

# **Evolving impacts of COVID-19 vaccination intentions on travel intentions**

COVID-19疫苗接种意愿对旅行意愿的动态影响

**Dogan Gursoy**

Washington State University, USA

**Ali Selcuk Can**

The Ministry of Culture and Tourism, Turkey

**Nigel Williams**

University of Portsmouth, UK

and

**Yuksel Ekinci**

University of Portsmouth, UK

## **Citation:**

Gursoy, D., Can, A.S., Williams, N. and Ekinci, Y. (2021-Accepted). Evolving impacts of COVID-19 vaccination intentions on travel intentions, *Service Industries Journal*.

<https://doi.org/10.1080/02642069.2021.1938555>

## **Abstract**

This study examines the evolving impacts of COVID-19 vaccination intentions and vaccine hesitancy on travel intentions. The study also examines the sociodemographic factors that can influence willingness to take the vaccine and vaccine hesitancy since achieving herd immunity is critical for social and economic recovery. Data were collected through five surveys from a total of 4,223 individuals in the USA between February 2021 and May of 2021. The findings of the study indicate that over 70 per cent of the respondents are willing to get vaccinated with a COVID-19 vaccine. Vaccination intention and hesitancy rates have also been stable over time. Early in the vaccination process, vaccination intentions negatively impacted travel intentions, suggesting that individuals who are willing to get the vaccine postponed their travels in the short term, while individuals who do not plan to get the vaccine may not have changed their travel plans as travel restrictions were eased. However, this negative impact disappeared later as the number of vaccinated individuals significantly increased, closing the gap between the two groups. Findings also suggest that sociodemographic factors such as generational age, gender, marital status, education, region, race, religion, occupation influence the COVID-19 vaccination intention and vaccine hesitancy.

**Keywords:** COVID-19 vaccine; sociodemographic factors; willingness to travel; vaccine hesitancy; travel anxiety, hospitality; tourism; travelers.

这项研究考察了COVID-19疫苗接种意愿和犹豫倾向对旅行意愿的动态影响。由于获得群体免疫对社会和经济复苏至关重要，因此本研究还考察了可能影响疫苗接种意愿以及犹豫倾向的社会人口统计因素。在2021年2月至2021年5月之间，通过五项调查从美国4,223名参与者中收集了数据。研究结果表明，超过70%的受访者愿意接种COVID-19疫苗。随着时间的推移，疫苗接种意向和犹豫率也一直保持稳定。在接种疫苗的早期，疫苗接种意图会对旅行意愿产生负面影响，这表明愿意接种疫苗的个人会在短期内推迟旅行，而那些不打算接种疫苗的人由于旅行限制条件的放宽，可能不会改变他们的旅行计划。然而，随着接种疫苗人数的显著增加，两组人之间的差距不断缩小，这种负面影响后来逐渐消失。调查结果还表明，代龄、性别、婚姻状况、受教育程度、地区、种族、宗教、职业等社会人口统计因素会影响COVID-19疫苗接种意向和犹豫倾向。

**关键词：** COVID-19疫苗；社会人口统计因素；旅行意愿；疫苗犹豫倾向；旅行焦虑；热情好客；旅游业；游客。

## **1. Introduction**

While the current COVID-19 pandemic is disrupting societies and economies globally (Lazarus et al., 2021), the hospitality and tourism industry has been one of the most negatively affected industries (Gursoy & Chi, 2020). Lockdowns, stay-at-home orders, and travel restrictions continue to negatively impact the hospitality and tourism industry (Bartik et al., 2020). Several factors such as fear of infection, risk averseness, perceived health risks, travel anxiety, wait and see attitudes of consumers constrain activities in this sector . Approval of COVID-19 vaccines for emergency use has significantly raised the hopes for recovery since the COVID-19 vaccines can effectively lower the spread of the virus and help attain herd immunity against the virus (Gursoy & Chi, 2021). There is an expectation that life will go back to normal with the increasing availability of COVID-19 vaccines (Li & Giabbanelli, 2021), which is likely to improve the demand for hospitality and tourism products.

While vaccinations can speed up the economic recovery, individuals' willingness to get vaccinated can mitigate the positive impacts of the vaccination programs on the recovery. Thus, this study examines the evolving impacts of COVID-19 vaccination intentions and vaccine hesitancy on travel intentions and the sociodemographic factors that can influence willingness to take the vaccine and vaccine hesitancy since achieving herd immunity is critical for social and economic recovery. This study utilized data that were specifically collected from U.S. consumers since the U.S. is one of the countries with a very aggressive COVID-19 vaccination program (Pierce, 2021). According to Bloomberg (2021), more than 1.65 billion vaccine shots have been administered worldwide as of May 23, 2021. Over 286 million doses of those COVID-19 vaccine shots were administered in the U.S., suggesting that the U.S. is ahead of many other countries in terms of vaccinating the population. Considering the size of the U.S. vaccination program, the U.S. offers an opportunity for understanding the effects of COVID-19 vaccinations on consumers attitudes and behavior.

