

RESEARCH ARTICLE

# Factors Impacting COVID-19 Vaccine Hesitancy and Resistance Among College Students in Northwest Ohio

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## ABSTRACT

**Background:** Vaccination is a critical strategy for controlling the transmission of COVID-19 and for returning to normalcy on college campuses; however, vaccine hesitancy and resistance persist as a significant barrier. This study utilized the integrated behavior model (IBM) and the precaution adoption process model (PAPM) to identify factors predictive of COVID-19 vaccine willingness (receptive, hesitant, and resistant) among college students.

**Methods:** A sample of 1248 students at 2 universities in northwest Ohio were surveyed online in 2021. Stata/SE, version 17 (StataCorp) software was used to conduct stepwise logistic regression to investigate the association of theoretical constructs with vaccine willingness, after controlling for COVID-19 related factors and sociodemographic factors.

**Results:** Most students (82.5%) were vaccine receptive, 6.9% were vaccine hesitant, and 10.6% were vaccine resistant. Vaccine hesitancy was higher among students aged 18 to 22 years (9.3%), undergraduates (16.5%), and students who identified as Black (13%) or Middle Eastern (14.3%). Lower vaccine hesitancy was significantly predicted by IBM constructs of positive attitudes, high self-efficacy, and high salience. Not getting an influenza vaccine in the past 3 years and viewing vaccination as a personal choice were significantly associated with higher vaccine hesitancy. Lower odds of vaccine resistance were predicted by higher subjective norms. Descriptive norms, not getting an influenza vaccine in the past 3 years, agreeing with conspiracies, and viewing vaccination as a personal choice were strongly predictive of higher vaccine resistance.

**Conclusion:** Identifying the factors that predict vaccine hesitancy and resistance among college students is critical for college administrators, and for those who are designing health communication campaigns, to increase vaccination among this priority population.

**Keywords:** COVID-19 vaccine; Vaccine hesitancy; Integrated behavior model; College students

## INTRODUCTION

Today in the United States (US), there are more COVID-19 vaccines than people willing to receive one.<sup>1</sup> Across the US, mass vaccination sites are closing,<sup>2</sup> a somber acknowledgment that future vaccination efforts will require an individualized and customized approach.<sup>3</sup> As of May 2022, nearly 83% of the total US population had received at least 1 dose of a COVID-19 vaccine.<sup>4</sup> Among

adults aged 18 years and over, those in the age range of 18 to 24 years have the lowest vaccination rates with 78.2% receiving at least 1 dose of vaccine, and only 63.6% completing the vaccine series.<sup>4</sup>

Since fall of 2020, the highest incidence of COVID-19 cases are consistently reported among young adults aged 20 to 29 years, accounting for > 20% of all confirmed cases.<sup>4-7</sup> Even though young





adults have a lower risk of developing severe symptoms and complications due to COVID-19, they can be super spreaders to their families and social networks, especially among those who are unvaccinated.<sup>8,9</sup> Almost 20 million students are enrolled in institutions of higher education annually, comprising 40% of the US population aged 18 to 24 years.<sup>10,11</sup> College campuses across the nation reported an increased incidence of COVID-19 infection rates throughout the 2020-2021 academic year.<sup>12</sup> During August 2020, counties with colleges and universities offering remote instruction reported a 17.9% decline in mean COVID-19 incidence versus those counties with institutions offering in-person instruction, which reported a 56.2% increase in COVID-19 incidence.<sup>13</sup>

Variants of SARS-CoV-2, the virus that causes COVID-19, are expected to continue to emerge, and vaccination is a critical strategy for controlling the transmission of COVID-19.<sup>14</sup> Vaccination is also an important approach for returning to normalcy on college campuses, yet estimates show that 25% to 40% of American adults remain hesitant to get vaccinated or have decided not to do so.<sup>15-18</sup> The World Health Organization (WHO) defines vaccine hesitancy as a “delay in acceptance or refusal of vaccination despite the availability of vaccination services.”<sup>19</sup> Reasons for vaccine hesitancy include the novelty of COVID-19, rapid speed of vaccine development and approval that instilled concerns about safety and efficacy, beliefs in conspiracy theories and misconceptions, religious beliefs, and political dogmas.<sup>17,18,20</sup>

### Theoretical Framework

We utilized the integrated behavioral model (IBM) and precaution adoption process model (PAPM) as the primary framework for our study. The IBM draws on the concepts from several pertinent theories, which have been combined in the literature to obtain a holistic perspective about beliefs and intentions of individuals toward a health behavior, including COVID-19 vaccine hesitancy.<sup>21-24</sup>

According to the IBM, a person’s behavioral intention to perform a specific behavior is the primary determinant of behavior.<sup>25</sup> Behavioral intention is shaped by 3 main construct categories: attitude (experiential and instrumental), perceived norm (subjective and descriptive), and personal agency (perceived behavioral control and self-efficacy). There are also 4 factors outside the model that influence behavior directly: knowledge and skills to perform the behavior, salience of the behavior, environmental constraints, and habit.

The PAPM explains how people decide to take preventive action.<sup>26,27</sup> The PAPM identifies 7 stages of readiness to adopt a new preventive or precautionary behavior: (1) being unaware of the issue, (2) unengaged by the issue, (3) undecided, (4) thought about it and decided not to act, (5) decided to act, (6) acting, and (7) maintenance.<sup>28</sup> These stages were used to assess the primary construct of “behavioral intention” within the IBM model. The PAPM model has been used in the literature to understand vaccine intentions, specifically human papillomavirus (HPV) vaccines.<sup>29,30</sup>

The aim of the current study was to assess the role of theoretical constructs and other relevant factors that best predicted college students’ decision-making regarding receiving COVID-19 vaccination.

### METHODS

#### Study Design, Participants, and Sampling

During the spring semester of 2021, a nonexperimental, cross-sectional study was conducted among college students aged 18 years and over who were enrolled at 2 relatively similar sized public universities in northwest Ohio. Sample size estimates were calculated separately for each institution for adequate external validity (95% confidence interval, 5% margin of error, 50% response distribution, and projected response rate of 20%); N = 7190. Despite the random selection of 7190 students, the low expected and actual response rates reflected a convenience sample included in the study.

