting severe but rare vaccine reactions will be ***less likely*** to encourage unvaccinated relatives to get the COVID-19 vaccine compared to participants who only read base rate safety information.

1b. Participants who read base rate information regarding the safety of COVID-19 vaccination and who also watch two brief videos depicting severe but rare vaccine reactions will be ***more likely*** to report that an unvaccinated relative or friend would develop a severe adverse reaction to COVID-19 vaccination compared to participants who only read base rate safety information.

1c. Participants who read base rate information regarding the safety of COVID-19 vaccination and who also watch two brief videos depicting severe but rare vaccine reactions will express ***more worry*** about unvaccinated relatives experiencing severe vaccine reactions to COVID-19 vaccination compared to participants who only read base rate safety information.

Hypothesis 2: When evaluating vaccine safety, reliance on base rate information ***increases*** after participants are exposed to many anecdotal reports describing positive vaccine experiences and a smaller number of anecdotal reports describing severe but rare adverse vaccine experiences.

Predictions

2a. Participants who read base rate information regarding COVID-19 vaccine safety, and who also watch two videos depicting severe but rare vaccine reactions and six videos or more depicting positive vaccine experiences will be ***more likely*** to encourage unvaccinated relatives to get the COVID-19 vaccine compared to participants who only watch two videos depicting severe but rare vaccine reactions and six videos depicting positive vaccine reactions.

2b. Participants who read base rate information regarding COVID-19 vaccine safety, and who also watch two videos depicting severe but rare vaccine reactions and watch six or more videos depicting positive vaccine experiences will be ***less likely*** to report that an unvaccinated relative would develop a severe adverse reaction as a result of getting the COVID-19 vaccine compared to participants who only watch two videos depicting severe but rare vaccine reactions and six videos depicting positive vaccine experiences.

2c. Participants who read base rate information regarding COVID-19 vaccine safety, and who also watch two videos depicting severe but rare vaccine reactions and watch six or

more videos depicting positive vaccine reactions, will express ***less worry,*** about unvaccinated relatives experiencing severe vaccine reactions to the COVID-19 vaccine compared to participants who only watch two videos depicting severe but rare vaccine reactions and six videos depicting positive vaccine experiences.

Hypothesis 3: When evaluating vaccine safety, as the number of positive anecdotal reports regarding vaccine safety increases, the impact of rare adverse events on participants' judgement decreases.

Predictions

3a. Participants who read base rate information regarding Covid 19 vaccine safety and watch two videos depicting negative experiences after the COVID-19 vaccine will be ***less likely*** to encourage unvaccinated relatives to get vaccinated compared to participants who read the same base rate information, watch the same two videos depicting negative experiences after the COVID-19 vaccine and also watch six or more videos depicting positive experiences after the COVID-19 vaccine.

3b. Participants who read base rate information regarding COVID-19 vaccine safety and watch two videos depicting negative experiences after the COVID-19 vaccine will be ***more likely*** to report that their unvaccinated relatives would develop a severe adverse reaction as a result of getting the COVID-19 vaccine compared to participants who read the same base rate information, watch the same two videos depicting negative experiences after the COVID-19 vaccine and also watch six or more videos depicting positive experiences after the COVID-19 vaccine.

3c. Participants who read base rate information regarding Covid 19 vaccine safety, and watch two videos depicting negative experiences after the COVID-19 vaccine will

express ***more worry*** that their unvaccinated relatives would develop a severe adverse reaction as a result of getting the COVID-19 vaccine compared to participants who read the same base rate information, watch same two videos depicting negative experiences after the COVID-19 vaccine and also watch six or more videos depicting positive experiences after the COVID-19 vaccine.

More generally, I am predicting that participants who are exposed to base rate safety information and a small number of anecdotal reports describing rare but severe adverse vaccine reactions would be less likely to recommend the COVID-19 vaccine, would express more worry, and would perceive the likelihood of an adverse reaction higher compared to participants who are only exposed to base rate information. Additionally, I am predicting that exposure to positive anecdotal reports regarding COVID-19 vaccination will reduce the impact of negative anecdotal reports when evaluating the safety of COVID-19 vaccination.

Chapter 2: Methods

2.1 PARTICIPANTS

Three hundred and fifty-nine undergraduate students (76% female; M_{age} = 20.28, SD = 2.35) participated in this study. Students were recruited from a large, public, university in the U.S. southwest. The sample comprised 87% Hispanics, 4% Whites, 4% Asian Americans, 3% African Americans, and 2% were classified as "Other". Thirty-two percent of the sample were freshmen, 28% were sophomores, 22% were juniors, and 17% were seniors.

The sample size was based on a power analysis using Cohen's (1988) power tables for analysis of variance. The sample size estimate was based on an alpha level of 0.05, small to medium effect size (specifically setting "f" to 0.20), six group means, and statistical power of 80% to detect significant mean differences between groups.

The study was preregistered at Open Science Forum. (https://osf.io/xf68r/).

2.2 MEASURES

Nine measures were used to obtain background information, demographic information, COVID-19 History and COVID-19 Vaccine History, Vaccine hesitancy, Beliefs and Attitudes about COVID-19, the likelihood of an adverse reaction, self-reported worry, behavioral intentions to encourage an unvaccinated relative or friend to discuss getting the COVID-19 vaccine with a healthcare provider, and chances of an adverse reaction to the COVID-19 vaccine. These measures are described in more detail below.

Background Survey-I **(Appendix A)*:*** A 4-item eligibility survey was administered to determine if a respondent met the three eligibility criteria: 1) the respondent was 18 to 28 years of age; 2) the respondent had at least one relative or friend who was unvaccinated or whose

vaccination status was unknown; 3) the respondent's unvaccinated or partially vaccinated relative or friend was living in the United States.

Background Survey-II **(Appendix B)*:*** A 7-item survey assessed basic demographic information, including age, gender, ethnic background, college level, and self-reported language proficiency.

COVID-19 History & COVID-19 Vaccine History Questionnaire **(Appendix C)**: A 5-item self-report survey assessed each participant's history of COVID-19 vaccination. The measure was developed by researchers in the Cohn Lab. Sample item: *Have you received the COVID-19 vaccination?* Response options included *(1) "Yes," and (2) "No."* Survey items also assessed if the participant or any immediate family member had tested positive for COVID-19. Sample item: *Have you tested positive for the COVID-19 virus?* Response options included *(1) "Yes," and (2) "No."*

Adult Vaccine Hesitancy Scale (aVHS) **(Appendix D)*:*** A 10-item measure assessed general vaccine hesitancy. The measure was adapted from Akel et al. (2021). The scale is widely used in the literature in many different contexts (e.g., past and future flu vaccination). The aVHS demonstrates high internal consistency (range of Cronbach's alphas: 0.8 to 0.94) (Akel et al., 2021). Sample item: *"Vaccines are important for me."* Response options included the following: (1) *"strongly disagree,"* (2) *"Disagree,"* (3) *"Neither agree nor disagree,"* (4) *"Agree,"* and (5) *"Strongly agree."* Responses to three items (5, 9, and 10) were reverse-coded. A composite score was computed by summing ratings of all items (minimum score ten and maximum score 50). A higher score on this scale indicated lesser vaccine hesitancy, and lower scores indicated higher vaccine hesitancy.

Beliefs and Attitudes About COVID-19 **(Appendix E)*:*** A 4-item survey assessed COVID-19-related beliefs and attitudes. Items were adapted from Sherman et al. (2020). Sample item: *"To what extent do you think coronavirus poses a risk to people in the US."* Response options included: (1) *"No risk at all,"* (2) *"Minor risk,"* (3) *"Moderate risk,"* (4) *"Significant risk,"* and (5) *"Major risk."* Responses to each question will be analyzed separately. No composite score was created.

Behavioral Intention: Encouraging an Unvaccinated Family Member to Speak with a Heath Care Provider **(Appendix F):** A single item assessed each participant's *likelihood* of encouraging an unvaccinated relative or friend to schedule an appointment with a doctor or nurse to discuss getting the COVID-19 vaccine or COVID-19 booster vaccine. Item: *"During the next month, how **likely** are you to encourage your unvaccinated relative or friend to schedule an appointment with a doctor or nurse to discuss getting the COVID-19 vaccine or the COVID-19 booster shot." Response options included the following:* (1) "*Not at all likely,"* (2) "*A little likely,"* (3) "*Moderately likely,"* (4) "*Quite a bit likely,"* and (5) "*Extremely likely."*

Perceived *Likelihood of Adverse Reaction:* A single item assessed the perceived *likelihood* of developing a severe adverse reaction to the COVID-19 vaccine. Item: *In your opinion, what is the **likelihood** that your unvaccinated relative or friend would develop a blood clot, severe allergic reaction, or other extremely serious health problem as a result of getting vaccinated against COVID-19? Response options included the following:* (1) "*Not at all likely,"* (2) "*A little likely,"* (3) "*Moderately likely,"* (4) "*Quite a bit likely,"* and (5) "*Extremely likely."*

Chance of an Adverse Reaction: A single item assessed the perceived *probability* of developing a severe adverse reaction to the COVID-19 vaccine. Item: *In your opinion, what are the **chances** that your unvaccinated relative or friend would develop a blood clot, severe allergic reaction, or other extremely serious health problem as a result of getting vaccinated against*

COVID-19? Response options included the following: Approximately….. (1) *"1 in 10 chance"* (2) *"1 in 100 chance"* (3) *"1 in 1,000 chance"* (4)*"1 in 10,000 chance"* (5)*"1 in 100,000 chance"* (6) *"1 in 1,000,000 chance" and* (7)*"1 in 10,000,000 chance."*

Perceived Worry: A single item assessed how much a participant would *worry* about their unvaccinated relative or friend developing a severe reaction to the COVID-19 vaccination. Item: *How much would you* ***worry*** *about your unvaccinated relative or friend developing a severe reaction to the COVID-19 vaccine if they decide to get the COVID-19 vaccine or the COVID-19 booster shot?"* Response options included*: (1) "Not at all worried," (2) "A little worried," (3) "Moderately worried," (4) "Quite a bit worried," and (5) "Extremely worried."*

2.3 EXPERIMENTAL STIMULI

COVID-19 Vaccine Fact Sheet (Appendix G): A one-page fact sheet (396 words) summarized the dangers of COVID-19, the development of safe COVID-19 vaccines, and base rate information regarding the likelihood of severe adverse events following COVID-19 vaccination. Specifically, participants were informed that severe allergic reactions to the COVID-19 vaccine were very rare and occurred in fewer than six people out of every one million people vaccinated. Similarly, blood clots after Johnson & Johnson's COVID-19 vaccination have been reported in only 3 people out of every one million people vaccinated. Inflammation of the heart muscle after COVID-19 vaccination was rare and has occurred in 2 people every one million people vaccinated in the United States. During the period between December 14, 2020, through March 15, 2022, more than 557 million doses of COVID-19 vaccines were administered in the United States, and 0.0024% deaths were reported among people who were vaccinated against COVID-19. Vaccine safety information was obtained from the Centers for Disease Control

(https://www.cdc.gov/coronavirus/2019ncov/vaccines/safety/adverse-events.html) on October 6, 2021, and edited for length and ease of presentation. Base rate information for each of the four severe adverse events associated with COVID-19 vaccination was obtained from data reported in Morbidity and Mortality Weekly reports (Centers for Disease Control and Prevention [CDC], 2021). Base rate information highlighted the extreme safety of COVID-19 vaccination. For example, participants were informed that more than 557 million doses of COVID-19 vaccines were administered in the United States from December 14, 2020, through March 15, 2022. During this time, 0.0024% deaths were reported among people who were vaccinated against COVID-19.

The text of the Fact Sheet was assessed for readability using the Flesch-Kincaid Readability Measure (Flesch–Kincaid Grade Level). The Flesch-Kincaid readability measure is the most widely used measure of readability in the US and indicates how difficult a written passage is to understand in English (*The Flesch grade level readability formula, n.d.*). In the current study, the Fact Sheet was written at the eleventh-grade readability level.