Increasing vaccination levels are expected to help the economic recovery. However, the short-term and long-term impacts of the vaccination programs on consumers attitudes and behaviour are not yet known. Although the availability of the COVID-19 vaccine provides an opportunity for economic recovery, it is not clear how the vaccination intentions may influence consumers attitudes and behaviours towards travelling to a destination and staying at a hotel in the short-term and long term. Vaccination intentions may reduce consumers' travel intentions in the short term due to perceived health risks associated with travelling. In the long term, increased vaccination levels may lower perceived health risks associated with travelling and increase travel intentions. Since the short-term and long-term effects of vaccination intentions on travel

intentions are unknown, investigating the short-term and long-term effects of vaccination intentions on travel intentions can provide critical insights to the industry and policymakers.

COVID-19 vaccination programs need to reach a large percentage of the population in order to achieve herd immunity and refusal of higher than 10% of the eligible population may reduce this likelihood (DeRoo, Pudalov and Fu, 2020). Intended recipients may have expressed pro or anti vaccination sentiments before the program started based on perceived risks. As the vaccines have been developed, tested and approved for public use, these perceptions may have changed. Several studies have reported that a large portion of the U.S. population may not be willing to take a COVID-19 vaccine (Sallam, 2021; Sherman et al., 2020), which can have significant negative consequences for the recovery and the hopes of herd immunity. Thus, it is critical to understand consumers' level of willingness to take the COVID-19 vaccine and how this willingness/ unwillingness can influence their hospitality and tourism consumption behavior. Furthermore, studies have been reporting significant variations among individuals from various sociodemographic groups in the United States (Latkin, Dayton, Yi, Colon, & Kong, 2021). Since achieving herd immunity is critical for the social and economic recovery, it is important to investigate whether individuals are willing to take the COVID-19 vaccine and the sociodemographic factors that can influence their willingness.

The current study attempts to fill the research gaps identified above by examining the evolving impacts of the COVID-19 vaccination intentions on individuals' attitudes toward travelling to a destination and staying at a hotel. Hence, the study utilizes a series of monthly data to detect this trend among U.S. citizens between February 2021 and May 2021. Since vaccine hesitancy is viewed as one of the main hurdles that can inhibit herd immunity, this study also seeks to identify the sociodemographic determinants of COVID-19 vaccination intention

during an ongoing mass public vaccination program (Ruiz & Bell, 2021). Furthermore, identification of the effects of sociodemographic factors on vaccination intention can help officials develop profiles of vaccine-hesitant individuals. Using these profiles, government officials can design communication and policy initiatives that ameliorate the primary concerns of individuals from different sociodemographic groups who are reluctant to get vaccinated through targeted health communication strategies (Goldstein et al., 2015). Also, understanding the effects of COVID-19 vaccines on individuals' willingness to travel is crucial for destination marketers and travel intermediaries. The present study provides monthly trends for tourists' desire to travel to a destination and stay in a hotel, which can provide critical insight into the future demand for hospitality and tourism products.

## **2. Literature Review**

Pandemics are defined as the occurrence and spread of infectious diseases worldwide (World Health Organization, 2021), resulting in a significant number of infections, illnesses, and deaths, which can cause considerable disruptions to domestic and global economic activities (Frankema & Tworek, 2020). COVID-19 pandemic is caused by a new influenza virus that quickly emerged and spread worldwide since most people did not have immunity against the virus that caused the COVID-19 (World Health Organization, 2021).

The COVID-19 pandemic has caused a major public health crisis and a major economic challenge (Huang et al., 2020; de Jong, & Ho, 2020), resulting in catastrophic disruptions worldwide. Since most infected individuals are asymptomatic and the virus keeps mutating (Caccuri, 2020), the virus has been spreading rapidly and causing devastating harm, especially among high-risk individuals such as senior citizens, people living in assisted living facilities,

immune compromised individuals and individuals with underlying health conditions (Gursoy & Chi, 2021). Most nations have imposed social distancing restrictions, curfews, travel restrictions, and restrictions on social gatherings and business activities to slow down the infection rates (Finsterwalder, 2020; The Khoa, Wang, & Guchait, 2020). These restrictions have inevitably caused disruptions in business activities, resulting in a wave of unemployment, bankruptcies, and economic slowdowns.

Hospitality and tourism industry has always been susceptible to domestic and global crises. As suggested by previous studies, the hospitality and tourism industry is usually the first and the most affected industry by infectious disease outbreaks (Kuo et al., 2008) since the viruses that cause those outbreaks are usually transmitted through human-to-human contact. As a result, the industry is usually one of the first to face restrictions resulting in a partial or a complete shutdown in order minimize or to slow down the spread of those viruses. Those restrictions and shutdowns can result in significant revenue losses and in some cases, temporary or permanent closure of businesses (Hall, Scott & Gössling, 2020).

