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# For Free or Not for Free: Do College Students Understand the Price of COVID-19 Vaccinations?

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**Abstract**
Institutions of higher education have mandated COVID-19 vaccinations for students wishing to return to an on-campus, in-person learning experience. However, some groups have expressed a hesitancy to be vaccinated, while others are unsure about the vaccine's side effects and/or efficacy. Yet, an under-researched aspect of COVID-19 vaccinations and related communication is whether individuals—in this study, college students—understand that the COVID-19 vaccine is free and whether that understanding varies among groups of people. As a result, this study surveyed 1,183 college students to explore these students' knowledge of vaccine costs and whether differences exist between groups. Data suggests many college students do not know that COVID-19 vaccinations are free: Asian American/Pacific Islander students were most aware of COVID-19 vaccines being free (55.7%), while Black/African American students were least aware (41.4%). Moreover, women were more aware of free COVID-19 vaccines (50.2%) than men (40.1%), first generation college students were more aware (50.9%) than non-first generation college students (42.7%), and students without disabilities (50.7%) were more aware than students with disabilities (26.6%). Implications for health communication, vaccine awareness, and higher education policy are addressed.

*Keywords*: COVID, vaccines, college students, college student health, communication

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# For Free or Not for Free:

# Do College Students Understand the Price of COVID-19 Vaccinations?

The COVID-19 pandemic substantially changed how institutions of higher education delivered curriculum, facilitated student support services, and prepared students for the workforce. Subsequently, many institutions of higher education mandated COVID-19 vaccines for their students, faculty, and staff to return to an in-person and on-campus learning environment for a variety of reasons (Redden, 2021). The pandemic has had a serious impact on institutional budgets, specifically related to students leaving physical campus spaces in March 2020. Even with the start of a new academic year during the fall of 2021, many students and staff still did not return to campus, thus resulting in millions of dollars of lost revenue in the institutional housing, student support services, library, athletics, and other institutional sectors (Burki, 2020; Lederman, 2020; Neitzel, 2020; Nguyen et al., 2021). Moreover, a wealth of research has documented how some college students have struggled to learn in a virtual-only environments without the in-person guidance and support from faculty and staff to help them succeed academically, socio-emotionally, and professionally (Aguilera-Hermida, 2020; Gonzalez-Ramirez et al., 2021; Means & Neisler, 2020). Subsequently, many institutions of higher education have prioritized vaccinations for students, faculty, and staff to render the on-campus environment safer and able to resume normal daily operations.

However, select groups of people, including many belonging to Generation Z or traditional college-going age (ages 18-24) have expressed skepticism and hesitancy to be vaccinated of a concern for their health and the health of others. In late April 2021, a Harris Poll found that 11%

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of Generation Z will not get the vaccine and 31% assert that they will wait an indeterminate amount of time before considering getting a vaccine (Owens, 2021). The same poll found that women, people of color, and those living in rural areas are least likely to get the vaccine, while men, Whites, and those living in urban areas expressed the greatest likelihood of getting the vaccine (Owens, 2021). Yet to date, little is known about how college students may express vaccine hesitancy and what can be done to assuage concerns and encourage vaccination.

Prior research into vaccine hesitancy often contributes to failed vaccination campaigns such as ones for influenza, and thus, and continued spread of preventable infectious diseases (Dubé et al., 2013). The causes behind vaccine hesitancy are multifaceted, with studies explaining that parents of children with disabilities often express high levels of vaccine hesitancy due to their child's health and the anxiety surrounding the potential effects of the vaccine (Salmon et al., 2015). Moreover, many parents are susceptible to the *post hoc ergo propter hoc* logical fallacy, or *after this, therefore because of this* as it relates to vaccines, often falsely believing that a child's illness is due to vaccines, and therefore, all vaccines are inefficacious or unsafe (Salmon et al., 2013). Salmon et al.'s (2013) study outlined several categories of vaccine hesitancy, including the natural versus *manmade hesitancy* (diseases are natural but vaccines are manmade and thus dangerous), the *predictable hesitancy* (disease impacts are known but vaccine impacts may not be known), and the *not dreaded* hesitancy (some diseases are not dreaded but adverse vaccine side effects are dreaded). Many of these *hesitancies* may be experienced by modern college students.