Base Rate Video (Appendix H): This video is 42 seconds long and comprised of edited portions of a COVID-related news segment that was downloaded from YouTube (see **Appendix H** for the video). Information in the video was presented by a formal newscaster of KTVB (an NBC affiliated television station). Base rate events for adverse outcomes were presented in this video and the base rate information was similar to the base rate information presented in the Fact Sheet (described above).

Negative Video #1 (Appendix I): This video was 2 minutes and 11 seconds in length (reduced from its original size of 7 minutes and 39 seconds) and was selected because of the negative emotional tone that it conveyed. The video depicted a father describing how his

daughter died within days of receiving the COVID-19 booster vaccine. The video was downloaded from YouTube (See Appendix I for the video).

Negative Video #2: This video was 1 minute and 38 seconds in length (reduced from its original 2 minutes and 47 seconds) and was selected because of the sadness and negative emotional tone that it conveyed. The video depicted a son describing how his mother, who did not have any underlying medical condition, died within days after getting the COVID-19 vaccine. The video clip was part of a newscast on ABC-7 news. The video was downloaded from YouTube (See Appendix I for the video).

Positive Video #1 (Appendix J): This video depicted a grandmother meeting with her grandchild, after receiving the COVID-19 vaccine. The edited video was 1 minute in length (reduced from its original size of 3 minutes and 37 seconds) and was selected because of the positive emotional tone that it conveyed. The video was downloaded from YouTube (See Appendix J for the video).

Positive Video #2: This video depicted a grandfather meeting his grandchildren after getting the COVID-19 vaccine. The edited video was 1 minute and 20 seconds (reduced from its original 1 minute and 34 seconds) and was selected because of the happiness depicted in the video (See Appendix J for the video).

Positive Video #3: This video depicted an 83-year-old husband reunited with his wife after being vaccinated. The edited video was 48 seconds in length (reduced from its original 2 minutes and 25 seconds) and was selected because of the positive emotional tone that it conveys. The wife was living in a long-term care facility and had lost her roommate. The husband and wife were reunited after being vaccinated. The video depicted an emotional husband who had

almost lost his wife and was selected because of the positive emotional tone that it conveyed. The video was downloaded from YouTube (See Appendix J for the video).

Positive Video #4: This video depicted a heartwarming reunion between a grandson and his grandparents, their first meeting in 8 months after everyone was vaccinated. The edited video was 49 seconds in length (reduced from the original 1 minute and 9 seconds). The video was downloaded from YouTube (See Appendix J for the video). This video was selected because of the presence of a positive emotional tone associated with COVID-19 vaccination.

Positive Video #5: This video depicted a grandmother hugging her granddaughter after getting a prescription from her doctor that said, 'you are allowed to hug your granddaughter.' This prescription was a symbolic gesture stating that both, the grandmother and the granddaughter, were safe after getting vaccinated against the coronavirus. The video was reduced to 1 minute and 53 seconds (from its original 2 minutes and 23 seconds). The video was downloaded from YouTube (See Appendix J for the video). This video was chosen because it showed how vaccines could protect loved ones by preventing spread of the coronavirus, and restore the simple joys of life, like hugging.

Positive Video #6: This video was 1 minute and 57 seconds in length (reduced from the original 2 minutes and 18 seconds). The video depicted a long-awaited reunion between a sister and her brother with Down Syndrome, who were separated for more than a year because of the COVID-19 pandemic. The video was downloaded from YouTube (See Appendix J for the video). This video was selected because it conveyed a positive emotional tone associated with COVID-19 vaccination and a reminder of how COVID-19 vaccines could help us unite with our loved ones restoring the joyful bonds that the COVID-19 pandemic had severed.

Positive Video #7: This video was 1 minute and 27 seconds in length (reduced from the original 2 minutes and 24 seconds) and depicts grandparents visiting their grandkids after one year after getting the COVID-19 vaccine. The video clip was part of a newscast on 'Finally At Four'. The video was downloaded from YouTube (See Appendix J for the video).

Positive Video #8: This video was 1 minute and 52 seconds in length (reduced from the original 4 minutes and 17 seconds). The video depicted grandparents meeting their grandchild born during the pandemic for the first time after getting the COVID-19 vaccine. The video clip was part of a newscast on WATE news and was downloaded from the website of the news channel (See Appendix J for the video). This video was chosen because it emphasizes how COVID-19 vaccines are helping people reunite with their families.

Positive Video #9: This video was 1 minute and 11 seconds in length. The video depicted a fully vaccinated 102-year-old great-grandmother meeting with her great-grandson after one year. The great-grandmother joined her great-grandson in his virtual PE class, and both were dancing and enjoying each other's company. The video was downloaded from YouTube (See Appendix J for the video) and was chosen because of the positive emotional tone associated with COVID-19 vaccination. The video shows how the COVID-19 vaccine helps people connect and stay close.

Positive Video #10: This video was 1 minute and 56 seconds in length (reduced from the original 2 minutes and 15 seconds) and depicted a daughter reuniting with her mother after they got their 2nd dose of the COVID-19 vaccine. The video was part of Spectrum News 1 (See Appendix J for the video) and was downloaded from the website of the news channel. The video was chosen for the presence of the positive emotional tone associated with COVID-19 vaccination.

Debriefing Sheet (Appendix K): At the end of the protocol, participants were presented with a debriefing sheet explaining how their participation helped us learn more about how individuals make health-related decisions and judgments after encountering different types of evidence regarding the safety of vaccination.

The Debriefing Sheet also informed participants that the American Medical Association (AMA), Centers for Disease Control and Prevention (CDC), Food and Drug Administration (FDA), and other leading health experts endorsed the use of the COVID-19 vaccine and the additional COVID-19 booster shot for eligible adults. Participants were also provided with the fact sheet, which summarized the safety of the COVID-19 vaccine and the additional COVID-19 booster shot.

Participants were told that they should consult with their doctor or a medical professional if they had questions about whether the booster was right for them. In case they had questions about the city's COVID vaccination sites or services, they should call 915-212-6843 or visit https://www.epcovidvaccine.com. Participants were provided with information about UTEP's on-campus resources by visiting the following website: https://www.utep.edu/liberalarts/theatre-dance/resources/covidprotocol.html

2.4 SEARCH FOR COVID-19-RELATED VIDEOS

A search for relevant COVID-19-related videos was conducted using Google and YouTube search engines. The search was conducted between July 27, 2021, and September 19, 2021, using the keywords "COVID-19 vaccine adverse reaction," "COVID-19 vaccine happy families," "COVID-19 vaccine family reunions," "Happy after vaccine," and "Hugs after vaccine." I reviewed more than 80 videos, of which 35 videos were found relevant. These 35 videos depicted various aspects related to COVID-19 vaccines. Specifically, they covered two

main themes: 1) Positive outcomes after COVID-19 vaccination (e.g., family reunions after vaccination), and 2) Adverse reactions to COVID-19 vaccines (e.g. serious rare allergic reactions, inflammation of heart muscle, blood clots or death). The purpose of including videos depicting positive and negative outcomes was to provide a comprehensive understanding of the potential benefits and risks associated with COVID-19 vaccination.

I selected 13 videos and downloaded these from YouTube: one video providing base rates of occurrence of several adverse events, two videos depicting negative experiences after the COVID-19 vaccine, and 10 videos depicting positive experiences after getting the COVID-19 vaccine. These 13 videos were edited for length to focus on the information that was specific to COVID-19-related content, and also to maintain the interest of the participants throughout the protocol.

Stimulus Check: Prior to conducting the proposed research, the 13 videos described above were evaluated for their level of emotional content (base rate, negative and positive). Students were recruited from multiple undergrad psychology classes from a large, public, university in the U.S. southwest and received one-hour research credit for their participation. One hundred and seventy-two participants assessed the emotional content of each video. Sixty-nine participants completed the evaluations in-person, 31 participants evaluated the videos via Zoom, and 72 participants evaluated the videos remotely.

Participants who evaluated the videos via Zoom scheduled a meeting time with the principal investigator or research assistants. Participants provided their email address, and the link to the protocol was sent to them. Participants completed the protocol during the Zoom meeting. Participants were requested to keep the audio on to ensure that they were paying attention to the protocol.

Participants who evaluated the videos remotely were sent the link to the protocol via email and were asked to set aside a time slot of 40 minutes to complete the protocol. The link to the protocol was emailed on the scheduled time with the instruction that the link would expire in 60 minutes, and participants must complete the protocol during those 60 minutes. They were also asked to take the protocol in a quiet place with minimum distractions.

After watching each video, participants responded to the following item: *"We would like your opinion about the emotions expressed in this video. Please indicate how well each of the following adjectives describes the emotions expressed in the video:"* The response options ranged from extremely negative (e.g., "1- Extremely sad") to extremely positive (e.g., "7-extremely happy") (see **Appendix L**).

The individual ratings assigned to each of the six positive emotions *(happy, pleasant, uplifting, comforted, joyful, and hopeful)* were combined and averaged for each participant to create a "mean positive emotional valence" rating. Similarly, a composite mean score was created for the negative emotions. The individual ratings for six negative emotions (*sad, unpleasant, disturbing, fearful, heartbroken, and hopeless)* were combined and averaged to create a "mean negative emotional valence" rating. Values ranged from 1-7 (e.g. "1-Extremely Sad" to "7-Extremely Happy"). Specifically, a mean score below 4 indicated a negative rating, a mean score of 4 indicated a neutral rating and a mean score above 4 indicated a positive rating. The base rate video yielded a mean rating of 4.27 (0.27 above the neutral point, i.e., 4). The two videos depicting negative experiences after the COVID-19 vaccine yielded a "mean negative emotional valence' rating of 2.74 and 2.76 (1.26 and 1.40, respectively, below the neutral point) on a scale from 1 through 7 where 1 was extremely negative (*sad, unpleasant, disturbing, fearful, heartbroken, and hopeless)* and 7 was extremely positive *(happy, pleasant, uplifting,*

comforted, joyful, and hopeful). The "mean negative emotional valence" for the videos depicting negative experiences were below the neutral point ("4-Neither sad nor happy"). The ten videos depicting positive experiences after COVID-19 vaccination yielded a "mean positive emotional valence' of 4.13 or higher on a scale that ranged from extremely negative ("1-Extremely Sad") to extremely positive ("7-Extremely Happy). In sum, the videos that I selected as depicting negative experiences, indeed elicited negative emotions. The videos that I selected as depicting positive experience yielded positive ratings. The mean ratings for each of the videos used in the present study are presented below (see Table 2).