#### Survey Instrument and Pilot Testing

A newer survey instrument (Appendix) was developed because, at the time of data collection, there was a paucity of IBM-based validated tools that elucidated the decision-making process of college students regarding COVID-19 vaccination. Furthermore, the existing tools did not capture the additional COVID-19 related variables which appear in our instrument. The survey instrument was built using Qualtrics online survey software. Face validity of the instrument was established via a comprehensive review of the published literature, and content validity was established by having the survey reviewed by 4 external experts. To establish stability reliability, the survey instrument was pilot-tested prior to its launch with a convenience sample of 11 matched-pair responses, each survey taken 10 days apart. The intraclass correlation coefficients ranged from .57-.92 for all scales. Using the final results of the survey, the Cronbach  $\alpha$  values ranged from .49-.92 for the scales. Construct validity of the theoretical subscales was assessed by conducting post hoc exploratory factor analysis using a maximum likelihood estimation method with a varimax rotation.

#### Measures

The survey instrument included variables based on the IBM constructs, PAPM stages of readiness, COVID-19 related variables, and sociodemographic factors.

#### Dependent Variable

The dependent variable was “vaccination willingness.” We used the responses of the PAPM item to create this categorical variable with 3 groups: (1) Vaccine receptive—those who already got the vaccine, decided to get the vaccine as soon as it was available to them, or were in the process of making their vaccination appointment. (2) Vaccine hesitant—those who were undecided about getting the vaccine. (3) Vaccine resistant—those who had decided not to get the COVID-19 vaccine. At the time of data collection,



vaccines were made available free of cost to all adults above 18 years of age, and no vaccine mandates were in place. Hence, the likelihood of respondents who obtained vaccines due to workplace or school mandates was very unlikely, thereby minimizing the chances of misclassification bias.

### Integrated Behavior Model Independent Variables

#### Attitudes

Seven items assessed how favorable or unfavorable students' instrumental and experiential attitudes were toward the COVID-19 vaccine. The responses ranged on a 5-point Likert scale from "least favorable" to "most favorable."

#### Perceived Social Norms

Descriptive norms were assessed in 2 ways. First, a single item measured if most people would approve/disapprove of the respondent getting vaccinated. Responses ranged on a 5-point Likert scale from "strongly agree" to "strongly disagree." Second, an 8-item scale measured the likelihood of individuals in the student's social network getting the COVID-19 vaccine. The responses ranged on a 5-point Likert scale from "very unlikely" to "very likely," in addition to "not applicable." Subjective norm was measured with an 8-item scale that assessed the perceived influence of others regarding obtaining the vaccine. The 4-point Likert scale ranged from "not influential at all" to "very influential," in addition to "not applicable."

#### Personal Agency

This 8-item scale assessed students' level of confidence to perform actions related to getting a COVID-19 vaccine. Responses ranged on a 4-point Likert scale from "not confident at all" to "very confident." Perceived behavioral control was a single item that assessed students' perceived control of getting a COVID-19 vaccine. The 5-point Likert scale ranged from "not under my control" to "completely under my control."

### Independent Variables Outside the Integrated Behavioral Model

#### Salience

Three items measured students' perceived importance of getting the COVID-19 vaccine with a 4-point Likert scale ranging from "not important at all" to "very important."

#### Knowledge

Three items assessed knowledge related to COVID-19 infection. Five items assessed knowledge pertaining to COVID-19 vaccines. Items were marked as true/false.

#### Environmental Constraints

Twelve items measured potential environmental conditions that made it easier or more difficult to getting vaccinated. Responses ranged on a 5-point Likert scale from "very easy" to "very difficult."

### Habit of Getting Influenza Vaccine

This item assessed influenza vaccination in the past 3 years with response options as "once every year," "2 times in the past 3 years," "1 time in the past 3 years," "did not get the influenza vaccine at all in the past 3 years," and "unsure."

### Other Independent Variables

#### COVID-19 Related Variables

These items included COVID-19 infection history (history of testing positive, getting hospitalized, or know someone who died); COVID-19 related health behaviors (6 items assessing adherence to Centers for Disease Control and Prevention [CDC] recommendations); conspiracy thinking (9 items such as media is creating unnecessary fear, the US government is trying to control the population, pharmaceutical companies hid information about vaccines, etc); political affiliation (political leaning as "Republican," "Democrat," "Independent," "don't know," or "no preference"); perceptions about COVID-19 pandemic (worst of the pandemic was "behind us," "happening currently," or "still to come"); and perceptions about COVID-19 vaccination (it is "a personal choice," "everyone's responsibility," "both," "neither," or "unsure").

#### Sociodemographic Factors and Health Status

These items included age, gender, race, ethnicity, rank in college, international student status (domestic versus international), living arrangements (residing alone versus with others), physical and mental health, (ranging on a 5-point Likert scale from "excellent" to "very poor") and health care utilization in the past 12 months (response options were yes/no/unsure).

### Data Collection

Following institutional review board approval of a reciprocal application (#300897) between the 2 institutions, data collection was completed between March and April 2021 using an anonymous Qualtrics survey link sent to student emails. Electronic informed consent was obtained from students prior to accessing the survey. At the end of the survey, students were offered an opportunity to enter a random drawing for 1 of 50 Amazon gift cards.

### Data Analysis

Data analyses were performed using Stata/SE, version 17 (StataCorp). Descriptive statistics were used to characterize the survey respondents using frequencies and percentages for categorical variables. Chi-square tests were used to determine if there were statistically significant differences in the proportions of respondents in the 3 outcome groups (vaccine resistant, vaccine hesitant, and vaccine receptive) across the independent variables.

First, we used a multivariable, logistic regression model to identify the factors predictive of vaccine hesitancy compared to those who were vaccine receptive. The initial step of developing this model included a stepwise logistic regression model using the theoretical



constructs, with a cutoff  $p$  value of  $<.05$  for retention. The retained variables were included in the final multivariable logistic regression model that compared vaccine hesitant to vaccine receptive students while controlling for variables related to conspiracy type thinking, influenza vaccination habit, political party, COVID-19 health behaviors, and perceptions about the COVID-19 pandemic and vaccination. Finally, using the same method, we developed another multivariable logistic regression model to identify the factors predictive of vaccine resistance compared to students in the other 2 groups (ie, vaccine hesitant and vaccine receptive).

## RESULTS

A total of 7190 students were invited to complete the survey, resulting in 1471 responses. Survey responses were eliminated when they were partially complete ( $n = 211$ ), from students medically ineligible to receive the COVID-19 vaccine ( $n = 10$ ), and from students less than 18 years of age ( $n = 2$ ). The final data set consisted of 1248 completed surveys and a final response rate of 18%.