The current COVID-19 pandemic had unprecedented negative consequences for the hospitality and tourism industry (Gursoy, Chi & Chi, 2021), more than any other previous global crises. According to the UNWTO (2021), international tourist arrivals decreased by 87 per cent in January 2021 due to a surge of infections, the emergence of new variants, and resulting in tighter travel restrictions. Around 32 per cent of the destinations worldwide completely closed down their borders and another 34 per cent partially closed their borders to international travellers, which is forecasted to result in an 85 per cent decrease in travel activity worldwide (UNWTO, 2021). Furthermore, according to STR, a leading hotel operation data provider, the average hotel occupancy rates for June 2020 reduced by 68.9%, 72.8%, 71.4%, 43.0%, 72.6%, and 42.9% in the

U.S., Europe, Canada, Asia Pacific, Africa, and the Middle East, respectively, compared to June 2019 (STR, 2020). While the industry is slowly recovering due to the gradual opening of economies, the pandemic is still having detrimental effects on the industry.

Millions of people around the world have died from COVID-19 infections (Huang & Farboudi Jahromi, 2020). As a result, consumers have grown to fear the pandemic (Addo, Jiaming, Kulbo, & Liangqiang, 2020), which significantly impacted their purchasing behaviours. As suggested by the theory of perceived risk, the degree perceived health risks can significantly alter consumer behaviour (Mitchell, 1992) due to possible adverse consequences of being in a retail setting where many other individuals are present. This is especially true for hospitality and tourism services consumers since most hospitality and tourism services are consumed in a social setting. Awareness of possible adverse consequences of being in a social setting where many other people are present on personal health can easily result in anxiety, an emotional and physiological response to stress caused by fear resulting from actual or potential risk (Barlow, 2000). The highly infectious nature of the COVID-19 virus made consumption of hospitality and tourism services a risky proposition. The perceived health risks resulting from the fear of getting infected with the COVID-19 virus made many consumers nervous and uncomfortable with the consumption of hospitality and tourism services (Atadil & Lu, 2021; Shin & Kang, 2020). Considering the fact that consumers are constantly exposed to news about the number of deaths, how easy to contract and spread the virus, and the infection rate of COVID-19, the level of fear and anxiety among hospitality and tourism consumers, tend to be very high, which significantly influences their consumption behaviours and travel intentions.

The pandemic had disastrous effects on the hospitality and tourism businesses due to restrictions imposed by governments and consumers' fear of infection and the resulting anxiety.

The fear of COVID-19 significantly influenced individuals' health risk perceptions and their travel anxiety, ultimately making them afraid to travel (Yang, Kim, Min, & Hernandez-Calderon, 2020). Industry professionals and health experts suggest that the large scale availability of the COVID-19 vaccine and the resulting herd immunity may lower health risk perceptions and travel anxiety, which can help the recovery of the hospitality and tourism industry (Gursoy & Chi, 2021). However, there is limited evidence about the impact of the COVID-19 vaccination program on individuals' travel plans. Several studies reveal that a large portion of the population may not be willing to take the vaccine due to their vaccine hesitancy, which may slow down the recovery and the goal of reaching herd immunity (Latkin et al., 2021).

Individuals may vary on vaccine risk perceptions, the likelihood of catching the disease, and the vaccination program's effectiveness, which can influence their intention to take a given vaccine (Sallam, 2021). Emerging evidence at an earlier stage of the COVID-19 pandemic was that younger people perceived higher risk of infection (Schwarzinger, Watson, Arwidson, Alla, & Luchini, 2021) but expressed a lower vaccination intention (Latkin, Dayton, Yi, Colon, & Kong, 2021). More recent work suggests that their vaccine intention has changed. Young people's vaccine intentions are higher than the general population (Benis, Seidmann, & Ashkenazi, 2021). Previous research suggested that women, lower-income and lower education individuals in developed countries would seek to mitigate health risks by vaccination (Dohmen et al., 2011) due to higher perceived infection health risks (Abel, Byker, & Carpenter, 2021). Educated people in developed countries may have low intention to adopt vaccination, due to perceived vaccine side effects and lower perceived infection risks (Larson et al., 2016).

Racial minority and ethnic groups are especially concerned about unknown vaccine adverse effects because of the vaccine composition (e.g. human trace) and inadequate



representation of their race in the testing process (Motta, 2021). For example, African American and Hispanic or Latino respondents indicated lower vaccination intention in May 2020 (Latkin et al., 2021). As the vaccine program has started, vaccine hesitancy has been somewhat reduced, but more recently, white evangelicals in the U.S. have expressed the lowest intention to take the vaccine. Religious objections to vaccination have been made based on the perceived composition of the vaccine (Hotez et al., 2021).

The scale of the COVID 19 pandemic requires mass vaccination coverage to mitigate the health risks and the resulting travel anxiety associated with travelling to a destination and staying at a hotel(Wang, Liu-Lastres, Ritchie, & Mills, 2019). This suggests a need to identify the sociodemographic groups that are less likely to take the COVID-19 vaccine to develop communication strategies to lower their vaccine hesitancy for a faster recovery.