Table 2: *Mean Rating for the Emotions (From Extremely Negative to Extremely Positive) for the Videos used in the Present Study*

Video #	**Content**	**Mean emotional valence**	**Distance of the mean emotional valence from mean**
1.	Base rate video depicting chances of an adverse but rare negative reaction to the COVID-19 vaccine	4.27	+0.27
2.	Video depicting adverse experience (Death of the daughter after getting the COVID-19 vaccine)	2.86	-1.4
3.	Video depicting adverse experience (Death of mother after getting the COVID-19 vaccine)	2.74	-1.26
4.	Video depicting positive experience (A grandmother meeting with her grandchild)	5.35	+1.35
5.	Video depicting positive experience after vaccination. (A grandfather meeting his grandchildren)	5.19	+1.19
6.	Video depicting positive experience after vaccination. (Eighty-three-year-old husband reunited with his wife)	4.13	+0.87

7.	Video depicting positive experience (a grandson meeting his grandparents after 8 months)	5.45	+1.45
8.	Video depicting positive experience (Grandmother hugging her granddaughter)	5.04	+1.04
9.	Video depicting positive experience (Brother with Down Syndrome meeting his sister after more than a year)	5.37	+1.37
10.	Video depicting positive experience (Grandparents visiting their grandkids after one year)	5.53	+1.53
11.	Video depicting positive experience (Grandparents meeting their grandkid born during pandemic, for the first time)	5.33	+1.33
12.	Video depicting positive experience (One-hundred-two-year-old great grandmother joining her great grandson in his virtual PE class)	5.49	+1.49
13.	Video depicting positive experience (A daughter reuniting with her mother)	5.34	+1.34

1-Extremely negative emotional valence; 4=neutral emotional valence; 7=Extremely positive emotional valence

2.5 PROCEDURE

Participants who were enrolled in undergraduate psychology classes signed up for the study (online) via SONA-Systems, an online participant recruitment platform used by the Psychology Department of the University of Texas at El Paso (UTEP). The eligibility criteria were posted on SONA, and eligible participants were invited to schedule a day and time to complete the full protocol in person in the lab testing room within the Psychology Department. Participants were randomly assigned to one of the six experimental conditions using Qualtrics' randomizer. All the participants completed the protocol via Qualtrics in the following order:

1) Background Survey-I (Eligibility Criteria)
2) Consent Form
3) Background Survey-II
4) Experimental Stimuli
5) Dependent Variables: Behavioral intentions, Perceived likelihood of an adverse reaction, and perceived worry
6) COVID-19 Vaccine and COVID-19 History Questionnaire
7) Adult Vaccine Hesitancy Survey
8) Beliefs and Attitudes about COVID-19
9) Debriefing sheet

2.6 DESIGN

The study employed a between-subject experimental design in which participants were randomly assigned to one of six experimental groups (conditions). Group 1 participants received a fact sheet regarding COVID-19, COVID-19 vaccination, and base rate information regarding the safety of the COVID-19 vaccine and the associated frequency of adverse events after COVID-19 vaccination. Group 2 participants received the same fact sheet and base rate information described above; in addition, Group 2 participants also viewed two brief videos of individuals describing their negative experiences with COVID-19 vaccination. Group 3 participants received the same fact sheet, base rate information, and two 'negative' videos described above; in addition, Group 3 participants also viewed two videos depicting individuals' having positive experiences after COVID-19 vaccination. Group 4 participants received the same fact sheet, base rate information, and two 'negative' videos described above; in addition, Group 4 participants viewed six videos depicting positive experiences after COVID-19

vaccination. Group 5 participants received the same fact sheet, base rate information, and two 'negative' videos described above; in addition, Group 5 participants viewed ten videos depicting positive experiences after COVID-19 vaccination. Group 6 participants viewed two 'negative' videos described above; in addition, Group 6 participants viewed six videos depicting positive experiences after COVID-19 vaccination (see Table 3).

Table 3: *Study Design*

Experimental Stimuli	**Group 1**	**Group 2**	**Group 3**	**Group 4**	**Group 5**	**Group 6**
Base rate statistics and video describing the frequency of adverse events after COVID-19 vaccination	Yes	Yes	Yes	Yes	Yes	No
Videos describing 'negative' experiences after Covid-19 vaccination	No	Yes;*N=2*	Yes;*N=2*	Yes;*N=2*	Yes;*N=2*	Yes;*N=2*
Videos describing 'positive' experiences after COVID-19 vaccination.	No	No	Yes;*N=2*	Yes;*N=6*	Yes;*N=10*	Yes;*N=6*

Chapter 3: Results

3.1 PARTICIPANT CHARACTERISTICS

Three hundred and fifty-nine students (75% female; $M_{age} = 20.34$, $SD = 2.08$) participated in this study. Approximately 87% of the sample was Hispanic, followed by Caucasian/White (4%), Asian/Asian-American/ Pacific Islander (4%), African Americans (3%), Native American, and "Others" (2%). Thirty-two percent of the sample were freshmen, 28% were sophomores, 22% were juniors, 17% were seniors, and 1% were not sure of their academic classification. Tables 4 through 6 summarize participant characteristics.

Participants were asked to identify a 'target individual' when responding to vaccination-related questions on the protocol. Specifically, participants were asked the following: "You previously indicated that you have at least one close relative or close friend who **may not have been vaccinated** against the COVID-19 virus or **may not have gotten the COVID-19 booster shot** or **whose vaccination status they were unsure of**. Please choose one close relative or a close friend who may not have been vaccinated against the COVID-19 virus…" Approximately 40% of the participants reported that the ''target individual' was an immediate family member, 29% of the participants reported the target character was a close relative (grandma, grandpa), and 31% of the participants reported that the "target individual" was a close friend.

Fifty-seven percent of the participants reported that they, themselves, had previously tested positive for the COVID-19 virus. Out of these, 21% reported experiencing no symptoms or mild symptoms (cold or cough), 35% reported experiencing moderate (fever, fatigue or breathlessness), 1% reported experiencing severe symptoms (required hospitalization), and 42% did answer the question because they had tested negative for the COVID-19 virus.

Ninety-five percent of the participants reported that a close relative or a close friend had previously tested positive for the COVID-19 virus. Approximately 24% of the participants reported that their close relative or close friend (who had tested positive for the coronavirus) had experienced no symptoms or mild symptoms, 60% reported that their close relative or close friend (who had tested positive for the coronavirus) experienced moderate to severe symptoms, 11% reported that their close relative or close friend (who had tested positive for the coronavirus) was either hospitalized or put on life support system (ventilator), and 5% of the participants either did not know or preferred not to answer this question.

Eighty-eight percent of the participants reported getting at least one shot of the COVID-19 vaccine, and 15% of these individuals reported that they had thought about not getting the 2nd shot due to the unpleasant reaction they had experienced after receiving the first COVID-19 vaccination. Sixty-nine percent of the participants reported getting the second shot of the COVID-19 vaccine, and 6% of these individuals reported that they had thought about not getting the booster shot due to the unpleasant reaction they had experienced after receiving the 2nd shot of the COVID-19 vaccination. Forty percent reported getting the booster shot of the COVID-19 vaccine, and out of these, 6% reported that they had experienced an unpleasant reaction to the booster shot of the COVID-19 vaccine.

Nineteen percent of the participants reported that coronavirus poses a *"significant or major risk"* to them personally, 36% reported that coronavirus poses a *"moderate risk*" to themselves, and 45% reported that coronavirus poses *"minor or no risk"*. Sixty-two percent of the participants reported that coronavirus poses a *"significant or major risk"* to people in the United States (US), 30% reported that coronavirus poses a *"moderate risk"* to people in the US, and 8% reported that coronavirus poses a *"minor risk"* to people in the US (See Table 7).

3.2 PRIMARY ANALYSES

Three omnibus F-tests were conducted to identify the presence of group differences in the mean ratings for each of the three dependent variables: 1) "*likelihood"* of encouraging an unvaccinated relative to speak to a healthcare provider about getting vaccinated, 2) perceived *"likelihood"* of a relative or friend experiencing an adverse reaction to the COVID-19 vaccine, and 3) the extent to which participants in each experimental group 'worried' about their unvaccinated relative or friend experiencing an adverse reaction to the COVID-19 vaccine. The mean ratings for each experimental group are presented in Table 8.

Experimental conditions did not significantly influence the likelihood of encouraging an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine. Specifically, a one-way ANOVA did not reveal significant group differences in their self-reported likelihood of encouraging an unvaccinated friend or relative to talk to a health care provider about getting the COVID-19 vaccine [F (5, 353) = 0.98, p = 0.43]. Mean "likelihood" ratings across the six experimental groups ranged from 2.47 to 2.90. The verbal anchor associated with a rating of 2.0 was *"a little likely",* and the verbal anchor associated with a rating of 3.0 was *"moderately likely"*. Thus, in no experimental condition were participants reporting that they were even moderately likely to encourage their unvaccinated relatives to speak with a health care provider about vaccination.

The response options for *"likelihood"* of an adverse reaction ranged from *"1-Not at all likely"* to *"5-Extremely likely."* A one-way ANOVA did not reveal significant differences between group means [F (5, 353) = 0.62, p = 0.69]. Mean "likelihood" ratings ranged from 1.52 to 1.82. The verbal anchor associated with a rating of 1.0 was *"not at all likely"*, and the verbal anchor associated with a rating of 2.0 was *"a little likely"*. Thus, in no experimental condition

were the participants reporting it was even 'a little likely' that an unvaccinated close relative or close friend would experience an adverse reaction to COVID-19 vaccination.

The response options for *"worry"* about a serious adverse reaction ranged from *"1-Not at all worried"* to *"7-Extremely worried."* A one-way ANOVA did not reveal significant differences between group means [F (5, 353) = 0.84, p = 0.52]. Mean *"worry"* ratings for each group ranged from 2.13 to 2.62. The verbal anchor associated with a rating of 2.0 was *"a little worried"*, and the verbal anchor associated with a rating of 3.0 was *"moderately worried"*. Thus, in no experimental condition were the participants even "moderately worried" that an unvaccinated close relative or close friend would experience a severe adverse reaction to the COVID-19 vaccine.

Levene's test of homogeneity of variance was used to test for potential violations in equality of variances between groups on the dependent measures. If the Levene's tests are non-significant, then the variance in scores on the dependent variables between groups can be assumed to be equal. No violations were observed across three dependent variables.

Although the three omnibus F-tests were non-significant, I conducted a series of planned t-tests to assess the accuracy of each of my predictions. Planned or focused comparisons are justified even when an omnibus F-test is non-significant. Planned comparisons between two group means are more powerful and more 'focused' than an omnibus F-test of the equality of six group means. The results of these planned independent t-tests are presented in Table 9.

Hypothesis 1 (H1) postulated that when evaluating vaccine safety, exposure to a small number of anecdotal reports describing severe adverse reactions to the COVID-19 vaccine would ***decrease*** participants' reliance on base rate information. I predicted that participants in Group 2 (exposed to base rate information regarding COVID-19 vaccine safety plus anecdotal

information containing two videos depicting severe adverse reactions to the COVID-19 vaccine) would be ***less likely*** than the participants in Group 1 (exposed to only base rate information) to encourage their unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine. To test this prediction, I conducted an independent samples t-test on behavioral intentions. Results did not support this prediction. Participants in Group 2 were not significantly *less likely* to encourage their unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine than participants in Group 1 (*Mean=2.52* and *Mean=2.56*, respectively); t(120)=0.13, *p=0.90.* The verbal anchor associated with a rating of 2.0 was *"a little likely",* and the verbal anchor associated with a rating of 3.0 was *"moderately likely".* Thus, in neither experimental condition were participants reporting that they were even *"moderately likely"* to encourage their unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine.

I also predicted that participants who were exposed to the base rate information plus anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine (Group 2) would report a ***higher likelihood*** that an unvaccinated relative or friend would develop a severe adverse reaction to the COVID-19 vaccine, compared to participants who were exposed to only base rate information (Group 1). To test this prediction, I conducted an independent samples t-test on the self-reported ***likelihood*** of severe adverse reactions to the COVID-19 vaccine in an unvaccinated relative or friend. Results did not support this prediction. Participants in Group 2 did not report a significantly higher *likelihood* of severe adverse reactions to the COVID-19 vaccine in an unvaccinated relative or friend than the participants in Group 1 (*Mean = 1.57 and Mean=1.52,* respectively); t(120)=0.27, *p=0.79.* The verbal anchor associated with a rating of 1.0 was *"not at all likely"*, and the verbal anchor associated with a

rating of 2.0 was *"a little likely"*. Thus, in both experimental conditions, participants reported it was not even *"a little likely"* that an unvaccinated relative or friend would experience an adverse reaction to the COVID-19 vaccine.

I also predicted that the participants who were exposed to base rate information plus anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine (Group 2) would express ***more worry*** about an unvaccinated relative or friend developing a severe adverse reaction to the COVID-19 compared to participants who were exposed to only base rate information (Group 1). To test this prediction, I conducted an independent samples t-test on self-reported ***worry***. Results did not support this prediction. Participants in Group 2 did not express significantly more *worry* than participants in Group 1 (*Mean = 2.34* and *Mean=2.13*, respectively); t(120)=0.84, *p=0.40.* The verbal anchor associated with a rating of 1.0 was *"a little worried"*, and the verbal anchor associated with a rating of 3.0 was *"moderately worried"*. Thus, in both experimental conditions, participants were not even *"moderately worried"* about an unvaccinated close relative or close friend experiencing a severe adverse reaction to the COVID-19 vaccine.