Participants were predominantly non-Hispanic (95.4%), White (82.4%), and female (69.0%). Table 1 displays additional demographic characteristics broken down by the 3 levels of willingness to obtain the COVID-19 vaccine (ie, resistant, hesitant, or recep-

tive). In our sample, 10.6% of respondents were classified as vaccine resistant, 6.9% as vaccine hesitant, and 82.5% as vaccine receptive. Students aged 18 to 22 years were statistically significantly more vaccine resistant and vaccine hesitant than other students. Undergraduate students reported more than twice as much vaccine resistance (16.5% versus 5.9%) and vaccine hesitancy (9.6% versus 4.8%) than graduate students. Among all racial groups, Black (13%) and Middle Eastern (14.3%) students reported higher vaccine hesitancy. Vaccine resistance was almost twice as high among those living with others when compared with students living alone (11.6% versus 6.4%).

The proportion of vaccine receptive students was reported to be higher among those who had COVID-19 infection (73.7%), knew someone who tested positive (83.9%), and knew someone who was hospitalized (84.6%). Moreover, 1 in 5 students reported knowing someone who had died of COVID-19, and those who did not know someone who died of COVID-19 were almost 2 times more likely to be vaccine resistant than those students who did (11.4% versus 6.9%).

Students who received at least 1 influenza vaccine in the past 3 years were significantly more vaccine receptive than those who reported not getting an influenza vaccine in the past 3 years (87.8% versus 63.8%;  $\chi^2 = 140.07$ ,  $df = 8$ ,  $p < .01$ ). In addition,

**Table 1. Participant Demographic Characteristics by COVID-19 Vaccination Willingness**

Characteristic	COVID-19 Vaccination Willingness			Total $n$ (%)	
	Resistant $n$ (%)	Hesitant $n$ (%)	Receptive $n$ (%)		
Sex					
	Female	87 (10.1)	54 (6.3)	717 (83.6)	858 (69.0)
	Male	44 (11.5)	32 (8.3)	308 (80.2)	384 (31.0)
Race**					
	White	118 (11.5)	67 (6.5)	843 (82.0)	1028 (82.4)
	Asian	3 (2.9)	8 (7.6)	94 (89.5)	105 (8.4)
	Black	2 (4.4)	6 (13.0)	38 (82.6)	46 (3.7)
	Multiracial	3 (10.0)	1 (3.3)	26 (86.7)	30 (2.4)
	Middle Eastern/North African	0 (0.0)	3 (14.3)	18 (85.7)	21 (1.7)
	Other	6 (33.3)	1 (5.6)	11 (61.1)	18 (1.4)
Ethnicity					
	Non-Hispanic	125 (10.5)	83 (7.0)	983 (82.5)	1191 (95.4)
	Hispanic	7 (12.3)	3 (5.3)	47 (82.5)	57 (4.6)
Age in years***					
	18-22	79 (15.0)	49 (9.3)	400 (75.8)	528 (44.9)
	23-27	19 (5.4)	24 (6.8)	308 (87.8)	351 (29.2)
	28+	29 (9.0)	12 (3.7)	283 (87.4)	324 (26.9)
College level***					
	Undergraduate	91 (16.5)	53 (9.6)	408 (73.9)	552 (44.7)
	Graduate	40 (5.9)	33 (4.8)	611 (89.3)	684 (55.3)
International student status**					
	Domestic	130 (11.5)	76 (6.7)	929 (81.9)	1135 (90.9)
	International	2 (1.8)	10 (8.6)	101 (89.4)	113 (9.1)
Living arrangement*					
	Living with others	116 (11.6)	73 (7.3)	809 (81.1)	998 (80.0)
	Living alone	16 (6.4)	13 (5.2)	221 (88.4)	250 (20.0)

Values may not equal 100% due to rounding or missing responses.

$\chi^2$  tests were not run on any cells with 0 as frequencies or if less than 80% of cells had frequencies  $> 5$ .

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$



students who followed CDC recommended COVID-19 guidelines such as avoiding contact with COVID-19 positive people ( $\chi^2 = 152.17, df = 8, p < .01$ ), avoiding indoor shared spaces ( $\chi^2 = 225.65, df = 8, p < .01$ ), and utilizing frequent hand washing/hand sanitizers ( $\chi^2 = 44.41, df = 8, p < .01$ ) reported statistically significantly greater vaccine receptiveness than those who did not.

Table 2 reports political affiliation, perceptions about the COVID-19 pandemic and vaccination, and conspiracy-type thinking across the 3 levels of willingness (ie, resistant, hesitant, or receptive). Students who self-identified politically as Democrats were more likely to be receptive to vaccination (96.3%) compared with Republicans (53.4%) and Independents (78.7%). Vaccine resistance was markedly higher among students who identified as

**Table 2. Political Affiliation, Perception about COVID-19 Pandemic and Vaccination, Conspiracy Thinking by COVID-19 Vaccination Willingness**

	COVID-19 Vaccination Willingness		
	Resistant n (%)	Hesitant n (%)	Receptive n (%)
<b>Political affiliation***</b>			
Republican	65 (31.9)	30 (14.7)	109 (53.4)
Democrat	10 (1.6)	13 (2.1)	591 (96.3)
Independent	24 (13.8)	13 (7.5)	137 (78.7)
Don't know	33 (12.9)	30 (11.7)	193 (75.4)
<b>Perception about COVID-19 pandemic***</b>			
Behind us	93 (13.7)	48 (7.1)	539 (79.3)
Happening currently	15 (4.5)	18 (5.4)	302 (90.2)
Still to come	24 (10.3)	20 (8.6)	189 (81.1)
<b>Perception about COVID-19 vaccination***</b>			
Personal choice	120 (39.3)	53 (17.4)	132 (43.3)
Everyone's responsibility	2 (0.4)	4 (0.8)	520 (98.9)
Both	5 (1.3)	24 (6.1)	362 (92.6)
Neither	3 (60.0)	1 (20.0)	1 (20.0)
<b>Conspiracy thinking about COVID-19</b>			
<b>Media created fear ***</b>			
Disagree	11 (2.8)	10 (2.6)	366 (93.4)
Neither disagree nor agree	16 (5.8)	23 (8.3)	239 (86.0)
Agree	105 (18.2)	53 (9.2)	420 (72.7)
<b>Almost all people who get the disease recover from it***</b>			
Disagree	46 (4.4)	46 (4.4)	943 (91.1)
Neither disagree nor agree	43 (32.6)	27 (20.5)	62 (47.0)
Agree	43 (53.1)	13 (16.0)	25 (30.9)
<b>Harm from the disease has been exaggerated***</b>			
Disagree	27 (3.3)	25 (3.0)	776 (93.7)
Neither disagree nor agree	19 (9.7)	32 (16.4)	144 (73.9)
Agree	86 (38.2)	29 (12.9)	110 (48.9)
<b>More people die from influenza than from COVID-19***</b>			
Disagree	33 (5.2)	21 (3.3)	575 (91.4)
Neither disagree nor agree	33 (8.8)	40 (10.6)	304 (80.6)
Agree	66 (27.5)	25 (10.4)	151 (62.9)
<b>Vaccine is more dangerous than getting the disease</b>			
Disagree	37 (3.6)	50 (4.8)	945 (91.6)
Neither disagree nor agree	62 (39.7)	32 (20.5)	62 (39.7)
Agree	33 (55.0)	4 (6.7)	23 (38.3)
<b>Pharmaceutical companies withheld information on vaccine side effects***</b>			
Disagree	27 (3.0)	29 (3.3)	834 (93.7)
Neither disagree nor agree	57 (21.9)	40 (15.4)	163 (62.7)
Agree	48 (49.0)	17 (17.3)	33 (33.7)
<b>Higher power determines my health outcomes***</b>			
Disagree	52 (5.0)	51 (4.9)	944 (90.2)
Neither disagree nor agree	31 (27.2)	26 (22.8)	57 (50.0)
Agree	49 (56.3)	9 (10.3)	29 (33.3)
<b>Vaccination is an attempt to take away my personal freedom***</b>			
Disagree	36 (3.5)	49 (4.8)	940 (91.7)
Neither disagree nor agree	25 (22.9)	29 (26.6)	55 (50.5)
Agree	71 (62.3)	8 (7.0)	35 (30.7)
<b>Government will control the population through vaccination***</b>			
Disagree	34 (3.4)	41 (4.1)	921 (92.5)
Neither disagree nor agree	26 (21.0)	31 (25.0)	67 (54.0)
Agree	72 (56.3)	14 (10.9)	42 (32.8)