### **3. Methodology**

This study conducted four monthly surveys using a random sampling approach and an additional survey using a stratified random sampling approach between February 2021 and May 2021. A total of 790 responses was received in February, 797 in March, 782 in April and 833 in May. The fifth study collected data from 1,021 respondents utilizing a stratified sampling approach to assess the influence of sociodemographic variables on COVID-19 vaccination intention. We filtered the respondents to obtain sufficient numbers of responses from different sociodemographic groups. We collected five rounds of data from U.S. residents who were older than 18 years old using Amazon Mechanical Turk (MTurk). The surveys included questions about participants' willingness to travel to a destination and stay in a hotel, intention to get COVID-19 vaccine and demographic information. COVID-19 vaccination intention was

measured with a single question (On a scale of 0 to 100% (highest chance), how likely are you going to get vaccinated once the COVID-19 vaccine is available to you?). The likelihood of traveling to a destination and staying in a hotel was measured with a single item (How likely are you to travel to a destination and stay in a hotel this month or next month). A 5-point Likert type scale ranging from very unlikely (1) to very likely (5) was used to measure responses. Data were analyzed using descriptive statistics, linear regression, and one-way ANOVA through SPSS Version 26.

## **2. Results**

A one-way ANOVA was performed to compare whether mean degrees for intention to get the COVID-19 vaccine differs between participants in February 2021, March 2021, April 2021, and May 2021. As shown in Table 1, the test results indicated that there was no significant change in the vaccination intention over four months ( $p > 05$ ).

INSERT TABLE 1 AROUND HERE

Afterwards, a linear regression analysis was conducted to examine the effect of respondents' vaccination intention on their likelihood of travelling to a destination and staying in a hotel. We examined predicted and residual values to assess normality and calculated VIF values to assess multicollinearity. Visual inspection of the plots confirmed that the data did not display any problems with normality. All VIF scores were smaller than 2, which indicate that multicollinearity was not an issue between the measures (Hair et al., 2018). As presented in Table 2, early in the vaccination process, respondents' vaccination intention had significant

negative impacts on travel intentions. However, in April and May, the significant negative impact of vaccination intention on travel intentions tapered off and became insignificant.

INSERT TABLE 2 AROUND HERE

Since individuals' willingness to get vaccinated is a critical determinant of whether a community can achieve herd immunity, which is vital for the recovery of the hospitality and tourism industry, the team also investigated the sociodemographic factors that can influence individuals' willingness to take the vaccine. Using study 5 data, effects of sociodemographic variables on vaccination intentions were estimated. Table 3 presents the results of the series of analysis of variance tests that were conducted to estimate the affects sociodemographic variables. As presented in Table 3, the Tukey post hoc test indicated that the mean score for 18-25 age group (Mean = 3.85, SD =1.34) was significantly higher than those for 36-45 (Mean =3.11, SD =1.53,  $p =.000$ ) and 46-55 (Mean =3.14, SD =1.54,  $p =.000$ ) age groups. Also, participants who are in 26-35 age group had higher COVID-19 vaccination intention (Mean =3.57, SD =1.40) than those who are in 36-45 (Mean =3.11, SD =1.53,  $p =.002$ ) and 46-55 age groups (Mean =3.14, SD =1.54,  $p <.05$ )

INSERT TABLE 3 AROUND HERE

In terms of gender, COVID-19 vaccination intention for males (Mean = 3.58, SD = 1.37) was statistically higher than that for females (Mean = 3.34, SD = 1.56). With regards to marital status, married (Mean = 3.37, SD = 1.47,  $p =.039$ ) and divorced/separated/widowed (Mean =

2.96, SD =1.55,  $p = .001$ ) participants had lower COVID-19 vaccination intention than single participants (Mean = 3.64, SD =1.40). Participants who hold a 4-year degree had higher (Mean = 3.72, SD =1.37) vaccination intention than those who have high school or less (Mean = 3.11, SD =1.60,  $p = .000$ ), some college but no degree (Mean = 3.11, SD =1.57,  $p = .000$ ) and 2 year degree (Mean = 3.04, SD =1.44,  $p = .000$ ). Furthermore, participants who have a master's /doctoral/professional (Mean = 3.80, SD =1.30) degrees had higher vaccination intention than those who have high school degree or less ( $p = .000$ ), some college but no degree ( $p = .000$ ) and 2-year degree ( $p = .000$ ). Participants who reside in North-eastern (Mean = 3.71, SD =1.38) had higher COVID-19 vaccination intention than those who are from Midwest (Mean = 3.27, SD =1.57,  $p = .016$ ) and South (Mean = 3.22, SD =1.47,  $p = .000$ ) regions. Participants who reside in West (Mean = 3.78, SD =1.39) regions had higher COVID-19 vaccination intention than those who are from Midwest and South regions ( $p < .05$ ).

With regard to ethnicity, Asians (Mean = 4.17, SD =.99) had higher COVID-19 vaccination intention than those who belong to Black or African (Mean = 3.23, SD =1.47,  $p = .000$ ), Hispanic or Latino (Mean = 3.46, SD =1.39,  $p = .001$ ), White Americans (Mean = 3.18, SD =1.56,  $p = .000$ ) and other groups. (Mean =2.94, SD =1.60,  $p = .000$ ).