Hypothesis 2 (H2) postulated that when evaluating vaccine safety, reliance on base rate information ***increases*** after individuals are exposed to many anecdotal reports describing positive vaccine experiences and a small number of anecdotal reports describing severe adverse vaccine experiences. I predicted that participants who were exposed to base rate safety information regarding COVID-19 vaccination plus exposure to two videos depicting severe adverse consequences of COVID-19 vaccination and six videos depicting positive consequences of COVID-19 vaccination (Group 4), would be ***more likely*** to encourage an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine compared

to participants who were only exposed to the two 'negative' videos and six 'positive' videos (Group 6). To test this prediction, I conducted an independent samples t-test on behavioral intentions. The results did not support my prediction. Participants in Group 4 were not significantly more *likely* to encourage their unvaccinated relative to talk to a healthcare provider about getting the COVID-19 vaccine than participants in Group 6 *(Mean=2.47 and Mean=2.90,* respectively); t(117)=0.24, *p=0.81)*. The verbal anchor associated with a rating of 2.0 was *"a little likely",* and the verbal anchor associated with a rating of 3.0 was *"moderately likely".* Thus, in neither of the experimental conditions were participants even *"moderately likely"* to encourage their unvaccinated relative or friend to speak with a healthcare provider about vaccination.

I also predicted that participants who were exposed to base rate information plus two videos depicting adverse consequences of COVID-19 vaccination and six videos depicting positive consequences (Group 4) would be more ***likely*** to report that an unvaccinated relative or friend would develop an adverse reaction to the COVID-19 vaccine compared to participants who were only exposed to the two 'negative' videos and six 'positive' videos (Group 6). To test this prediction, I conducted an independent samples t-test on the self-reported ***likelihood*** that an unvaccinated relative or friend would develop a serious adverse reaction to the COVID-19 vaccine. Results did not support this prediction. Participants in Group 4 did not report a significantly ***higher likelihood*** of an adverse reaction to the COVID-19 vaccine in unvaccinated relative or friend than the participants in Group 6 (*Mean=1.60, and Mean=1.82,* respectively); t(116)=1.15, *p=0.25*. The verbal anchor associated with a rating of 1.0 was *"not at all likely",* and the verbal anchor associated with a rating of 1.0 was *"a little likely".* Thus, in no

experimental condition did participants report it was even *"a little likely"* that an unvaccinated close relative or close friend would experience an adverse reaction, to the COVID-19 vaccine.

I also predicted that participants who were exposed to base rate information plus anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine, and six videos depicting positive reactions to the COVID-19 vaccine (Group 4) would express ***less worry*** about an unvaccinated relative or friend developing a severe adverse reaction to the COVID-19 vaccine compared to the participants who were exposed to only anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine, and six videos depicting positive reactions to the COVID-19 vaccine (Group 6). To test this prediction, I conducted an independent samples t-test on self-reported *worry.* Results did not support this prediction. Participants in Group 4 did not express significantly more *worry* than the participants in Group 6 (*Mean=2.41 and Mean=2.62*, respectively); t(116)=0.779, *p=0.44*. The verbal anchor associated with a rating of 2.0 was *"a little worried"*, and the verbal anchor associated with a rating of 3.0 was *"moderately worried"*. Thus, in no experimental condition were the participants even "*moderately worried"* that an unvaccinated close relative or close friend would experience a severe adverse reaction to the COVID-19 vaccine.

Hypothesis 3 (H3) postulated that when evaluating vaccine safety, as the number of positive anecdotal information regarding the COVID-19 vaccine safety increases, the impact of severe adverse events on people's judgement decreases. I predicted that participants who were exposed to the base rate information regarding COVID- 19 vaccine safety, plus anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine and six or more videos depicting positive reactions to the COVID-19 vaccine (Group 4 and 5) will be ***more likely*** to encourage an unvaccinated relative or friend to speak with a healthcare

provider about getting the COVID-19 vaccine compared to participants who are exposed to the same base rate information plus anecdotal information containing two videos depicting severe adverse reactions to the COVID-19 vaccine (Group 2). To test this prediction, I conducted an independent samples t-test on behavioral intentions. Results did not support this prediction. Participants in Group 4 were not significantly *more likely* to encourage their unvaccinated relative to speak with a healthcare provider about getting vaccinated than participants in Group 2 *(Mean = 2.47 and Mean=2.52,* respectively*)*; t(117)=0.238, *p=0.81.* Similarly, participants in Group 5 were not significantly *more likely* to encourage their unvaccinated relative to get vaccinated than participants in Group 2 *(Mean=2.85 and Mean=2.52,* respectively); t(118)=1.233, *p=0.22*. The verbal anchor associated with a rating of 2.0 was *"a little likely",* and the verbal anchor associated with a rating of 3.0 was *"moderately likely".* Thus, participants in all three experimental conditions were not even *"moderately likely"* to encourage an unvaccinated relative or friend to speak to a healthcare provider about getting the COVID-19 vaccine.

I also predicted that the participants in Groups 4 & 5 will be ***less likely*** to report that an unvaccinated relative or friend would experience an adverse reaction to the COVID-19 vaccine compared to the participants in Group 2. To test this prediction, I conducted an independent samples t-test on the self-reported ***likelihood*** that an unvaccinated relative or friend would develop a serious adverse reaction to the COVID-19 vaccine. The results did not support my prediction. Participants in Group 4 were not significantly ***less likely*** than the participants in Group 2 to report that an unvaccinated relative or friend would experience a severe adverse reaction to the COVID-19 vaccine *(Mean = 1.60 and Mean=1.57,* respectively*)*; t(117)=0.162, *p=0.87.* Similarly, participants in Group 5 were not significantly ***less likely*** than participants in

Group 2 to report that an unvaccinated relative or friend would experience a severe adverse reaction to the COVID-19 vaccine *(M=1.63 and Mean = 1.57,* respectively*)*; t(118)=0.302, *p=0.76*. The verbal anchor associated with a rating of 1.0 was *"not at all likely",* and the verbal anchor associated with a rating of 2.0 was *"a little likely".* Thus, participants in all three experimental conditions reported it was not even *"a little likely"* that an unvaccinated close relative or close friend would develop an adverse reaction to the COVID-19 vaccine.

I also predicted that the participants in Groups 4 & 5 would express ***less worry*** about severe adverse reactions to the COVID-19 vaccine in an unvaccinated relative or friend compared to Group 2 participants. To test this prediction, I conducted an independent samples t-test on self-reported ***worry***. The results did not support my prediction. Participants in Group 4 did not express significantly *less worry* about severe adverse reactions to the COVID-19 vaccine in an unvaccinated relative or friend than participants in Group 2 (*Mean = 2.41 and Mean=2.34,* respectively); t(117)=0.270, *p=0.79.* Similarly, participants in Group 5 did not express significantly *less worry* about severe adverse reactions to the COVID-19 vaccine than participants in Group 2 (*Mean=2.24 and Mean=2.34,* respectively); t(118)=0.425, *p=0.67*. The verbal anchor associated with a rating of 2.0 was *"a little worried"*, and the verbal anchor associated with a rating of 3.0 was *"moderately worried"*. Thus, in no experimental condition were participants even *"moderately worried"* that an unvaccinated close relative or close friend would experience a severe adverse reaction to the COVID-19 vaccine.

Potential Impact of Vaccination Status of Participants

The key analyses were rerun based on data obtained from only vaccinated individuals (N=316). Thus 43 participants were dropped from these analyses (See Table 10 and 11). The mean ratings for each of the experimental groups are presented in Table 12. Results of these

analyses are presented in Table 13 and 14. The pattern of findings was identical to the pattern of findings revealed when vaccinated and unvaccinated participants were included.

I also conducted an independent sample t-test on the three dependent variables to compare the group means between participants who had gotten at least one shot of the COVID-19 vaccine (*N=316*) and participants who were not vaccinated (*N=43*). The results indicated significant groups differences such that participants who had gotten at least one shot of the COVID-19 vaccine were significantly more likely to encourage an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine compared to the participants who did not get the COVID-19 vaccine (*Mean=2.78 and Mean=1.72,* respectively; t(61.75)=5.74, *p=0.001*). Similarly, vaccinated participants were significantly less likely than the unvaccinated participants to report that an unvaccinated relative or friend would experience a severe adverse reaction to the COVID-19 vaccine (*Mean=1.58 and Mean=2.00,* respectively; t(357)=2.66, *p=0.008*). Additionally, vaccinated participants reported significantly *less worry* about severe adverse reactions to the COVID-19 vaccine than the unvaccinated participants (*Mean=2.27 and Mean=3.00,* respectively; t(61.75)=5.74, *p<0.001*) (See Table 15 and 16).

The primary analyses were based on multiple t-tests, which inflates familywise error rates. Two strategies can be adopted to address this issue: 1) A Bonferroni adjustment can be used, setting the p-value at 0.05 and divide by the number of t-tests; 2) A series of regression analyses testing for interaction effects can be used. However, a Bonferroni adjustment to correct for familywise error rates did not need to be employed because no significant findings were revealed in the original 12 independent t-tests, so I did not adjust p-values using a Bonferroni adjustment. However, I conducted three hierarchical regressions to examine if the interaction of vaccination status and experimental condition influenced responses to the three dependent

variables: behavioral intention, perceived risk of adverse vaccine-related events, and self-reported worry about a relative experiencing adverse vaccine reactions. In the first step, I entered the vaccination status of the participants, in the second step I entered the experimental condition each participant was assigned to, and in the third step, I entered the interaction of the two variables (vaccination status*experimental condition). There was a significant main effect of vaccination status on *'Behavioral Intentions', 'Likelihood of an Adverse Reaction', and 'Self-reported Worry* (b=-0.81*, $p<0.001$;* b=0.32, *$p<0.03$;* and b=0.64, *$p<0.001$*, respectively. Neither the main effect of experimental condition, nor the interaction (vaccination status * experimental condition) was significant (See Table 17 through 19).

3.3 IMPACT OF VACCINE HESITANCY ON BEHAVIORAL INTENTIONS

Two-tailed post hoc analyses were conducted to determine if participants' vaccine hesitancy scores explained participants' behavioral intentions within each experimental group. To explore if participants' vaccine hesitancy scores explained participants' behavioral intentions, I regressed behavioral intentions (i.e., *'likelihood to encourage to talk to a healthcare provider about getting the COVID-19 vaccine')* on the vaccine hesitancy score of participants within each of the six experimental groups. The regressions were significant for three groups: Group 2, Group 5, and Group 6. Specifically, an increased vaccine hesitancy score predicted decreased intentions to encourage an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine (See Table 20).

Chapter 4: Discussion

The present study contributes to prior research investigating factors that influence an individual's vaccine-related decisions. Although scientific research supports the safety and efficacy of the COVID-19 vaccines, vaccine-related decisions can be influenced by non-scientific factors (CDC, 2020). The present study investigated if decisions to get vaccinated against the coronavirus may be impacted by the presence of anecdotal and statistical evidence.

Findings from the current study suggest that young adults in my sample were concerned about the risk that coronavirus posed to people in the US. Sixty-three percent of the sample reported that coronavirus posed a 'significant' or 'major risk' to people in the US. This highlights the level of concern among young adults regarding the potential impact of the coronavirus. A large portion of the sample recognized the severity of the coronavirus outbreak. Approximately one-third of the sample (32%) reported that it would be 'extremely horrible or dreadful' or 'quite a bit horrible or dreadful' if their unvaccinated relative or friend got sick with COVID-19. An additional 25% of the sample reported that it would be 'moderately horrible or dreadful' if their unvaccinated relative or friend got sick with COVID-19. These findings underscore the emotional weight associated with the potential consequences of COVID-19 infection for a close relative or a close friend.

A majority of participants (88%) reported receiving at least one shot of the COVID-19 vaccine. However, it is noteworthy that a significant proportion (15%) of these individuals reported considering not getting the second shot due to experiencing an unpleasant reaction following the first vaccination. This indicates that adverse reactions to the initial dose may influence individuals' decision-making regarding the subsequent vaccination.