\*p < .05, \*\*p < .01, \*\*\*p < .001



Republican (31.9%) than as Democrat (1.6%) or Independent (13.8%). Students who believed that the worst of the pandemic was behind us were more resistant to vaccination (13.7%) than those who believed the worst of the pandemic is happening currently (4.5%). Those students who believed that getting vaccinated is a social responsibility to others were more than twice as receptive to vaccination (98.9%) than students who believed getting vaccinated is a personal choice (43.3%). Approximately 40% of students who viewed COVID-19 vaccination as a personal choice were vaccine resistant.

Vaccine resistance was also more common among those who believed in misinformation and conspiracy theories. Those who agreed that the potential health risks of COVID-19 had been greatly exaggerated by the media were more likely to be vaccine resistant than students who disagreed with that sentiment (18.2% versus 2.8%). Furthermore, students who believed that the pharmaceutical companies that manufactured the vaccines hid information from the public's view were more likely to be vaccine hesitant than those who disagreed (17.3% versus 3.3%). Students who agreed that the government telling everyone to get vaccinated is a method to control the population were significantly more resistant to vaccination than those who disagreed with that belief (56.3% versus 3.4%). Vaccine resistance was significantly higher among students who agreed that the vaccine is an attempt to take away personal freedom (62.3% versus 3.5%).

Table 3 reports 2 logistic regression models that were conducted to identify and assess independent variables that were predictive of vaccine hesitancy and vaccine resistance. Model 1 identified factors that were significantly associated with vaccine hesitancy versus vaccine receptiveness, while adjusting for covariates. As per the IBM, positive instrumental and experiential attitudes (OR 0.79; 95% CI, 0.72-0.86), high self-efficacy to get vaccinated (OR 0.90; 95% CI, 0.84-0.96), and high salience (OR 0.80; 95% CI, 0.68-0.94) predicted lower odds of vaccine hesitancy. Not receiving the influenza vaccine within the past 3 years (OR 4.0; 95% CI, 1.75-9.13) or being unsure (OR 5.22; 95% CI, 1.40-19.43) about receiving it significantly predicted increased COVID-19 vaccine hesitancy compared to those who got yearly influenza vaccination. Viewing the COVID-19 vaccine as a personal choice compared to those who saw it as a social responsibility (OR 6.50; 95% CI, 1.81-23.22) was significantly associated with vaccine hesitancy. Model 1 discriminated well between vaccine hesitancy and vaccine receptiveness with a C statistic of 0.96.

Model 2 predicted factors associated with vaccine resistance versus all other vaccine willingness categories, while adjusting for covariates. As per IBM, subjective norms were significantly predictive of resistance to getting the COVID-19 vaccine. Students who were not influenced by people in their social network regarding the decision to get the COVID-19 vaccine had significantly higher odds of vaccine resistance (OR 0.91; 95% CI, 0.86-0.95). Descriptive norms were also significantly predictive of resistance to get-

ting the COVID-19 vaccine. Students who strongly disagreed with the idea that most people they know approve of them getting a COVID-19 vaccine were almost 5 times as resistant compared with students who strongly agreed with that sentiment (OR 4.69; 95% CI, 1.12-19.74). Students who disagreed or were ambivalent (neither disagree nor agree) that most people approve of them getting a COVID-19 vaccine were 4 times as resistant compared with students who strongly agreed with that view (OR 4.18; 95% CI, 1.40-12.43 and OR 4.52; 95% CI, 1.95-10.50, respectively).

Not obtaining the influenza vaccine for the past 3 years also increased vaccine resistance when compared to those who got yearly influenza vaccination (OR 3.44; 95% CI, 1.67-7.11). Higher conspiracy-type thinking predicted increased resistance to vaccination (OR 1.09; 95% CI, 1.04-1.14). Believing that COVID-19 vaccination is a personal choice and not a social responsibility to others strongly predicted increased resistance to the vaccine (OR 16.12; 95% CI, 3.53-73.57). Overall, model 2 was highly predictive of vaccine resistance with a C statistic of 0.97.

## DISCUSSION

Nearly 83% of students in the current study were vaccine receptive, meaning that they had already received the vaccine, were in the process of making an appointment to get it, or were planning to get it as soon as it was available. Only 6.9% were vaccine hesitant and 10.6% were vaccine resistant. Our results were similar to a spring 2021 survey of 1032 college students across the US conducted by College Finance which reported that 87.6% of college students were planning on getting the vaccine, 8.4% were unsure, and 4% were not planning to get it.<sup>31</sup>

As we hypothesized, the IBM constructs of instrumental and experiential attitudes and self-efficacy predicted lower odds of vaccine hesitancy. Conversely, perceived social norms were highly predictive of vaccine resistance. According to IBM instrumental attitudes (cognitive beliefs about the outcomes of getting vaccinated) and experiential attitudes (emotional responses to the thought of getting vaccinated) play a significant role in behavioral intentions.<sup>32</sup> In this situation, students who did not believe in beneficial outcomes of getting vaccinated and/or those who had strong negative, emotional responses to the idea of getting vaccinated (eg, fear of needles or side effects) were more vaccine hesitant and resistant. Prochaska<sup>33</sup> recommends that for a person to move toward action, the advantages of changing must *increase* about twice as much as the disadvantages/cons *decrease*. Therefore, those who design health communication campaigns for the vaccine hesitant should put twice as much emphasis on the benefits of getting vaccinated as on reducing the disadvantages or barriers.