In terms of religion, Agnostic (Mean = 3.75, SD =1.36) participants had higher COVID-19 vaccination intention than Evangelical Protestant (Mean =3.17, SD =1.56,  $p = .048$ ), Other Christians (Mean = 2.82, SD =1.52,  $p = .000$ ) and any other religion (Mean = 3.28, SD =1.57,  $p = .026$ ). Atheist (Mean = 4.02, SD =1.34) participants had higher COVID-19 vaccination intention than Evangelical Protestant (Mean =3.17, SD =1.56,  $p = .001$ ), Mainline Protestant (Mean=3.20, SD=1.46,  $p = .003$ ), Other Christians (Mean = 2.82, SD =1.52,  $p = .000$ ) and any other religion (Mean = 3.28, SD =1.57,  $p = .000$ ). Furthermore, Other Christians had lower

COVID-19 vaccination intention (Mean = 2.82, SD =1.52) than Catholics (Mean = 3.64, SD =1.29,  $p=.000$ ).

Management, professional, and related (Mean = 3.85, SD =1.36,  $p=.005$ ) professionals had a higher COVID-19 vaccination intention than those who have sales and office (Mean = 3.26, SD =1.52,  $p =.005$ ) professions and unemployed (Mean = 3.35, SD =1.48,  $p =.006$ ) participants. However, COVID-19 vaccination intention did not significantly differ among income groups.

#### **4. Discussions**

This study examines the evolving impacts of COVID-19 vaccination intentions on consumers' attitudes toward traveling to a destination and staying in a hotel over four months utilizing a series of monthly data collected from U.S. consumers between February and May of 2021. Since vaccination can have a significant impact on the speed of the recovery, this study also investigates the sociodemographic determinants of COVID-19 vaccination intentions. Understanding of sociodemographic determinants of COVID-19 vaccination intentions is crucial not only for policy makers who are responsible for conveying public health messages but also for tourism marketers. Improving the COVID-19 vaccine intentions is vital for the public to induce the herd immunity, which can end the pandemic.

Findings indicate that the level of vaccination intention in February and March had significantly negative impacts on pro-vaccine consumers intentions toward travelling to a destination and staying in a hotel. This finding also indicates that the travel intentions of individuals who are less like to get the vaccine has increased significantly. These findings can suggest that the approval of the COVID-19 vaccines for emergency use encouraged pro-vaccine

consumers to postpone travel in the short term in order to minimize the risk of infection. Early in the vaccination programs, these individuals still did not feel comfortable with activities that take place in social settings where many other people are present. On the other hand, since individuals who are less likely to get the vaccine tend to be more health risk complacent or tolerant, they had already adopted a lifestyle similar to the life they had before the pandemic with the increasing opening of the economy and easing of the travel restrictions. Furthermore, during the early stages of the vaccination process, perceived COVID-19 health risks associated with travelling to a destination and staying in a hotel and the resulting fear of getting infected and travel anxiety were still high (Luo & Lam, 2020). The availability of a possible mitigator to these risks within few months made pro-vaccine individuals more reluctant to travel to a destination and stay at a hotel. Thus, perceived health risks, fear of infection and travel anxiety continued to influence travel intentions during the early stages of the vaccination process. Pro-vaccine individuals postponed their travel plans until they felt safe with traveling to a destination and staying in a hotel, which resulted in a negative relationship between vaccination intention and travel intentions.

However, as the availability of the COVID-19 vaccines increased, the number of individuals who received the first or both shots of the vaccine has significantly increased over time as presented in Figure 1. This continuing increase in the number of individuals receiving the COVID-19 vaccine also lowered pro-vaccine consumers' perceived health risk perceptions and travel anxiety, which resulted in significant increases in those consumers' intention to travel to a destination and stay in a hotel as presented in Figure 2. As a result, increased vaccination and wide availability of vaccines have closed the gap in travel intentions between pro-vaccine individuals and individuals who are less likely to take the vaccine.

## INSERT FIGURE 1 & FIGURE 2 AROUND HERE

These findings clearly suggest that perceived health risks and travel anxiety are some of the key determinants of travel intentions in the short-term (Reisinger & Mavondo, 2005) during the recovery stage of the COVID-19 pandemic. As pro-vaccine individuals' health risk perceptions and their travel anxiety decreased due to increased vaccination levels, the negative effects of vaccination on pro-vaccine travelers' willingness to travel to a destination and stay in a hotel disappeared in April and May 2021. These findings suggest that in the future months, the massive vaccination program is likely to further lower the health risk perceptions of pro-vaccine individuals and the resulting travel anxiety. This is likely to cause significant increases in pro-vaccine individuals' willingness to travel to a destination and stay in a hotel, which will inevitably speed up the recovery of the industry. However, this effect is likely to depend on individuals' level of vaccination intention.

Results of the monthly surveys demonstrate that sociodemographic factors play critical roles in determining people's vaccination intention. Previous COVID-19 studies have suggested younger people believe themselves to be at higher risk of catching the COVID-19 virus (Schwarzinger et al., 2021). As a result, they are more willing to take the COVID-19 vaccine, which is supported by the findings of this study where the mean score for 18-25 age group (3.85) was significantly higher than any other age groups as presented in Table 3.