Among those who received the first and second shots, 69% reported receiving the recommended second dose. However, a small percentage (6%) of these individuals expressed hesitancy toward getting the booster shot due to experiencing an unpleasant reaction after the second dose. This suggests that adverse reactions following the second vaccination may lead to concerns or hesitations about receiving further doses.

Furthermore, 40% of participants reported receiving the booster shot of the COVID-19 vaccine. Among this group, 6% reported experiencing an unpleasant reaction to the booster shot. This finding underscores the possibility of adverse reactions even after receiving booster doses, albeit at a lower rate.

It is important to recognize that despite a relatively small number of individuals encountering unpleasant reactions after vaccination, these adverse events were significant to the extent that some participants contemplated not receiving the subsequent doses of the vaccine. These findings highlight the importance of understanding and addressing adverse reactions in the context of vaccine acceptance and adherence. Individuals who have experienced unpleasant reactions after receiving any of the vaccine doses may be more likely to hesitate or reconsider future vaccinations. Therefore, it is crucial for healthcare providers and public health authorities to effectively communicate the expected side effects of COVID-19 vaccines, manage individuals' concerns, and provide appropriate support and guidance to ensure ongoing adherence to vaccination protocols.

Most participants reported a vanishingly small likelihood that their unvaccinated relative or friend would experience severe adverse reactions to the COVID-19 vaccine. A little more than half of the participants (54%) reported that the chances of a severe adverse reaction due to vaccination were less than one in a million. However, despite the perceived danger of the virus

and despite the perceived safety of the vaccine, almost one-half of the respondents (47%) reported that they were not even ‘moderately likely’ to encourage an unvaccinated relative or a friend to talk to a healthcare provider about getting the COVID-19 vaccine. This finding highlights a key question plaguing public health officials: What causes vaccine hesitancy?

I hypothesized that exposure to anecdotal reports depicting adverse consequences of vaccination would reduce the likelihood of a participant encouraging vaccination among unvaccinated friends and relatives. Yet the current findings provide no support for the latter hypothesis, an issue that I discuss below.

The current study investigated the impact of anecdotal evidence on vaccine-related decision-making in the presence of statistical evidence that contradicted the anecdotal evidence. This study is similar to the work done by Evans and Fetterman (2022), who investigated the idea of 'science of denialism'. Denialism happens when people don't believe scientific findings that go against their personal experiences. Evans and Fetterman investigated if inconsistencies between participants’ personal experiences and scientific findings increased psychological discomfort and the tendency to deny the validity of science. Specifically, when scientific findings do not align with a person's own experiences, are more likely to reject the scientific evidence, guided by the belief that "seeing is believing." Evans and Fetterman instructed participants to complete two personality measures: Participants were subsequently told that their scores on the measures were unrelated. Participants were told that prior research revealed a strong relationship between two personality variables. Evans and Fetterman then asked participants to complete a measure of psychological discomfort. Participants reported experiencing higher levels of psychological discomfort when there was a discrepancy between their own experience and scientific evidence. Furthermore, the participants were more inclined to

deny the validity of the prior research findings. These results demonstrated that the primary source of discomfort for participants was the perceived discrepancy between their personal experiences and the scientific evidence. This investigation strongly supports the claim that people tend to be skeptical of scientific information that does not align with their individual experiences. Surprisingly, however, findings from the current study do not support this claim. In the current study, participants were presented with anecdotal evidence in the form of videos depicting dreadful events after getting the COVID-19 vaccine. These anecdotal reports contradicted the statistical evidence based on one million data points. However, the presence of anecdotal reports did not impact participants' vaccine-related decisions across the six experimental groups. All the participants, irrespective of experimental condition, reported that it was not even *'a little likely'* for their unvaccinated relative or friend to develop a severe adverse reaction to the COVID-19 vaccine. Similarly, participants were not even *'moderately likely'* to encourage an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine and not even *'a little worried'* about an adverse reaction after the COVID-19 vaccine.

In sum, the current study did not find any impact of anecdotal evidence on vaccine-related decisions when anecdotal evidence regarding vaccine safety contradicted statistical (base rate) evidence regarding vaccine safety. While Evans & Fetterman (2022) found that people may question scientific agreement if it goes against their own experiences, the current results do not support this findings. The current study's failure to replicate prior research underscores the potentially intricate relationship between personal stories and data, highlighting the need for more research to understand how people make health-related decisions in the presence of scientific information.

4.1 THE RELATIVE IMPACT OF ANECDOTAL AND STATISTICAL EVIDENCE ON COVID-19 VACCINE INTENTIONS

Findings from the current study do not support the hypothesis that vaccine-related decisions are unduly influenced by anecdotal evidence. Specifically, a participant's likelihood of encouraging a relative or a friend to talk to a healthcare provider about getting vaccinated against COVID-19 was not influenced by anecdotes describing vivid and dreadful events following COVID-19 vaccination. Recall that participants in Group 1 were only exposed to base rate information that highlighted the extreme safety of COVID 19 vaccination. This base rate information revealed that only two out of every million people who are vaccinated experience a serious adverse reaction (e.g., heart inflammation). In contrast, participants in Group 2 were exposed to the same safety information *plus two* anecdotal reports describing severe adverse reactions to the COVID-19 vaccine. In essence, participants in Group 1 were presented with safety-related findings based on one million data points, and participants in Group 2 were presented with safety-related findings based on one million and two data points (and the latter two 'data points' were in the form of two anecdotal reports depicting adverse events). Yet participants in Group 2 were just as likely to encourage their unvaccinated relative or friend to seek out vaccine related information as participants in Group 1 (who were not exposed to any anecdotal information). This finding suggests that Group 2 participants were not influenced by the two 'additional data points' that highlighted the potential danger of the vaccine. The failure to find a significant impact of anecdotal information on the behavioral intentions of participants is particularly striking because this 'anecdotal information' was presented in video-format rather than written text format and thus the anecdotal information was infused with many emotionally powerful cues. One video, for example, depicted a man crying as he described how his daughter

died shortly after getting the COVID-19 vaccine, his voice shaking as he described her death after vaccination. Despite the emotional distress conveyed by the two videos, participants in Group 2 were not significantly less likely to encourage a relative or a friend to talk to a healthcare provider about getting the COVID-19 vaccine than participants in Group 1.

On average, participants in Group 1 and Group 2 reported that they were not even 'moderately likely' to encourage an unvaccinated relative or a friend to talk to a healthcare provider about getting the vaccine. This finding is unexpected. Participants in Group 1 recognized the dangers of COVID-19 and they also recognized the rarity of adverse outcomes after COVID-19 vaccination. Moreover, Group 1 participants were only presented with base rate safety information; Group 1 participants were not exposed to videos depicting adverse vaccine experiences. Yet Group 1 participants were not even moderately likely to encourage unvaccinated relatives to seek out vaccine-related information. Potential reasons for this unexpected outcome are discussed in a subsequent section below.

Perceived Likelihood of Developing an Adverse Reaction to COVID-19 Vaccination

Recall that all participants evaluated the likelihood that an unvaccinated friend or relative would experience an adverse reaction to the COVID-19 vaccine. I predicted that the perceived likelihood of developing a severe adverse reaction (e.g., heart inflammation) to COVID-19 vaccination would be higher among participants in Group 2 compared to participants in Group 1. Group 1 participants were presented with only one type of safety information: base rate information indicating that we can expect two serious adverse events for every one million COVID-19 vaccinations. In contrast, Group 2 participants were presented with two types of safety-related information: the same base rate information described above plus two vivid descriptions (in the form of YouTube videos) of tragic events occurring shortly after COVID-19

vaccination. In essence, Group 1 participants were presented with one million data points (base rate information), and Group 2 participants were presented with one million and two data points (one million data points derived from base rate safety estimates and two anecdotal reports describing serious adverse events). However, the perceived likelihood of an unvaccinated relative or friend experiencing a serious adverse outcome was not significantly influenced by exposure to the two anecdotal reports (videos) depicting tragic outcomes following vaccination. Moreover, participants in Group 1 and Group 2 reported that it was not even 'a little likely' for their unvaccinated relative or friend to develop a severe adverse reaction to the COVID-19 vaccine. Here, too, the findings are inconsistent with prior research. Potential reasons for this unexpected outcome are discussed in a subsequent section below.

I also predicted that exposure to a series of videos depicting positive outcomes of COVID-19 vaccination would reduce the impact of videos depicting adverse outcomes of COVID-19 vaccination. Here too, results did not support my predictions. Viewing two, six, or ten videos depicting positive vaccination outcomes did not impact the perceived likelihood of a close relative or friend experiencing an adverse reaction to COVID-19 vaccination. Conceivably participants in Groups 3, 4, & 5 were not engaged by the videos and did not find these videos emotionally uplifting or 'positive'. However, my prior study evaluating the emotionality of these 10 videos does not support the latter explanation. For example, one video depicted a heartwarming reunion between grandparents and grandchildren after being apart for one year due to the COVID-19 pandemic. Tears streaming down the grandchildren's faces, their emotions overflowing with joy and relief as they tightly held their beloved grandparents in their arms. The reunion was possible because the grandparents and the grandchildren got the COVID-19 vaccine. Positive anecdotes had no significant impact on the perceived likelihood of experiencing adverse

events after COVID-19 vaccination. Additional reasons for this unexpected outcome are discussed in a subsequent section below.

Additionally, I predicted that the perceived likelihood that an unvaccinated friend or relative would experience an adverse reaction to the COVID-19 vaccine would be lower among participants in Group 4 compared to Group 6 participants. Recall that Group 4 participants were presented with safety-related findings based on one million plus eight ‘data points’ (two of the latter ‘data points’ were in the form of two anecdotal reports depicting adverse events, and six ‘data points’ were in the form of six anecdotal reports depicting positive outcomes). Group 6 participants were presented with only eight ‘data points’ in the form of anecdotal reports (two negative and six positive anecdotal reports depicting adverse outcomes and positive outcomes respectively, after the COVID-19 vaccine). Yet the participants Group 4 were not significantly less likely than participants in Group 6 in their perceived likelihood than an unvaccinated relative or friend would develop an adverse reaction to the COVID-19 vaccine. On average, both Group 4 and Group 6 participants reported that it was not even 'a little likely' for their relatives or friends to develop severe adverse reactions to the COVID-19 vaccine. These findings indicate that the presentation of different types of information, base rate safety information derived from one million ‘data points’ or anecdotal reports depicting negative or positive outcomes after the COVID-19 vaccine, did not significantly influence participants' perceptions of the likelihood of adverse reactions in their unvaccinated relative or friend. Additional reasons for this unexpected outcome are discussed in a subsequent section below.

The results of this study suggest that exposure to anecdotal reports of the benefits and dangers of COVID-19 vaccination do not impact individuals' behavioral intentions, perceived likelihood of risk, and the level of worry accompanying vaccination. These findings contradict

the findings of several previous studies that demonstrated a significant influence of anecdotal information on health-related behavioral intentions. (Ubel et al., 2001; Bestch et al., 2011; Gutierrez, 2015; Coffman, 2015). For example, Ubel et al (2001) demonstrated that exposure to one or two 'negative' testimonials can impact an individual's reliance on base rate information when making health-related decisions. Specifically, when individuals are exposed to negative anecdotes, they may place less importance on base rate evidence and instead give more weight to the personal experiences shared in the testimonials. Coffman (2015) found that exposure to negative anecdotes in combination with base rate information had a significant impact on individuals' vaccination intentions, leading to a lower likelihood of receiving the HPV vaccine in the following year. Moreover, the presence of negative anecdotes appeared to outweigh the influence of positive anecdotes in shaping individuals' intentions to get the HPV vaccine.