We also found that higher levels of self-efficacy predicted lower vaccine hesitancy. Students with a strong sense of efficacy are more likely to be intrinsically motivated and will exert a high degree of effort to accomplish a goal, even in the midst of resistance or barriers. According to Bandura,<sup>34</sup> all 4 sources of self-efficacy


**Table 3. Integrated Behavior Model Constructs and other Key Variables that Predict COVID-19 Vaccine Hesitance and Resistance**

<b>Model 1: Vaccine Hesitance<sup>b</sup></b>		<b>OR (95% CI)</b>
<b>IBM constructs</b>		
	Instrumental and experiential attitudes	.79*** (.72-.86)
	Personal agency—self-efficacy	.90*** (.84-.96)
<b>Key independent constructs</b>		
	Saliency	.80** (.68-.94)
	Habit of getting influenza vaccine in the last 3 years	Reference
	Once every year	Reference
	1 time	.89 (.27–2.94)
	2 times	1.72 (.55–5.36)
	Did not get it	4** (1.74–9.13)
	Unsure	5.22* (1.40–19.43)
<b>Other constructs</b>		
	COVID-19 related health behaviors	1.12 (1–1.26)
	Conspiracy thinking	.97 (.91-1.04)
	Perceptions about COVID-19 pandemic	Reference
	Behind us	Reference
	Happening currently	.73 (.32–1.66)
	Still to come	.83 (.36–1.89)
	Perceptions about COVID-19 vaccination	Reference
	Everyone's responsibility	Reference
	Personal choice	6.50*** (1.81–23.22)
	Both	3.06 (.91–10.26)
	Neither	.96 (.00–187.90)
	Unsure	2.82 (.43–18.30)
	Political affiliation	Reference
	Democrat	Reference
	Republican	2.87 (.95–8.69)
	Independent	1.62 (.56–4.68)
	No preference	1.53 (.55–4.24)
	Don't know	2.60 (.82–8.28)
<b>Model 2 –Vaccine Resistance<sup>b</sup></b>		<b>OR (95% CI)</b>
<b>IBM constructs</b>		
	Perceived norms—subjective	.91*** (.86-.95)
	Perceived norms—descriptive	Reference
	Strongly agree	Reference
	Agree	1.23 (.53–2.88)
	Neither agree nor disagree	4.52*** (1.95–10.50)
	Disagree	4.18** (1.40–12.43)
	Strongly disagree	4.69* (1.12–19.74)
<b>Key independent constructs</b>		
	Knowledge	Reference
	Regarding COVID-19 infection	.79 (.56–1.14)
	Regarding COVID-19 vaccine	.77 (.59-1.01)
	Habit of getting influenza vaccine in the last 3 years	Reference
	Once every year	Reference
	1 time	2.05 (.81–5.21)
	2 times	.44 (.09–2.06)
	Did not get it	3.44** (1.67–7.11)
	Unsure	1.87 (.53–6.58)
<b>Other constructs</b>		
	COVID-19 related health behaviors	.96 (.89–1.04)
	Conspiracy thinking	1.09** (1.04–1.14)
	Perceptions about COVID-19 pandemic	Reference
	Behind us	Reference
	Happening currently	.91 (.40–2.07)
	Still to come	.86 (.41–1.80)
	Perceptions about COVID-19 vaccine responsibility	Reference
	Everyone's responsibility	Reference
	Personal choice	16.13*** (3.53–73.57)
	Both	1.15 (.20–6.75)
	Neither	5.88 (.35–99.97)
	Unsure	3.80 (.44–32.78)
	Political affiliation	Reference
	Democrat	Reference
	Republican	1.40 (.49–4)
	Independent	1.31 (.43–3.97)
	No preference	1.57 (.57–4.36)
	Don't know	.96 (.25–3.73)

OR = Odds Ratio, CI = confidence interval \*p < .05, \*\*p < .01, \*\*\*p < .001

<sup>a</sup>Model 1 compares vaccine hesitant students with vaccine resistant students, number of observations = 1073, df = 19, log likelihood = -140.40, R<sup>2</sup>=0.50.

<sup>b</sup>Model 2 compares vaccine resistant students with all other students, number of observations = 1243, df = 23, log likelihood = -169.37, R<sup>2</sup>=0.59.



should be considered when designing an intervention: (1) mastery experiences (give many opportunities to achieve success), (2) vicarious experience (see peers and hear from peers who were vaccinated), (3) verbal persuasion (give credible, valid information and positive feedback to guide them through the behavior and/or to motivate them to make their best effort), and (4) emotional state (alleviate their fears and reduce anxiety surrounding vaccination).<sup>35</sup>

Considering that we surveyed young adults, who are more typically concerned than older adults about what others think about them, the influence of perceived social norms was not surprising. Students who believed that most people they know would not approve or be ambivalent of them getting a vaccine were much more resistant to getting vaccinated than students with the opposite perceptions of the social norm. In general, people have a greater tendency to behave in accordance with their attitudes when their attitudes are supported by in-group norms.<sup>36</sup> Such results point to the importance of connecting the vaccine hesitant with others who are familiar, well-respected, and who recommend obtaining the vaccine (eg, their primary care providers.) For example, 67% of participants in a recent study reported they would accept a COVID-19 vaccine if it is recommended for them.<sup>37</sup>

Our findings regarding political party affiliation corroborate our results that students are influenced by perceived social norms. For example, students who self-identified as Democrat were much more likely to be receptive to getting vaccinated than Republicans or Independents. Likewise, vaccine resistance was much higher among Republican students than students who identified as Democrat or Independent. Our findings regarding the deep partisan divide in vaccine receptivity are supported by multiple studies. A Monmouth University poll of American adults in April 2021 reported that only 36% of Republicans had received at least 1 shot of the vaccine compared with 67% of Democrats and 47% of Independents. In that same study, 43% of Republicans said they would likely never get the vaccine.<sup>38</sup>

Similar partisan divide exists for vaccine mandates. As of August 2021, a total of 572 colleges and universities required a COVID-19 vaccine of at least some students and/or employees.<sup>39</sup> In a survey of 2000 college students conducted by Inside Higher Ed and College Pulse, 90% of students who self-identified as Democrat supported a vaccine mandate for colleges versus only 37% of students who self-identified as Republican.<sup>40</sup>