Previous research has suggested that women, lower-income and lower education individuals in developed countries are more averse to risk in general and will seek to mitigate health risks by vaccination where possible (Dohmen et al., 2011). Others have suggested that these individuals risk aversion is rooted in their higher perceived personal exposure to these health risks due to the nature of their occupations, resulting in higher fear of communicable diseases (Abel et

al., 2021). The findings of this research suggest that the COVID-19 vaccination intention of males is observed to be statistically higher than that of females, which is in line with current research (Ruiz & Bell, 2021). Findings also suggest that single people are more likely to express a significantly higher intention to get a COVID-19 vaccine.

Education level has been identified as a nuanced influencer on risk perceptions (Larson et al., 2016). Some individuals may express low confidence in specific vaccines based on their composition and perceived side effects. However, in this study, vaccine intention was higher in respondents who have higher levels of education. This might be explained by the fact that highly educated individuals express a higher trust in expert and scientific community opinions (Lu & Gursoy, 2017). Since this high trust in scientist opinions can play an essential role in changing individuals' perception of vaccine risks and the effectiveness of the vaccines, it is not surprising that highly educated individuals have a significantly higher vaccination intention.

The findings of this study regarding ethnic influences on vaccine intention are similar to previous research. Data collected in May 2020 indicated a lower vaccination intention among African American and Hispanic or Latino respondents (Latkin et al., 2021). This finding is persistent despite the formal emergency approval and extensive communication about the benefits of vaccination. Region of residence is also significantly related to intent to obtain a COVID-19 vaccine, which is opposite to previous research. This could be explained through devastating effect of the pandemic particularly on the Northeast United States. The current research identifies that particular religious sects have higher resistance to vaccination.

The findings of this study can provide significant insights on the immediate and future effects of COVID-19 vaccinations on individuals' consumption behaviours in other countries that are still in the early stages of their vaccination programs. The paper makes an academic



contribution by identifying the curvilinear relationship between vaccine intention and travel intention for individuals who have confidence or trust in vaccination while a mass vaccination program has been launched. In addition, the findings also provide critical information about vaccine hesitancy by identifying sociodemographic determinants of COVID-19 vaccination intentions, which can be used as a guideline by scholars and policymakers in other countries to develop proactive actions and policies against vaccine hesitancy.

Overall, the findings of this study provide critical insight to the policymakers and industry practitioners by investigating how fear of COVID-19, perceived health risks and travel anxiety impacts travel intentions. This study also identifies the effects of vaccination on individuals' willingness to travel to a destination and stay in a hotel over time. As discussed earlier, the pandemic devastated the hospitality and tourism industry. Emergency approval of a number of COVID-19 vaccines increased the hopes of quick recovery of the industry. However, as suggested by the finding of this study, the initial effects of the availability of the vaccines on pro-vaccine consumers' intentions to travel had been negative. Since many other countries are developing and implementing vaccination programs similar to the one that has been being implemented in the U.S., initial impact of those vaccine programs on travel intentions may be negative in those countries as well. Scholars in other countries where the vaccination programs in their infancy stage may need to investigate how to minimize the initial negative impacts of vaccination programs on travel intentions and propose strategies to reduce the initial negative impacts on the industry. Governments and policymakers may also need to offer significant assistance to the industry during the initial stages of the vaccination program to mitigate the short-term negative impacts of vaccination programs on the industry.

One of the conclusions of this study is that the fear of and perceived health risks associated with the COVID-19 pandemic can improve vaccination intentions, which is likely to decrease travel anxiety and, thus, improve travel intentions in the longer term. Thus, it might be important to investigate the effects of different types of fear and perceived health risks on individuals' anxiety levels and how they may influence travel intentions in the shorter and longer terms. However, just focusing on fear and health risks associated with the COVID-19 may not be enough. It may also be good for destination managers to provide information about the current risk levels in their destinations and what they do to mitigate those risks to further reduce travel anxiety. Future studies should examine the effects of safety precautions implemented by destinations and other hospitality and tourism businesses on consumers' travel anxiety levels and travel intentions.

While the vaccination can lower the level of fear and perceived health risks and resulting travel anxiety, findings of this study suggest that almost one-third of the participants are not likely to be willing to get vaccinated against COVID-19 virus. Hence, government officials need to identify factors associated with COVID-19 vaccine hesitation to achieve herd immunity and to support health communication strategy. This study also identifies the groups that are more likely to have higher vaccination hesitancy utilizing sociodemographic factors. However, this study fails to identify the specific causes of vaccine hesitancy. Government officials, policy makers, and scholars can utilize these findings to identify those groups and then conduct studies to identify the specific causes and reasons for each sociodemographic group's vaccine hesitancy. Targeted communication strategies can then be developed for each vaccine hesitant sociodemographic group to lower or eliminate their vaccine hesitancy, which can speed up the recovery of the hospitality and tourism industry and the overall economy. Thus, future studies need to identify specific causes of vaccine hesitancy and then develop appropriate public health messages and test

the effectiveness of those messages to lower vaccine hesitancy among each vaccine-hesitant sociodemographic group, particularly among women, ethnic minorities, and upper middle-aged people with a lower level of education residing in Midwest and South.