As COVID-19 has presented unprecedented challenges for the global society and countless individual societies, research has emerged focused on COVID-19 vaccine hesitancy. Specific to young people of traditional college-going age, Almaghaslah et al. (2021) found that nearly 50% of

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Saudi Arabian young adults will only take the COVID-19 vaccine if it was required by a government body, citing efficacy and safety concerns as reasons for hesitancy. In the United Kingdom, Robertson et al. (2021) found the highest levels of vaccine hesitancy in young people of color from Black and Pakistani/Bangladeshi backgrounds, low-income people, and people with lower education levels. Similarly in France, Schwarzinger et al. (2021) learned vaccine hesitancy was highest among French young people who identified as women, had lower education levels, and or belonged to the youngest age category (aged 18-24). Studies such as these affirm that differences exist between young people from different groups and that oftentimes the youngest and perhaps most healthy individuals avoid vaccines in the highest numbers, potentially endangering older community members or other at-risk populations (Almaghaslah et al., 2021; Schwarzinger et al., 2021).

What is rarely considered and analyzed by researchers is vaccine cost as it influences vaccine hesitancy. In an era of misinformation, fake news, and politicized reporting, a March 2021 U.S. Census survey found that nearly 90 million U.S. residents were hesitant to take a COVID-19 vaccine and 7 million of those residents expressed hesitancy over cost concerns (United States Census Bureau, 2021). These findings are problematic, as the United States Federal Government and the Centers for Disease Control and Prevention (2021) have informed the U.S. public that the "federal government is providing the vaccine free of charge to all people living in the United States, regardless of their immigration or health insurance status" (Centers for Disease Control and Prevention, 2021, para. 33), and that all COVID-19 vaccination providers cannot "Charge you for the vaccine" or "Charge you any administration fees, copays, or coinsurance" (Centers for Disease

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Control and Prevention, 2021, paras. 35-36). In U.S. contexts, vaccine hesitancy over cost may be misguided, as COVID-19 vaccines will be free for the foreseeable future.

Related to young adults, specifically college students, scant research has explored what college students know about the COVID-19 vaccine and whether college students understand that the COVID-19 vaccine is free (Taylor et al., 2021). It is critical to gauge the knowledge level of college students in this area, as many college students may delay their education, and thus, their improved job prospects and financial standing if they are vaccine-hesitant for an illogical reason. Moreover, countless institutions of higher education will require COVID-19 vaccines to return to in-person on-campus learning, yet college students may not re-engage themselves with their institution if they view a COVID-19 vaccine as unaffordable, stigmatizing low-income students. As a result, this study surveyed 1,183 current college students (enrolled as of March 2021) to answer these questions related to COVID-19 cost and vaccine hesitancy among college students:

1.) Do United States college students understand the COVID-19 vaccine is free?
2.) In what ways are there differences between groups of United States college students in their knowledge of COVID-19 vaccine costs?

Answering these questions will inform both the scientific and educational community regarding how to promote COVID-19 information especially as it relates to cost, as the United States attempts to achieve herd immunity and promote COVID-19 vaccination efforts across the country.

## Methods

Data for this survey were gathered in January 2021 when public availability of COVID-19 vaccines became clearer through official communication from the Centers for Disease Control and

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the World Health Organization (Centers for Disease Control and Prevention, 2021). The research team employed Amazon Mechanical Turk (MTurk) to survey postsecondary students currently enrolled at institutions of higher education. MTurk has been found to be a unique and robust source of human intelligence services, including survey completion in educational contexts (Follmer et al., 2017). Several recent studies in education focused on financial aid jargon (Taylor & Bicak, 2019, 2020) and computer science education (Hellas et al., 2020) have used MTurk to answer research questions that require a large, nationally representative dataset, akin to the study at hand related to postsecondary student attitudes toward COVID-19 vaccinations.

The survey asked for a student's birth year, race (Asian American/Pacific Islander, Black/African American, Latinx/Hispanic, White/Caucasian, or a fill-in-the-blank), gender (woman, man, non-binary conforming), first generation in college status (defined as neither parent earning any level of postsecondary credential), self-reported dis/ability status, educational level (two-year, four-year, or graduate), enrollment status (part- or full-time), and current mode of education (on-campus, online, or hybrid). A geospatial map of the location of survey respondents (n=1,183) can be found in Figure 1 below:

Then, students were asked one question:

1.) How much will the COVID-19 vaccine cost you? (Nothing - the vaccine will be free through insurance or the federal government: $1-99, $100-199, $200+