4.2 POTENTIAL EXPLANATIONS

There are several potential explanations for the lack of group differences across behavioral intentions, perceived likelihood of risk and perceived worry. Firstly, it is possible that the participants did not pay sufficient attention to either the measures or experimental manipulations. The protocol required between 30 to 40 minutes to complete (depending upon the number of videos that were shown to participants). Perhaps many participants were fatigued and, consequently, inattentive when responding to the manipulations and assessments. However, this potential explanation seems unlikely because all the participants completed the crucial components of the study, including exposure to the experimental manipulation and assessment of dependent variables early in the protocol (The longest session took between 30-40 minutes). Therefore, it seems unlikely that the lack of group differences was due to the length of time it took to complete the entire protocol.

Secondly, it is possible that participants who completed the protocol very quickly were not carefully attending to the information presented in the base rate Fact Sheet or the multiple videos themselves. Here, too, inattentiveness could have reduced the validity of their responses to each of the dependent measures. I anticipated this possibility and thus collected time stamps for each protocol. In Qualtrics, a time stamp refers to the recorded time at which a specific measure is completed during a survey or research study. It captures the start and end time of a survey, the duration of specific sections or questions, or the time at which a participant completes a particular task. I ensured that Qualtrics recorded the time each participant started and ended the protocol. However, the latter information could not be used in the present study because research assistants opened each participant's protocol prior to their arrival at the lab, and I did not instruct the research assistants to open each protocol after a subject had arrived at the lab and was seated at the computer. Thus, the protocols for some participants were opened 5, 10, or even 15 minutes before arriving at the lab (in order to have the protocol ready when the participants arrived at the lab). And if a participant did not show up, the protocol would remain open for the next participant, affecting the accuracy of the time stamps. As a result, the time stamps obtained from Qualtrics were not always accurate records of the time needed to complete a protocol.

Thirdly, it is possible that the participants did not understand or misunderstood the word *'likely'* when responding to the key dependent measures. For example, I assessed each participant's likelihood of encouraging their unvaccinated relative or friend to speak with a healthcare provider about getting the COVID-19 vaccine. The response options for this question ranged from "1-Not at all likely" to "5-Extremely likely." Despite reporting lower levels of worry and perceived likelihood of their unvaccinated relative or friend experiencing a severe adverse

reaction to the COVID-19 vaccine, it is notable that the participants in any of the six experimental groups did not indicate even a moderate likelihood of encouraging their unvaccinated relative or friend to consult a healthcare provider about getting the COVID-19 vaccine. This discrepancy raises the possibility that participants may not have fully grasped the meaning of the word 'likely' in the context of the protocol. Wintle et al. (2019) investigated how individuals understand and interpret verbal expressions of probability compared to numeric expressions of probability. In the study, participants were given verbal probability terms and asked to assign numerical values to them. Specifically, the participants were asked to assign numerical values, such as ’85-90%’ or ’20-45’, to verbal probability terms such as ‘very likely’ or ‘unlikely’ respectively. The results showed that participants had varying interpretations and understandings of these verbal probability terms, leading to greater variability and inconsistency in their assignments. This suggests that verbal expressions of probability can be ambiguous and confusing for individuals. Because I used verbal expressions of probability, such as ‘extremely likely’ and ‘not at all likely,’ it is possible that participants may have interpreted the word ‘likely’ differently. However, before conducting this study, I pilot-tested the measures to help identify wording that was unclear to participants. In the pilot test, participants were specifically asked to identify words and phrases that were unclear. According to the feedback from participants, the instructions and survey items were clear, and no one reported any terms that would be confusing to themselves or their friends.

4.3 STRENGTHS

Only a few studies have investigated the impact of anecdotal and statistical information on health-related decisions. The present study contributes to this line of research. The current study utilized COVID-19 vaccine-related videos downloaded from YouTube to manipulate the type of information presented to the participants. These videos depicted testimonials of individuals' describing their first-hand negative or positive personal experiences with the COVID-19 vaccine. One advantage of presenting safety and risk information in the form of a video is that it is more engaging and memorable than any other form of communication and can be tailored to the specific needs of the users (Shen et al., 2015; Witus & Larson, 2022). For example, the videos used in the current study were specifically about COVID-19 vaccination-related experiences. I also collected information on the vaccine-related experiences of participants, such as their own vaccination status and knowing a relative or friend who has not been vaccinated or partially vaccinated against the coronavirus, as a way to investigate how personal experience may influence their decision-making. This adds relevance to the findings of the study by making the information more personal and relatable.

The study was conducted in person under the supervision of trained research assistants and within a controlled lab setting. Additionally, research assistants explicitly requested participants to put aside their phones or electronic devices during the study. By combining the explicit request to set aside phones or electronic devices with direct supervision and the controlled lab setting, the study strengthened its ability to minimize distractions. The efforts made to minimize distractions through the controlled environment and direct supervision can enhance the quality and reliability of the data.

4.4 LIMITATIONS

There are several limitations associated with this study. First, the study was conducted with a specific population: undergraduate college students; thus, the findings have limited generalizability to other populations, such as older adults and young adults who do not attend college. Secondly, the study addressed the issue of COVID-19 vaccination, and there is no way to ensure that participants shared accurate information regarding the vaccination status, the likelihood of an adverse reaction in an unvaccinated relative or friend after the COVID-19 vaccine, or their perceived worry that an unvaccinated relative or friend would develop a severe adverse reaction to the COVID-19 vaccine. The study relied on self-report measures, which are prone to biases, and participants' responses might not have reflected their actual behaviors and attitudes accurately. One potential source of bias is social desirability bias, i.e., the tendency of individuals to respond in a manner that they perceive as more acceptable to others or that portrays themselves in a positive light. Participants might have over-reported their own vaccination status, downplayed the likelihood of an adverse reaction after the COVID-19 vaccine, or perceived worry that an unvaccinated relative or friend would develop an adverse reaction to the COVID-19 vaccine.

4.5 FUTURE DIRECTIONS

Future studies should investigate several of the key issues raised above. For example, future studies should investigate if individuals are overwhelmed by safety information presented in the form of base rates. That is, when presented with numerical values, such as percentages or ratios, individuals may get overwhelmed by the complexity of the numbers. As a result, individuals may focus on the gist of the information rather than grasping the underlying meaning. the latter suggestion aligns with Valerie Reyna's Fuzzy Trace Theory (FTT). Fuzzy

Trace Theory posits that when individuals encounter information, they create two mental representations: verbatim (precise and detailed) and gist (general and abstract). Verbatim representations reflect the raw, literal content of the information, while gist representations capture the essential meaning or bottom-line message of the information. The theory proposes that people tend to rely more on the gist representation when making decisions, especially when confronted with complex or emotionally charged information (Reyna, 2012). Gist representations capture the essence of the information, providing a summary or overarching understanding. For example, the base rate information states that heart inflammation occurs in two out of every one million people vaccinated. However, when individuals read this information, they may walk away with the gist that there is a risk that their relative or friend may experience an adverse reaction to the vaccine, even if the base rate states that the risk is statistically low. This leads to inadvertently drawing erroneous conclusions about vaccine safety that are inconsistent with the intent of public health safety data and public health officials.

In the current study, participants were presented with the base rate evidence and anecdotal reports. Future studies may benefit by investigating how individuals weigh base rate information by administering a questionnaire specifically designed to assess participants' comprehension of the presented base rate information. This approach would help researchers understand whether any observed effects (or lack thereof) in decision-making and behavioral intentions were due to participants' engagement in mere verbatim processing, comprehending the numbers at face value, or if they relied on gist representations by extracting the bottom line message or essential meaning of the information. By correlating participants' s comprehension levels with their subsequent decision-making patterns, future studies could unravel how

cognitive processing styles, as proposed by Reyna, impact the integration of base rate information into individuals' decision-making processes.

Similarly, future research should expand on the present study by varying the number of positive and negative anecdotes. By systematically manipulating the number of positive and negative anecdotes presented to individuals, researchers can identify the tipping point at which the cumulative effect of positive anecdotes overrides the influence of one or two negative anecdotes. This information will shed light on the relative weight individuals assign to different types of anecdotal information and help clarify the extent to which positive anecdotes can counteract the impact of negative stories.

Future research could benefit by addressing several validity issues involving the current experimental design and key theoretical constructs. Three types of validity are often referred to. The first involves internal validity, which pertains to the establishment of a cause-and-effect relationship between variables within an experimental study. In essence, it addresses the extent to which the observed outcomes can be attributed directly to the experimental manipulations in an experiment. In other words, when a study has a strong internal validity, it implies that the independent variable (the factor being manipulated) is directly responsible for the changes observed in the dependent variable (the outcome being measured). However, there are factors that may threaten internal validity of a study. In the current study, threats to internal validity may have come from several sources. For example, participants may have held pre-existing beliefs about the study's hypotheses, and such beliefs may have impacted the results of the study. Internal validity may have also been threatened by low statistical power. Future studies could address the issue of pre-existing beliefs of participants by administering a preliminary questionnaire to assess participants' awareness of the study's objectives. If it is established that

participants pre-existing beliefs did have an impact on the outcomes of the study, the responses from these participants may be deleted. Low statistical power increases the likelihood of making Type II error in a research study. Type II error occurs when a study fails to detect the true effect or relationship that actually exists in the population. In the current study, the statistical power employed was 80%. Future studies can increase the statistical power to 90% because higher statistical power is more sensitive to detecting even smaller differences or relationships between variables and reduces the likelihood of making Type II errors. However, a larger sample size is required to achieve 90% power that provides more data points, and improve a study's precision and ability to detect effects.

The second type of validity refers to external validity, i.e., the generalizability of findings beyond the sample. In the current study, the sample was restricted to university students between the ages of 18 and 28. One way to improve the generalizability of the current study is by diversifying the participant pool by recruiting a non-university sample and extending the age range beyond 28. Future studies may also recruit individuals who are not vaccinated to generalize the findings to both vaccinated and unvaccinated people.

The third type of validity refers to construct validity, i.e., how well the test measures the concept that it was designed to evaluate. For example, the current study assessed the perceived likelihood of an adverse event following COVID-19 vaccination. Future studies may use measures with high converging scores, i.e., participants with high scores on the perceived likelihood of an adverse event following COVID-19 vaccination should score high on a-vaccine hesitancy scale. Similarly, future studies may use make sure that scores on two tests measuring participants' vaccine hesitancy and the likelihood of encouraging vaccination are not correlated.

In other words, individuals scoring high on vaccine hesitancy are not expected to score high on their 'likelihood of encouraging vaccination.'

In sum, follow-up studies would benefit from strengthening the internal validity of the current research design and increasing the generalizability of findings. In addition, future research would likely benefit from bridging two broad areas of research: the relative impact of anecdotal and statistical evidence on decision-making and science denialism.