Furthermore, students who believed in conspiracies and misinformation and that getting a vaccination is a personal choice instead of a social responsibility to others were more likely to be vaccine hesitant and resistant. Given the widespread exposure to conspiracy theories via social media and the internet, it is an emerging research domain within social psychology.<sup>41</sup> There is a growing need to better understand these beliefs through research, cautiously mitigating the unintended risk of exposure to conspiracy

theories translating into beliefs for a small group of research participants.<sup>42</sup>

The results of our study should be interpreted with potential limitations in mind. First, we tested the stability-reliability of the survey with undergraduate college students in a health-related class. This may have biased our pilot-test results due to the shared career interests of the cohort. Second, our return rate was 18%, that has resulted in a convenience sample, diluting the effect of randomization. The extent to which the return rate is less than 100% threatens the external validity of our findings, limiting the ability to make generalizations beyond the responding students. Third, students were from only 2 public universities in northern Ohio. Thus, the generalizability of our results to all US college students may be limited. Fourth, due to the cross-sectional nature of our study, we cannot infer any causality and we lack the ability to determine whether those who intended to get a vaccine actually received it. Fifth, social desirability bias may have influenced some of the respondents' answers. If that is the case, the percentage of those who are vaccine receptive may have been overstated. However, the strength of our study is the utilization of well-accepted theoretical models as the framework of our research to increase its validity.<sup>25</sup> Lastly, the classification of vaccine willingness is much more complex today than that used in our study because of vaccines mandates and multiple boosters. However, it is a strength of this study that our vaccine willingness groups remained unbiased by these factors, thereby enabling fair prediction of receptiveness, hesitancy, and resistance.

## PUBLIC HEALTH IMPLICATIONS

Vaccine hesitancy is an ongoing and constantly evolving concern. Our data were collected before the outbreak of the Delta and Omicron variant, full US Food and Drug Administration (FDA) approval of Pfizer vaccine, and conversations pertaining to booster doses. The methodology described in our study, identifying the key theoretical constructs predictive of vaccine hesitancy, could inform valuable lessons for anticipated emerging and re-emerging infectious diseases. Approaches to prioritize and target such constructs could inform timely interventions to protect campus communities against them.

As college students return to campus, the emergence of the newer COVID-19 variants has become a great concern to college administrators. Continued campaigns on college campuses are necessary to communicate the doubled risk of hospitalization and attendance to emergency care due to the emerging variants among unvaccinated individuals.<sup>43</sup> Emphasis should be placed on vaccination as one of the best methods that protect against existing variants and slows the emergence of newer variants by reducing the spread of infection.<sup>14</sup> The Pfizer vaccine was approved by the FDA on August 23, 2021, and contributed to decreasing vaccine hesitancy as well as improving vaccination rates.<sup>44</sup> According to a survey published in June 2021 by the Kaiser Family Foundation,



30% of the unvaccinated respondents expressed willingness to get the COVID-19 vaccine after it received full FDA approval.<sup>20</sup> However, a subsequent study in 2022 has shown that the increase was moderate and very short-term post approval.<sup>45</sup> This observation has been potentially attributed to the fact that those awaiting approval may have provided a socially desirable response and did not act on their intentions after FDA approval. On the other hand, subsequent multiple vaccine approvals by the FDA resulted in educational and worksite vaccine mandates, even though opposition among the unvaccinated persists, with 92% of them opposed to such mandates.<sup>46</sup> Furthermore, conflicting and uncoordinated announcements from the US White House COVID-19 Response Team, CDC, and WHO before the FDA's approval of the booster doses generated confusion and doubt regarding the benefits and effectiveness of the primary and booster vaccines for COVID-19.<sup>47</sup> Thus, future studies should continually re-examine vaccine hesitancy among college students with the changing scope of the COVID-19 pandemic, vaccine mandates at educational institutions, and the evidence pertaining to long-term efficacy and safety of vaccines.

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#### ERRATUM

3/17/2023: Corrected co-author's name to Edoseawe Okoduwa.



APPENDIX.

The College Student COVID-19 Vaccination Survey

The Rocket Student Pandemic Health Survey  
The University of Toledo

- Thank you for participating in the pilot test for this important health study.
- The survey will only require about **10-12 minutes** of your time.
- No one can connect your answers to your identity.
- Your answers to this survey are **confidential**.

Please read carefully: By clicking "I agree" below, you are indicating that you:

- Are at least 18 years old.
- Have read the informed consent letter that was attached to the email invitation.
- Have had all your questions answered.
- Have decided to take part in this research.

I AGREE

Section A: Your Status, Intentions and History [Behavioral Intentions]

Instructions: For each item below, please select the answer that best describes your history and views.

- Which of the following statements best describes your **current status** regarding getting the COVID-19 vaccine? *(Please select only one response) (PAPM)*
  - I have not heard much about a COVID-19 vaccine.
  - I have not thought much about getting vaccinated with the COVID-19 vaccine.
  - I am undecided about getting the COVID-19 vaccine.
  - I thought about it and decided **not** to get the COVID-19 vaccine. *(skip to question #3 below)*
  - I have decided to get the COVID-19 vaccine as soon as it is available to me.
  - I am in the process of making an appointment to get vaccinated with a COVID-19 vaccine.
  - I was advised by a medical provider not to receive it. *(End of Survey)*
  - I have already received the vaccine. *(skip to question #3 below)*

- When the COVID-19 vaccine is available to you, which of the following best describes your **intentions?** [Behavioral Intentions]
  - I will get the vaccine as soon as I am able.
  - I will wait a while and see how the vaccine is working for others who received it.
  - I will get the vaccine but only if it is required of me to work or do other activities that I want to do.
  - I am not sure what I am going to do.
  - I will not be getting the vaccine.

- Thinking about the impact COVID-19 is having on the US, I would say that the worst of the problems are:
  - Behind us (in the past)
  - Happening currently
  - Still to come (in the future)

- Which statement below best describes your view regarding getting vaccinated against COVID-19?
  - Getting vaccinated is a personal choice.
  - Getting vaccinated is part of everyone's responsibility to protect the health of others.
  - Both
  - Neither
  - Unsure/Don't know

5. For each question below, please select the answer that applies to you.

Question	Yes	No	Don't know
a. Have you had a COVID-19 infection?			
b. Have you been tested for COVID-19?		Skip to 6	Skip to 6

- 5a. Was the test positive for having COVID-19?
  - Yes
  - No (Skip to 6)
  - Don't know (Skip to 6)

- 5b. Were you hospitalized due to your illness?
  - Yes
  - No

6.
 