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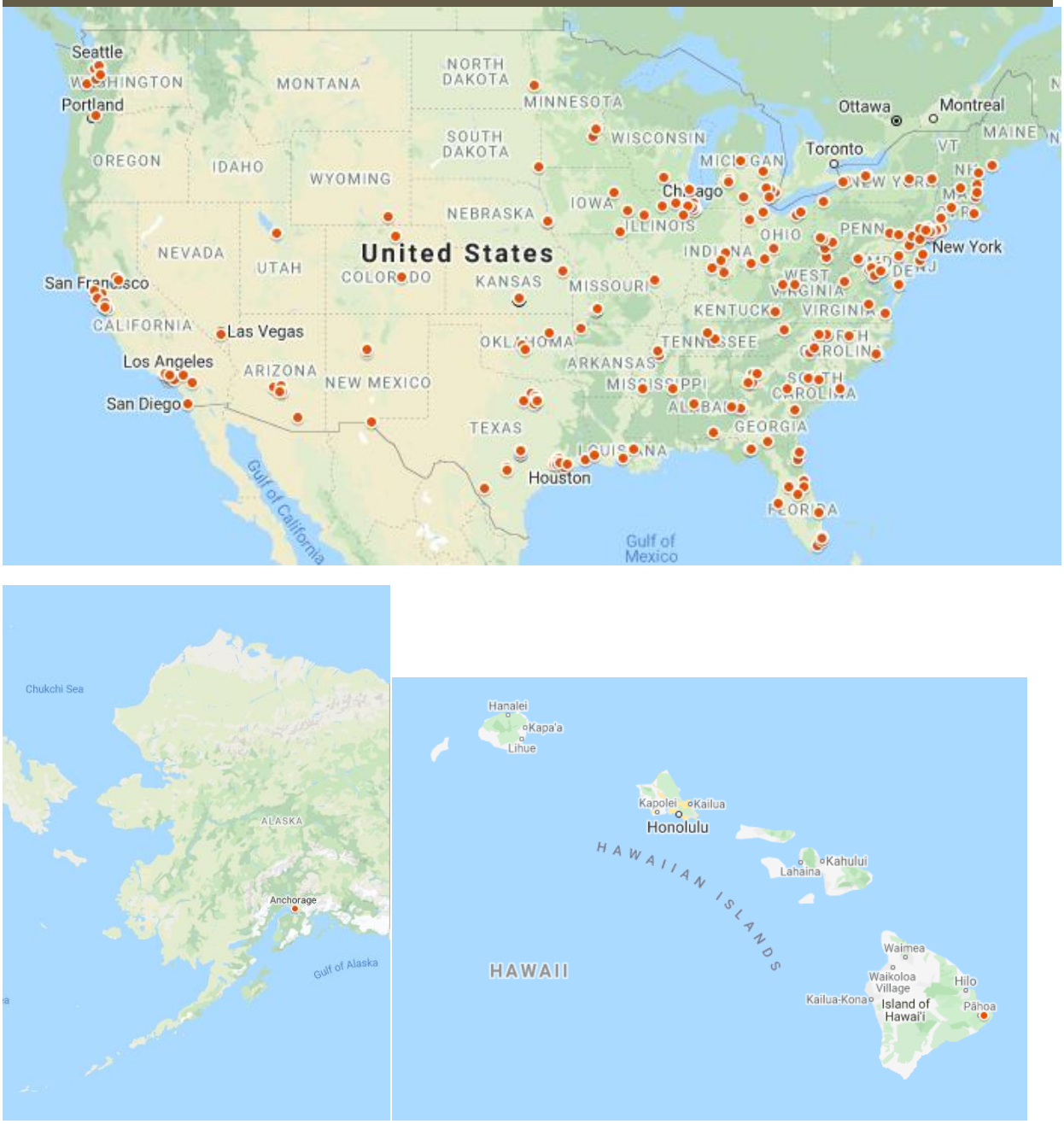


Figure 1. Geospatial map of survey participants (n=1,183)

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## Limitations

As with any survey study, this study is limited primarily by the reliability and validity of the survey data. This study gathered data from MTurk and participants who self-reported their college enrollment status as well as other demographics. Moreover, this study is also limited by its temporal nature, meaning that college student attitudes toward COVID-19 vaccines may drastically change over time as vaccine efficacy is reported and vaccines become safer and more available to the general public. In addition, as institutions of higher education release their reopening plans for full on-campus immersion in the 2021 and 2022 academic years, college student attitudes towards taking a COVID-19 vaccine may also change due to idiosyncratic institutional planning. Yet, the strengths of this study is its sample size (n=1,183), rendering it robust for quantitative analysis and generalizability, while also reporting timely and critical data for institutions of higher education: For these reasons, the research team feels the study's strengths outweigh its limitations.

## Results

Results from our final sample are presented below. When conducting analyses, fourteen observations were dropped from the sample due to lack of completion of at least one survey question. As such, data from n=1,183 students were examined. Table 1 below breaks down the descriptive statistics of our nationwide sample.