Like other studies, this study is not free from limitations. The first limitation is that all five sets of data used in this study were collected from the United States residents. Thus, the findings may not be applicable to other countries. In addition, in the vaccination campaigns of the U.S., public authorities gave priorities to individuals who are categorized in high-risk group such as 65 years or older people. Hence, the percentage of these people in the surveys had decreased from February to May 2021. The second limitation is that this study only investigated the effects of sociodemographic variables on vaccination intention. Future studies could segment respondents based on their COVID-19 vaccination intentions and the impact of other variables such as trust in vaccines, perceived health risks, social influence, fear, travel anxiety, and other situational and personal factors, on vaccination intentions and travel desires.

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**Table 1.** Differences between participants in terms of vaccination intention

	Mean	S.D.	<i>F</i>	<i>p</i>	
On a scale of 0 to 100% (highest chance), how likely are you going to get vaccinated once the COVID-19 vaccine is available to you?	February (N=790)	66.83	35.15	2.423	.064
	March (N=797)	68.81	35.19		
	April (N=782)	70.42	31.61		
	May (N=833)	70.98	33.39		

\* $p < .001$



**Table 2.** Regression analysis for COVID-19 vaccination intention and likelihood of travel

On a scale of 0 to 100% (highest chance), how likely are you going to get vaccinated once the COVID-19 vaccine is available to you?	$\beta$	S.E.	Standardized Coefficient Beta	$t$	$p$ -value	Adj. R <sup>2</sup>	Durbin-Watson	VIF
February	-.010	.002	-.165	-4.703	.000*	.026	2.026	1.000
March	-0.13	.002	-.204	-5.880	.000*	.040	1.968	1.000
April	-.004	.003	-.056	-1.553	.121	.002	1.938	1.000
May	-.001	.001	-.024	-.681	.496	-.001	1.834	1.000

\* $p < .05$

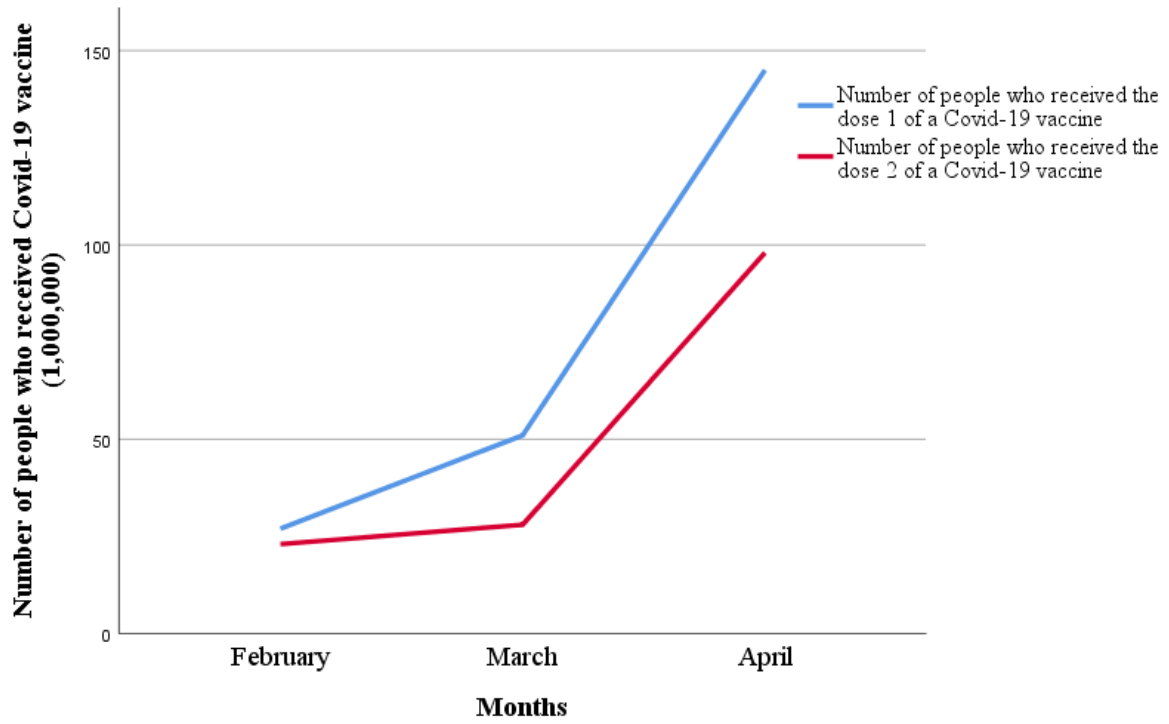
**Table 3.** One-way ANOVA test results: Effects of sociodemographic variables on vaccination intentions