Do you know someone in your social circle (example: friends, family, neighbors, co-worker, classmates) who	Yes	No	Don't know
a. tested positive for COVID-19?			
b. were hospitalized due to COVID-19?			
c. died from COVID-19?			

Factors Contributing to vaccination decision

Display: Only for those who decided to NOT get the vaccine

- Decision about not getting the COVID-19 vaccine is ...

Not under my control				Completely under my control	
1	2	3	4	5	

2. For each item below, please rate their impact on your decision not to take the COVID-19 vaccine.

	Significant Impact	Moderate Impact	A Little Impact	No Impact
a. Not knowing exactly where to get the vaccine.				
b. Not being able to drive somewhere within 10-15 minutes to get the vaccine.				
c. Having to wait more than a week to get an appointment to get the vaccine.				
d. Not being given time off from school or work without penalty to get the vaccine.				
e. Having a bad experience/bad reaction to vaccines in the past.				
f. Not getting a recommendation to get the vaccine from a health care provider.				
g. Not trusting the healthcare system.				
h. Not trusting the vaccine is safe.				
i. Not trusting in the US government				
j. Having to pay for part or all the cost of getting the vaccine.				
k. Observing others have negative side effects from the vaccine.				
l. Hearing from or reading the writings of others who are discouraging others from getting the vaccine.				

3. Please specify if you have any other factor(s) (not mentioned above) that has impacted your decision not to get the COVID-19 vaccine.

Section B: Your Thoughts

SKIP: for those who decided to NOT get the vaccine

1. How important is/was each of the following to you regarding getting the COVID-19 vaccine? Select the answer that best matches your views [Salience]

How important is/was it to you to ...?	Not Important at all	Somewhat Important	Important	Very Important
a. Get the COVID-19 vaccine.				
b. Decrease your odds of having serious health effects from COVID-19.				
c. Decrease your odds of dying from COVID-19.				

2. Which of the words below best describes your feelings and thoughts as you think about getting a COVID-19 vaccine in the future OR describe your past feelings or thoughts prior to when you went to get a COVID-19 vaccine?

Select the placement on the line that best describes your feelings/thoughts. [Instrumental and Experiential Attitude]

For me, getting the COVID-19 vaccine would be/was ...

Scary				Comforting	
1	2	3	4	5	

Painful				No Pain	
1	2	3	4	5	

Difficult				Easy	
1	2	3	4	5	

Opposed to my views				In agreement with my views	
1	2	3	4	5	

Ineffective at reducing serious illness				Effective at reducing serious illness	
1	2	3	4	5	

Unsafe				Safe	
1	2	3	4	5	

Harmful				Beneficial	
1	2	3	4	5	

3. For each statement below select "True" if the statement is true and "False" if the statement is false. [Knowledge]

Please mark "True" or "False" for each item below.	True	False
a. The vaccines available to Americans are less than 50% effective at preventing serious illness and/or death from COVID-19.		
b. The absolute best way to avoid getting COVID-19 is to not breathe the same air as other people who live outside your household.		



c. Most COVID-19 infection occurs when people touch a contaminated surface and then touch their eyes, nose, or mouth.		
d. Almost all people who spread the virus to others have a fever and other symptoms (eg, cough).		
e. The companies that developed the vaccines did not test the safety of their vaccines.		
f. The Pfizer and Moderna vaccines use a new technology that changes the DNA of your cells.		
g. The technique used by Johnson and Johnson to develop their vaccine is much safer than the techniques used by Pfizer and Moderna.		
h. In the US, the Pfizer and Moderna vaccines have caused serious side effects in more than 50% who have received it.		

**Section C: Your Perceptions**

1. Please indicate your level of agreement or disagreement with the following statements. [EPPM: Perceived Susceptibility, Severity, response efficacy, response costs]

Agree or Disagree?	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
a. My chances are high of getting severe health outcomes from COVID-19.					
b. If I were to get a COVID-19 infection or a reinfection, the health outcomes would be very serious.					
c. It would be/was a real hassle for me to get a COVID-19 vaccine.					
d. The COVID-19 vaccine that will be/was available to me is effective at reducing my risks of severe disease from COVID-19.					

2. Please rate your level of confidence to do each action below? [Self-Efficacy] **SKIP: for those who decided to NOT get the vaccine**

How confident are / were you regarding COVID-19 vaccine to ...	Not Confident at all	Somewhat Confident	Confident	Very Confident
a. Find an easily accessible location that provides/provided the vaccine to you.				
b. Make an appointment to get the vaccine.				
c. Get to a location that provides/provided the vaccine.				
d. Pay the cost of the vaccination.				
e. Get one or more vaccine shots as recommended by health professionals.				
f. Fill out and complete all the paperwork that is associated with getting the vaccine.				
g. Handle fear of needles that you may have.				
h. Handle any side effects of the vaccine.				

**Section E: Your Views of Others**  
[Subjective Norm and Descriptive Norm]

Instructions: For the statement below, please select the answer that best describes your views

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
1. Most people that I know would approve of me getting a COVID-19 vaccine. [Descriptive Norm]	SD	D	Neither	A	SA

Instructions: For each question below, please select the answer that best describes your views. Select "Not Applicable" if those specific people are not in your life.

2. How likely is it that the individuals listed below have already received or will get the COVID-19 vaccine, when available? Select "Not Applicable" if those specific people are not in your life. [Descriptive Norm]

	Very Unlikely	Somewhat Unlikely	Likely	Very Likely	Not Applicable
a. Health care providers	VU	SU	L	VL	NA
b. Immediate family (parents/siblings)	VU	SU	L	VL	NA
c. Other family members	VU	SU	L	VL	NA
d. Spouse/Partners/Significant others	VU	SU	L	VL	NA
e. Friends	VU	SU	L	VL	NA
f. Roommates	VU	SU	L	VL	NA
g. Professors/ Academic advisors	VU	SU	L	VL	NA
h. Your boss	VU	SU	L	VL	NA

3. How influential are the opinions of the people listed below regarding your decision to get the COVID-19 vaccine? [Subjective Norm]

	Not Influential at All	Somewhat Influential	Influential	Very Influential	Not Applicable
a. Health care providers	Not at all	Somewhat	Influential	Very Influential	NA
b. Immediate family (parents/siblings)	Not at all	Somewhat	Influential	Very Influential	NA
c. Other family members	Not at all	Somewhat	Influential	Very Influential	NA
d. Spouse/Partners/Significant others	Not at all	Somewhat	Influential	Very Influential	NA
e. Friends	Not at all	Somewhat	Influential	Very Influential	NA
f. Roommates	Not at all	Somewhat	Influential	Very Influential	NA

**Section D: Factors contributing to your decision regarding vaccine**

[Environmental Constraints, Perceived Control, Response Efficacy & Response Costs] **SKIP: for those who decided to NOT get the vaccine**

Instructions: For each item below, please select the answer that best describes your thoughts.