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Table 4: *Participant Characteristics*

Variable	***N***	***%***	***M***	***SD***
Age	359		20.34	2.08
Gender				
Males	89	25.0%		
Females	268	75.0%		
Ethnicity				
Hispanic	312	86.9%		
White	17	4.7%		
Asia American	14	3.9%		
Asian American	10	2.8%		
Other	6	1.7%		
College Level				
Freshman	115	32.3%		
Sophomore	103	28.7%		
Junior	79	22.3%		
Senior	58	16.7%		
Not sure	4	0.9%		

Table 5: *Participant Characteristics (continued)*

Variable	***N***	***%***
Vaccination History		
Initial COVID-19 vaccine	316	88.0%
Second shot of COVID-19 vaccine	249	69.4%
Booster shot of COVID-19 vaccine	143	39.8%

Table 6: *Participant Characteristics (continued)*

Variable	*N*	*%*
COVID-19 History		
Participant tested positive for the COVID-19 virus		
Yes	206	57.4%
No	151	42.0%
Prefer not to answer	2	0.6%
Participant symptoms after testing positive for COVID-19		
No symptoms or mild symptoms	76	21.1%
Moderate symptoms	126	35.1%
Severe symptoms (Hospitalization)	4	1.1%
Did not answer (Answered 'No' or 'Prefer not to answer to 'Have you ever tested positive for COVID-19 virus?')	153	42.7%
Close relative or friend tested positive for the COVID-19 virus		
Yes	341	95.0%
No	11	3.0%
I don't know	6	1.7%
Prefer not to answer	1	0.3%
Close relative or Friend symptoms after testing positive for COVID-19		
No symptoms or mild symptoms	88	24.3%
Moderate Symptoms	214	59.6%
Severe (Hospitalization) symptoms or on life support (Ventilator)	41	11.4%
Did not reply (Answered 'No' or 'Prefer not to answer' to 'Has a close relative or a close friend tested positive for COVID-19 virus?)	31	4.7%

Table 7: *Beliefs and Attitudes About COVID-19*

Variable	*N*	*%*
1. To what extent do you think coronavirus poses a risk to people in the U.S.?	359	
Significant or major risk	224	62%
Moderate risk	105	30%
Minor risk	29	8%
2. To what extent do you think coronavirus poses a risk to you personally?	359	
Significant or major risk	69	19%
Moderate risk	131	36%
Minor or no risk	158	45%

Table 8: *Mean ratings of behavioral intentions, perceived likelihood of adverse reaction, and perceived worry (Vaccinated and Unvaccinated Participant, N=359))*

	Base rate only (Group 1)	**Base rate plus two negative anecdotes (Group 2)**	**Base rate plus two negative and two positive anecdotes (Group 3)**	**Base rate plus two negative anecdotes and six positive anecdotes (Group 4)**	**Base rate plus two negative anecdotes and ten positive anecdotes (Group 5)**	**Two negative anecdotes and ten positive anecdotes (Group 6)**
	N=61 M(SD)	***N=61 M(SD)***	***N=60 M(SD)***	***N=58 M(SD)***	***N=59 M(SD)***	***N=60 M(SD)***
Likelihood to encourage speaking with a healthcare provider about getting the COVID-19 vaccine[1]	2.56 (1.40)	2.52 (1.43)	2.63 (1.44)	2.47 (1.25)	2.85 (1.44)	2.90 (1.40)
Perceived Likelihood of an adverse reaction to the COVID-19 vaccine[1]	1.52(1.01)	1.57(0.97)	1.63(0.96)	1.60(1.02)	1.63 (0.96)	1.82(0.98)
Worry about an adverse reaction to the COVID-19 vaccine[2]	2.13(1.38)	2.34(1.43)	2.40 (1.45)	2.41(1.38)	2.24 (1.33)	2.62(1.45)

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 9: *Group differences in behavioral intentions, perceived likelihood of adverse reaction after the COVID-19 vaccination, and self-reported worry about a severe adverse reaction after vaccination (Vaccinated and Unvaccinated Participants, N=359).*

	Likelihood of encouraging an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine[1]	**Likelihood of a close relative or friend developing a severe adverse reaction to the COVID-19accine[1]**	**Worry about a close relative or friend would develop a severe adverse reaction to the COVID-19 vaccine[2]**
Group1 & Group 2	*t(120)=0.13, p=0.90*	*t(120)=0.27, p=0.79*	*(120)=0.84, p=0.40*
Group 2 & Group 4	*t(117)=0.24, p=0.81*	*t(117)=0.16, p=0.87*	*t(117)=0.27, p=0.79*
Group 2 & Group 5	*t(118)=1.23, p=0.22*	*t(118)=0.03, p=0.76*	*t(118)=0.43, p=0.67*
Group 4 & Group 6	*t(116)=1.77, p=0.08*	*t(116)=1.15, p=0.25*	*t(116)=0.78, p=0.44*

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 10: *Total number of vaccinated and unvaccinated participants*

Vaccinated (At least one shot)	Unvaccinated	Prefer Not to Answer	Total
316	39	4	359

Table 11: *Group-wise distribution of vaccinated and unvaccinated participants*

Group #	No. of Vaccinated (N=316)	No. of Unvaccinated (N=39)	Prefer Not to Answer	Total
1	54	6	1	61
2	55	6	0	61
3	54	6	-	60
4	51	6	1	58
5	51	7	1	59
6	51	8	1	60

Table 12: *Mean ratings of behavioral intentions, perceived likelihood of adverse reaction, and perceived worry (Participants who had gotten at least one shot of COVID-19 vaccine, N=316)*

	Base rate only (Group 1)	**Base rate plus two negative anecdotes (Group 2)**	**Base rate plus two negative and two positive anecdotes (Group 3)**	**Base rate plus two negative anecdotes and six positive anecdotes (Group 4)**	**Base rate plus two negative anecdotes and ten positive anecdotes (Group 5)**	**Two negative anecdotes and ten positive anecdotes (Group 6)**
	N=54 M(SD)	***N=55 M(SD)***	***N=54 M(SD)***	***N=51 M(SD)***	***N=51 M(SD)***	***N=51 M(SD)***
Likelihood to encourage speaking with a healthcare provider about getting the COVID-19 vaccine[1]	2.72 (1.40)	2.69 (1.41)	2.65 (1.45)	2.63 (1.25)	2.90 (1.49)	3.12(1.33)
Perceived Likelihood of an adverse reaction to the COVID-19 vaccine[1]	1.39(0.79)	1.56(1.00)	1.61(0.98)	1.57(0.96)	1.57(0.90)	1.78(0.99)
Worry about an adverse reaction to the COVID-19 vaccine[2]	2.13(1.44)	2.24(1.39)	2.31(1.44)	2.29(1.35)	2.18(1.29)	2.47(1.36)

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 13: *Group differences in behavioral intentions, perceived likelihood of adverse reaction after the COVID-19 vaccination, and self-reported worry about a severe adverse reaction after vaccination (Participants who had gotten at least one shot of COVID-19 vaccine, N=316)*

	Likelihood of encouraging an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine[1]	**Likelihood of a close relative or friend developing a severe adverse reaction to the COVID-19accine[1]**	**Worry about a close relative or friend would develop a severe adverse reaction to the COVID-19 vaccine[2]**
Group 1 & Group 2	*t(107)=0.53, p=0.60*	*t(107)=1.05, p=0.29*	*t(107)=0.39, p=0.69*
Group 2 & Group 4	*t(104)=0.60, p=0.55*	*t(104)=0.28, p=0.82*	*t(104)=0.22, p=0.83*
Group 2 & Group 5	*t(104)=0.86, p=0.39*	*t(104)=0.15, p=0.88*	*t(104)=0.23, p=0.82*
Group 4 & Group 6	*t(100)=2.00, p=0.05*	*t(100)=0.21, p=0.84*	*t(100)=0.66, p=0.51*

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 14: *Dependent Variables*
(Participants who had gotten at least one shot of COVID-19 vaccine, N=316)

Dependent Variables	**N**	***M(SD)***
Likelihood to encourage speaking with a healthcare provider about getting the COVID-19 vaccine[1]	316	2.78(1.39)
Likelihood of an Adverse Reaction[1]	316	1.58(0.94)
Self-reported worry about an Adverse Reaction[2]	316	2.27(1.38)

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 15: *Mean ratings of behavioral intentions, perceived likelihood of adverse reaction, and perceived worry (Vaccinated versus Unvaccinated participants, N=359)*

Dependent Variables	Vaccinated (N=316)	Unvaccinated (N=43)
Likelihood of encouraging an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine[1]	*2.78(1.39)*	1.72(1.10)
Likelihood of a close relative or friend developing a severe adverse reaction to the COVID-19accine[1]	*1.58(0.94)*	*2.00(1.22)*
Worry about a close relative or friend would develop a severe adverse reaction to the COVID-19 vaccine[2]	*2.27(1.38)*	*3.00(1.46)*

Note: [1]*Response options: 1-Not at all likely; 2-Little likely; 3-Moderately likely; 4-Quite likely; 5-Extremely likely.*

[2]*Response options: 1-Not at all worried; 2-Little worried; 3-Moderately worried; 4-Quite worried; 5-Extremely worried.*

Table 16: *Group differences in behavioral intentions, perceived likelihood of adverse reaction after the COVID-19 vaccination, and self-reported worry about a severe adverse reaction after vaccination (Vaccinated versus Unvaccinated, N=359)*

Dependent Variables	Vaccinated (N=316) and Unvaccinated (N=43)
Likelihood of encouraging an unvaccinated relative or friend to talk to a healthcare provider about getting the COVID-19 vaccine[1]	*t(61.75)=5.74, p<0.001**
Likelihood of a close relative or friend developing a severe adverse reaction to the COVID-19accine[1]	*t(357)=2.66, p=0.008**
Worry about a close relative or friend would develop a severe adverse reaction to the COVID-19 vaccine[2]	*t(357)=3.25, p=0.001**

Note: *Statistically significant

Table 17: *Regression to predict behavioral intentions from Vaccination Status, Experimental Condition and Interaction (Vaccination status * Experimental Condition, N=359)*

Variable	β(S.E.)	95% CI		*p*
		LL	UL	
Step 1:				
Vaccination Status	1.06(0.22)	0.63	1.50	<0.001*
Step 2:				
Vaccination Status	1.08(0.22)	0.65	1.51	<0.001*
Experimental Condition	0.08(0.04)	0.00	0.16	0.06
Step 3:				
Vaccination Status	1.32(0.51)	0.32	2.32	0.01*
Experimental Condition	0.14(0.18)	-0.09	0.37	0.24
Vaccination Status*Experimental Condition	-0.07(0.12)	-0.31	0.18	0.60

Note: *Statistically significant

Table 18: *Regression to predict 'Likelihood of an Adverse Reaction' from Vaccination Status, Experimental Condition and Interaction (Vaccination status * Experimental Condition, N=359)*

Variable	β(S.E.)	95% CI		*p*
		LL	UL	
Step 1:				
Vaccination Status	-0.42(0.16)	-0.73	-0.11	<0.008*
Step 2:				
Vaccination Status	-0.41(0.16)	-0.72	-0.10	0.01*
Experimental Condition	0.04(0.03)	-0.002	0.10	0.16
Step 3:				
Vaccination Status	-0.81(0.38)	-1.53	-0.09	0.03*
Experimental Condition	-0.05(0.08)	-0.22	0.11	0.53
Vaccination Status*Experimental Condition	0.11(0.09)	-0.07	0.29	0.23

Note: *Statistically significant

Table 19: *Regression to predict 'Worry about an Adverse Reaction' from Vaccination Status, Experimental Condition and Interaction (Vaccination status * Experimental Condition, N=359)*

Variable	β(S.E.)	95% CI		*p*
		LL	UL	
Step 1:				
Vaccination Status	-0.73(0.23)	-1.18	-0.29	0.001*
Step 2:				
Vaccination Status	-0.72(0.23)	-1.16	-0.28	0.002*
Experimental Condition	0.55(0.04)	-0.03	0.14	0.20
Step 3:				
Vaccination Status	-0.38(0.52)	-1.41	0.65	0.47
Experimental Condition	0.14(0.12)	-0.10	0.37	0.26
Vaccination Status*Experimental Condition	-0.09(0.13)	-0.35	0.16	0.47

Note: *Statistically significant

Table 20: *Simple Linear Regression to predict behavioral intentions from Vaccine Hesitancy*

Variable	Unstandardized Coefficients		95% CI			
	β	S E	LL	UL	β	*p*
Group 2	-0.826	.203	-1.23	-0.42	-.468	<0.001*
Group 4	-0.464	0.144	-0.75	-0.18	-0.396	0.002*
Group 6	-0.371	.174	-0.72	-0.02	-0.269	0.04*

Note: *Statistically significant

Appendix A

Eligibility Criteria

1. Have all of your close relatives who are over the age of 18, and living in the United States, been vaccinated against the COVID-19 virus? Close relatives could include a mom, dad, brother, sister, grandma, grandpa, aunt, uncle, or cousin.

____Yes ___No ____I don't know

2. If you answered "yes" to question #1 above, then do you know if all of your close relatives over the age of 18 have received the additional booster vaccine against the COVID-19 virus?

____Yes ___No ____I don't know

3. Have all of your close friends over the age of 18, and living in the United States, been vaccinated against the COVID-19 virus?

____Yes ___No ____I don't know

4. If you answered "Yes" to question #3 above, then do you know if all of your close friends over the age of 18 have received the additional booster vaccine against the COVID-19 virus?