<b>Variables</b>	<b>Mean</b>	<b>S.D.</b>	<b>F value</b>	<b>p-value</b>
<b>Age</b>				
18-25	3.85*	1.34	9.58	.00
26-35	3.57*	1.40		
36-45	3.11*	1.53		
46-55	3.14*	1.54		
Over 56	3.51	1.54		
<b>Gender</b>				
Male	3.58*	1.37	4.80	.00
Female	3.34*	1.56		
Other	4.10	1.19		
<b>Marital Status</b>				
Cohabiting	3.44	1.58	5.81	.00
Divorced/Separated/Widowed	2.96*	1.55		
Married	3.37*	1.47		
Single	3.64*	1.40		
<b>Education</b>				
High school graduate or less	3.11*	1.60	12.96	.00
Some college but no degree	3.11*	1.57		
Associate degree in college (2-year)	3.04*	1.44		
Bachelor's degree in college (4-year)	3.72*	1.37		
Master's/Doctoral/Professional degree	3.80*	1.30		
<b>Personal Income</b>				
Unemployed	3.65	1.41	2.55	.02
Less than \$19,999	3.31	1.56		
\$20,000-39,999	3.29	1.47		
\$40,000-59,999	3.41	1.49		
\$60,000-79,999	3.57	1.33		
\$80,000 or more	3.69	1.47		
<b>Region</b>				
Northeast	3.71*	1.38	10.77	.00
Midwest	3.27*	1.57		
West	3.78*	1.39		
South	3.22*	1.47		
<b>Race/Ethnicity</b>				
Asian	4.17*	.99	17.02	.00
Black or African American	3.23*	1.47		
Hispanic or Latino	3.46*	1.39		
White	3.18*	1.56		
Mixed Race	3.63*	1.56		
Other	2.94*	1.60		
<b>Religion</b>			11.00	.00

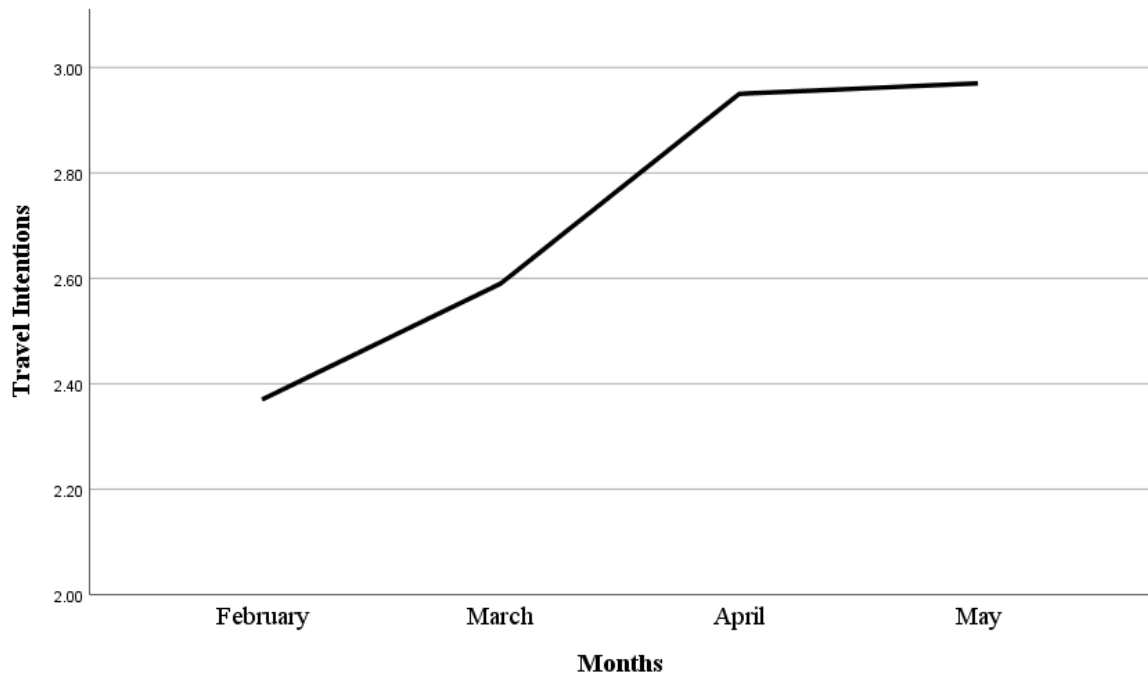
Agnostic	3.75*	1.36		
Atheist	4.02*	1.34		
Catholic	3.64*	1.29		
Evangelical Protestant	3.17*	1.56		
Mainline Protestant	3.20*	1.46		
Other Christians	2.82*	1.52		
Any other religion	3.28*	1.57		
<hr/>				
<b>Occupation</b>				
Construction, extraction, and maintenance, farming, fishing, and forestry	3.28	1.42		
Frontline essential workers	3.21	1.63		
Government	3.78	1.25		
Healthcare professional	3.25	1.43		
Management, professional, and related	3.85*	1.36	3.46	.00
Production, transportation, and material moving	3.10	1.66		
Retired	3.16	1.50		
Sales and office	3.26*	1.52		
Service	3.41	1.48		
Unemployed	3.35*	1.48		
<hr/>				

\*<.05

**Figure 1.** Number of people who received the COVID-19 vaccine



**Figure 2.** Respondents' travel intentions between February 2021 and May 2021 in the USA\*



(\*) 1=Very unlikely, 5=Very likely