1. Decision about getting or not getting the COVID-19 vaccine would be/was ...

Not Under My Control				Completely Under My Control
1	2	3	4	5

2. Please rate whether each factor listed below would/did make it DIFFICULT or EASY for you to obtain the vaccine.

	Very difficult	Somewhat difficult	Neither	Somewhat easy	Very easy
a. Knowing exactly where to get the vaccine.					
b. Be able to drive somewhere within 30 minutes to get the vaccine.					
c. Having to wait more than a week to get an appointment to get the vaccine.					
d. Having to pay more than \$20 for the vaccine.					
e. Being given time off from school or work without penalty to get the vaccine.					
f. Having a bad experience/had reaction to vaccines in the past.					
g. Obtaining a recommendation to get the vaccine from a health care provider.					
h. Trusting the vaccine is safe.					
i. Not trusting in the US government.					
j. Receiving a free vaccine (no cost to you).					
k. Seeing others get the vaccine and not having any health problems from the vaccine.					
l. Hearing/reading things from others that discourage people from getting the vaccine.					

3. Please specify if you have any other factor(s) (not mentioned above) that would make/made it DIFFICULT for you to get the COVID-19 vaccine.

4. Please specify if you have any other factor(s) (not mentioned above) that would make/made it EASIER for you to get the COVID-19 vaccine.

g. Professors/Academic advisors	Not at all	Somewhat	Influential	Very Influential	NA
h. Your boss	Not at all	Somewhat	Influential	Very Influential	NA

**Section F: Your Opinions**

1. How much do you agree or disagree with the following statements? [Conspiracy Type Thinking]

Rate your level of disagreement/agreement with each statement below.	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
a. The mainstream media has been creating unnecessary fear by constantly talking and writing about COVID-19.	SD	D	Neither	A	SA
b. A COVID-19 vaccine is not needed since almost all people who get the disease recover from it.	SD	D	Neither	A	SA
c. The potential harm of being infected by COVID-19 has been greatly exaggerated.	SD	D	Neither	A	SA
d. In the US, millions more per year die from the flu than from COVID-19.	SD	D	Neither	A	SA
e. The vaccine for COVID-19 is more dangerous than getting the disease itself.	SD	D	Neither	A	SA
f. Pharmaceutical companies who made the vaccines have hidden information from the public that these vaccines cause bad health conditions.	SD	D	Neither	A	SA
g. It really makes no sense for me to get the COVID-19 vaccine since a higher power determines my health outcomes anyway.	SD	D	Neither	A	SA
h. The COVID-19 vaccine is an attempt to take away my personal freedom.	SD	D	Neither	A	SA
i. The government telling everyone to get vaccinated is a method to control the population.	SD	D	Neither	A	SA

**Section G: About You**

1. Where do you get most of your information about COVID-19 topics? (select all that apply below).

- a. Friends
- b. Family
- c. Health care providers
- d. Religious leaders
- e. Social media (eg, Facebook, Instagram, Tik Tok)
- f. YouTube
- g. Television
- h. Government websites (eg, CDC)
- i. Medical related websites (eg, Mayo Clinic)
- j. Peer reviewed research papers in medical/scientific journals (eg, New England Journal of Medicine)
- k. My professors
- l. Other (please specify) \_\_\_\_\_



2. How many times in the past three years did you get the flu vaccine? [Habit]
- Once every year (3 times)
  - 2 times
  - 1 time
  - Did not get the flu vaccine at all in the past 3 years
  - Unsure/ do not remember

3. In the past month, how often did you do each of the following? (Health behavior)

In the past 30 days how often did you ...?	Never	Hardly Ever	Some of the Time	All or Most the Time	Do Not Remember
a. Wear a face covering/mask when in contact with others who live outside your household.					
b. Maintain at least 6ft distance between yourself and those who live outside your household.					
c. Wash your hands thoroughly with soap and water or hand sanitizer after touching objects frequently touched by others.					
d. Avoid indoor spaces where you would be breathing the same air as others who live outside your household.					
e. Avoid close contact with people who tested positive for COVID-19.					
f. Intentionally not go somewhere because of increased risk of COVID-19 infection.					

4. Currently, which political party do you lean more towards?
- Republican
  - Democrat
  - Independent
  - None/No preference
  - Don't know
5. Select the answer below that best describes your current overall health status in each area.

Health Areas	Excellent	Good	Fair	Poor	Very Poor
a. Physical health?					
b. Mental health?					

6. For each of the health areas listed below, have you seen a healthcare provider (in person or using telehealth) in the past 12 months? (Note: A healthcare provider means a physician, physician assistant, nurse practitioner, or a psychiatrist).

Health Areas	Yes	No	Unsure
a. For your physical health needs?			
b. For your mental health needs?			

15. Do you identify as Hispanic or Latino?

- Yes
- No

16. What is your race? (Select all that apply below)

- White
- Black
- Asian
- American Indian or Alaskan Native
- Native Hawaiian/Pacific Islander
- Middle Eastern or North African
- Other/Multiracial (please specify) \_\_\_\_\_

17. Is there anything else that you would like to say about the topic of COVID-19, and COVID-19 vaccines? Any final thoughts?

7. What is your current age (in years)? (dropdown menu)

- Less than 18 24
- 18 25
- 19 26
- 20 27
- 21 28
- 22 29
- 23 30 years old or more

8. What is your rank in college? (Select only one below)

- Freshman
- Sophomore
- Junior
- Senior
- Graduate Student
- Unclassified
- Other (please specify): \_\_\_\_\_

9. Which of the following best describes the college in which your current academic major is housed? (Select only one below)

- College of Arts and Letters
- College of Business
- College of Education
- College of Engineering
- Health and Human Services
- College of Law
- College of Medicine
- College of Music
- Other (please specify): \_\_\_\_\_

10. Which of the following best describes who you are currently living with?

- I live alone (skip to question 13)
- I live with other people

11. In which age categorie(s) are those with whom you live? (Select all that apply to capture everyone)

- 0-12
- 13-18
- 19-40
- 41-65
- 66 years and older

12. Do any of the people that you live with have a medical condition that puts them at risk of having serious health outcomes from a COVID-19 infection?

- Yes
- No
- Unsure

13. Are you an international student at UT?

- Yes
- No

14. What is your gender? (Select only one below)

- Male
- Female
- Other, please specify \_\_\_\_\_

Thank you for completing the survey!