____Yes ___No ____I don't know

Appendix B

Demographic Survey

1) Today's Date: _____

2) Your Age: _____

Please answer the following questions. For each question, place an "X" in the appropriate spot.

3) Gender:

(a) ____ Male
(b) ____ Female
(c) ____ Transgender
(d) ____ Other
(e) ____ Prefer not to answer

4) How do you describe yourself?

(a) ____ African-American
(b) ____ Asian/ Asian-American/ Pacific Islander
(c) ____ Caucasian/ White (not of Hispanic origin)
(d) ____ Mexican American, Hispanic, Latino
(e) ____ Native American
(f) ____ Other (write in)_____

5) Academic Classification:

(a) ____ Freshman
(b) ____ Sophomore
(c) ____ Junior
(d) ____ Senior
(e) ____ Not sure

6) Are you an international student?

(a) ____ Yes
(b) ____ No

6a) If you are an international student, then please indicate your home country (if you are not an international student, then please go to question #7):

(a) ____ Mexico
(b) ____ Canada
(c) ____ India
(d) ____ Korea
(e) ____ Other (Pease indicate: _____)

7) Have any of your friends participated in the study and discussed the task with you?

(a) ____ Yes
(b) ____ No

Appendix C

COVID-19 and Vaccine History Questionnaire

1. Have you been vaccinated against the COVID-19 and have also received the COVID-19 booster shot?

a) _____ Yes
b) _____ No
[If they answer yest, present the next question, otherwise skip to question 3

1b. Have you received the COVID-19 booster vaccine?

a) _____ Yes
b) _____ No
[If they answer yes, then present the next question, otherwise skip to question 3]

2. At any point, did you experience any physical reactions to vaccines?

a) _____ Yes
b) _____ No
[If they answer yes, then present the next question, otherwise skip to question 3]

2b. How severe were your reactions to the COVID-19 vaccines?

1	2	3	4	5
No reaction at all	Mild reaction (sore arm and/ or low-grade fever)	Serious reaction (difficulty breathing, swelling of face or throat, a fast heartbeat, a bad rash, dizziness)	Required Medical attention	Required hospitalization

3. Have you ever tested positive for the COVID-19 virus?

a) ____ Yes
b) ____ No

[If they answer “yes” present the next question, otherwise skip to question 4]

3a. If yes, what kind of symptoms did you experience?

1	2	3	4	5
No symptoms	Mild symptoms (cold and cough)	Moderate symptoms (fever, fatigue, cold, cough, and breathlessness)	Severe Symptoms (hospitalization)	On life support system (Ventilator)

4. Has a close relative or friend tested positive for the COVID-19 virus?

a) _____Yes
b) _____No
c) _____I don't know
[If they answer yes, present the next question, otherwise skip to question 5]

4a. What kind of symptoms did they experience?

1	2	3	4	5
No symptoms	Mild symptoms (cold and cough)	Moderate symptoms (fever, fatigue, cold, cough, and breathlessness)	Severe Symptoms (hospitalization)	On life support system (ventilator)

5. In your opinion how horrible or dreadful would it be to if you got sick with COVID-19

1	2	3	4	5
Not at all horrible or dreadful	A little horrible or dreadful	Moderately horrible or dreadful	Quite a bit horrible or dreadful	Extremely horrible or dreadful

Appendix D

Adult Vaccine Hesitancy Survey

How much do you agree with the each of the following statements on vaccinations? Please indicate your response with a check mark (√) in the appropriate box, using the scale below:

SCALE: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree

Sl.No.		1	2	3	4	5
1.	Vaccines are important for my health					
2.	Vaccines are effective					
3.	Being vaccinated is important for the health of others in my community					
4.	All routine vaccines offered by CDC are beneficial					
5.	New vaccines carry more risks than older vaccines					
6.	The information I receive about vaccines from CDC is reliable and trustworthy					
7.	Getting vaccines is a good way to protect me from disease					
8.	Generally, I do what my doctor or health care provider recommends about vaccines for me					
9.	I am concerned about serious adverse effects of vaccines					
10.	I do not need important to have vaccines for diseases rare diseases					

Appendix E

Beliefs, and attitudes about COVID-19

6. To what extent do you think coronavirus poses a risk to people in the U.S.?

a) _____ No risk at all
b) _____ Minor risk
c) _____ Moderate risk
d) _____ Significant risk
e) _____ Major risk

7. To what extent do you think coronavirus poses a risk to you personally?

a) _____ No risk at all
b) _____ Minor risk
c) _____ Moderate risk
d) _____ Significant risk
e) _____ Major risk

8. Do you believe you have had or currently have, coronavirus?

a) _____ Yes
b) _____ No
c) _____ I am not sure
d) _____ I prefer not to answer this question

9. Do you personally know someone (a family member or close friend) who has had coronavirus?

a) _____ Yes
b) _____ No
c) _____ I am not sure
d) _____ I prefer not to answer this question

Appendix F

You previously indicated that you have a close relative or close friend who may not have been vaccinated against the COVID-19 virus or may not have gotten the COVID-19 booster shot.

Who is the person you have in mind? Select one of the following:

a. An immediate family member (mom, dad, brother, sister)
b. A close relative but not immediate family member (grandma, grandpa, aunt, uncle, cousin)
c. A close friend

Answer the questions below thinking of that person in your mind.

1. During the next month, **how likely** are you to encourage your unvaccinated relative or friend to **schedule an appointment** with a doctor or nurse to discuss getting the COVID-19 vaccine or the COVID-19 booster shot?

1	2	3	4	5
Not at all likely	A little likely	Moderately likely	Quite a bit likely	Extremely likely

2. In your opinion, what is the **likelihood** that your unvaccinated relative or friend would **develop** a blood clot, severe allergic reaction, or other extremely serious health problem as a result of getting vaccinated against COVID-19?

1	2	3	4	5
Not at all likely	A little likely	Moderately likely	Quite a bit likely	Extremely likely

3. How much would you **worry** about your unvaccinated relative or friend developing **a severe reaction** to the COVID-19 vaccine if they decide to get the COVID-19 vaccine or the COVID-19 booster shot?

1	2	3	4	5
Not at all worried	A little worried	Moderately worried	Quite a bit worried	Extremely worried

4. In your opinion, what are the <u>chances</u> that your unvaccinated relative or friend would develop a blood clot, severe allergic reaction, or other extremely serious health problem as a result of getting vaccinated against COVID-19?

Approximately…..

a. ___1 in 10 chance
b. ___1 in 100 chance
c. ___1 in 1,000 chance (that is, one in a thousand)
d. ___1 in 10,000 chance (that is, one in ten thousand)
e. ___1 in 100,000 chance (that is, one in hundred thousand)
f. ___1 in 1,000,000 (that is, one in a million)
g. ___1 in 10,000,000 (that is, one in ten million)

Appendix G

COVID-19 Vaccine Safety Fact Sheet

Instructions: Please read the following information carefully.

Fact Sheet:
COVID-19 Vaccine Safety

For public awareness and in the interest of transparency, Centers for Disease Control and Prevention (CDC) is providing timely updates on the following serious adverse events of interest:

- **Severe allergic reaction after COVID-19 vaccination is rare** and has occurred in approximately 2 to 5 people for every one million people vaccinated in the United States. Severe allergic reactions can occur after any kind of vaccination.

- **Blood clots after Johnson & Johnson's COVID-19 vaccination are rare** and has occurred in 3 people for every one million doses of the vaccine administered.

- **Inflammation of the heart muscle after COVID-19 vaccination is rare** and has occurred in 2 people every one million people vaccinated in the United States.

- **Reports of death after COVID-19 vaccination are rare**. More than 557 million doses of COVID-19 vaccines were administered in the United States from December 14, 2020, through March 15, 2022. During this time, 0.0024% deaths have been reported among people who were vaccinated against COVID-19.

- **Reports of adverse events following vaccination, including deaths, do not necessarily mean that a vaccine caused a health problem.** A review of available clinical information, including death certificates, autopsy, and medical records, has not established a causal link to COVID-19 vaccines.

Source:
https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/safety-of-vaccines.html

Appendix H

Base Rate Information (Video)

Information about adverse side effects, and death from COVID-19 vaccine.

#1 Base Rate.mp4

Appendix I

Negative video#1

Negative#2.mp4

Negative Video #2

Negative#3.mp4

Appendix J

Positive Videos

#1

Positive Video #1.mp4

#2

Positive Video #2.mp4

#3

Positive Video #3.mp4

#4

Positive Video #3.mp4

#5

Positive Video #5.mp4

#6

Positive Video #6.mp4

#7

Positive Video #7.mp4

#8

Positive Video #8.mp4

#9

Positive Video #9.mp4

#10

Positive Video #10.mp4

Appendix K

Debriefing Sheet

Thank you for participating in our study. Your participation will help us learn more about how individuals make health-related decisions when confronted with different types of health information. We hope to learn how different types of health-related information impact an individual's health-related decisions, such as vaccination-related decisions.

In this study, you may have watched videos depicting either adverse reactions to the COVID-19 vaccination or positive reactions to the COVID-19 vaccination. It is important to know that the American Medical Association (AMA), Centers for Disease Control and Prevention (CDC), and Food and Drug Administration (FDA), strongly recommend getting the COVID-19 vaccine and the additional COVID-19 booster shot for eligible adults. Leading medical experts, doctors, and scientists recommend getting the vaccine as well, and their recommendation is supported by large amounts of medical evidence.

If you have any questions about whether the COVID-19 vaccine or booster shot, then please consult your doctor or a medical professional. The COVID-19 vaccine is free for all eligible individuals. If you have any question about the city's COVID-19 vaccination sites or services, please call the city of El Paso COVID-19 vaccine hotline services at (915) 212-6843 or visit https://www.epcovidvaccine.com. You may also access UTEP's on campus resources by visiting the following website:

https://www.utep.edu/liberalarts/theatre-dance/resources/covidprotocol.html

If you have any questions about this study, please feel free to contact the principal investigator of this study, Kiran Misra, at kmisra@miners.utep.edu or the advisor of this study, Prof. Lawrence D. Cohn, at Lcohn@utep.edu.

To help maintain the rigor of our research design, please do not discuss this project with other students who might participate in the study.

Thank you for your participation, time, and cooperation.

Appendix L

Evaluation of Videos for Emotional Valence

We would like your opinion about the emotions expressed in this video. Please indicate how well each of the following adjectives describes the emotions expressed in the video:

Extremely Sad	Moderately Sad	A Little Sad	Neither Sad nor Happy	A little Happy	Moderately Happy	Extremely Happy

Extremely Hopeless	Moderately Hopeless	A Little Hopeless	Neither Hopeless Nor Hopeful	A Little Hopeful	Moderately Hopeful	Extremely Happy

Extremely Heartbroken	Moderately Heartbroken	A Little Heartbroken	Neither Heartbroken Nor Joyful	A Little Joyful	Moderately Joyful	Extremely Joyful

Extremely Fearful	Moderately Fearful	A Little Fearful	Neither Fearful Nor Comforted	A Little Comforted	Moderately Comforted	Extremely Comforted

Extremely Disturbed	Moderately Disturbed	A Little Disturbed	Neither Disturbed Nor Uplifted	A Little Uplifted	Moderately Uplifted	Extremely Uplifted

Extremely Unsettled	Moderately Unsettled	A Little Unsettled	Neither Unsettled Nor Reassured	A Little Reassured	Moderately Reassured	Extremely Reassured

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Kiran Misra earned her Bachelor of Commerce (B.Com.) degree in from Kakatiya University, Andhra Pradesh, India. In 2019, she joined the doctoral program in Health Psychology at the University of Texas at El Paso.

While pursuing her degree, Kiran Misra worked as a research assistant, and assistant instructor for the department of Psychology. She also worked as a research assistant at the Research Evaluation and Assessment Services (REAS), Office of Research and Sponsored Projects (ORSP) at the University of Texas at El Paso (UTEP).

Kiran Misra's thesis, *The Relative Impact of Statistical and Anecdotal Evidence on COVID-19 Vaccine Intentions*, was supervised by Dr. Lawrence D. Cohn.