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Table 1

*Descriptive statistics of survey sample and responses (n=1,183)*

| **Student Characteristics** | **Count (N)** | **Percentage (%)** |
|---|---|---|
| Race | | |
| White or Caucasian | 700 | 59% |
| Asian American or Pacific Islander | 201 | 17% |
| Black or African American | 174 | 15% |
| Latinx or Hispanic | 108 | 9% |
| Gender | | |
| Man | 549 | 46% |
| Woman | 619 | 52% |
| Non-binary/Not Prefer to Say | 15 | 1% |
| First-generation status | | |
| First-generation students | 806 | 68% |
| Non-first-generation students | 377 | 32% |
| Disability status | | |
| Students with a disability | 237 | 20% |
| Students without a disability | 946 | 80% |
| Enrollment status | | |
| Full-time | 801 | 68% |
| Part-time | 382 | 32% |
| Current instruction mode | | |
| Online | 566 | 48% |
| Online and in-person (hybrid) | 542 | 46% |
| In-person | 75 | 6% |
| Student level | | |
| Four-year undergraduate students | 623 | 53% |
| Two-year undergraduate students | 272 | 23% |
| Graduate students | 288 | 24% |

Notes: Average age of students is 28 years old; We collected data from 1,197 students but dropped 14 students who did not fill out at least one of the survey questions, resulting in 1,183 complete responses.

It should be noted that our sample is relatively representative of the American postsecondary student population given the most recent statistics available from the National

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Center of Education Statistics (NCES). There were more women respondents than men (52% to 46%, respectively), which is a slightly more even distribution than the postsecondary population at large (57.4% to 42.6%; De Brey, Snyder, Zhang, & Dillow, 2021, Table 303.60). Four broad race categories emerged, with the majority of respondents identifying as White or Caucasian (59%), followed by Asian American or Pacific Islander (17%), Black or African American (15%), and Latinx or Hispanic (9%). The corresponding NCES numbers for these groups are 51.6%, 7%, 12.7% and 19.2%, respectively (De Brey et al., 2021, Table 306.50).

Again, our respondents were relatively representative, with oversampling of the first three categories and an under-sampling of Latinx/Hispanic students. The sample did not include any individuals who used the survey's fill-in-the-blank option to identify as American Indian/Alaska Native, two or more races, or nonresident aliens, with these three groups combined representing approximately 9.5% of the nationwide student population (De Brey et al., 2021, Table 306.50).

The majority of students reported being enrolled in a four-year undergraduate program (53%), with 23% enrolled in a two-year undergraduate program, and 24% pursuing a postbaccalaureate credential or degree. Both categories of undergraduate students are slightly undersampled compared to national enrollment of four-year (55.8%) and two-year (28.5%) programs, with graduate students being oversampled (15.6%) (De Brey et al., 2021, Table 303.60). At 68%, over two-thirds of respondents were enrolled full-time in their program, with 32% reporting part-time status; this full-time-heavy distribution is similar to the at-large population that is divided 61% to 39%, respectively (De Brey et al., 2021, Table 303.60). 20% of students self-identified as having a disability, which is in line with the 18.3% disability status found by NCES

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in the 2015-16 academic year, the most recent year for which data is available (De Brey et al., 2021, Table 311.10).

The remaining two demographic features, first-generation status and instruction mode, is not collected at the national level by NCES at this time. It should be noted that the vast majority of our sample—68%—identified as first-generation students. Additionally, as expected due to the COVID-19 pandemic and its subsequent impact on academic instruction, almost all students reported taking their courses either exclusively online (48%) or through an online/in-person hybrid (46%). Only 6% were found to be currently participating in in-person only instruction.

The overwhelming online component of student instruction makes this sample of particular interest when measuring respondents' willingness to adhere to institution-level vaccination requirements, as institutions have required COVID-19 vaccines to return to on-campus learning environments, forcing students to choose between online learning without a vaccine or in-person learning with a vaccine (Redden, 2021).

Summary statistics of college students' knowledge of COVID-19 vaccination costs can be found in Table 2 below. Notes about Table 2: Average age of students is 28 years old; We collected data from 1,197 students and dropped 14 students who did not fill out at least one of the survey questions, resulting in 1,183 complete responses.

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Table 2

*Summary statistics of college student survey responses (n=1,183)*

| **Student Characteristics** | **$1-$99** | **$100-$199** | **$200 +** | **Free** |
|---|---|---|---|---|
| Race | | | | |
| White or Caucasian (n=700) | 25.3% (177) | 26.3% (184) | 5% (35) | 43.4% (304) |
| Asian American or Pacific Islander (n=201) | 16.4% (33) | 22.3% (46) | 5% (10) | 55.7% (112) |
| Black or African American (n=174) | 24.1% (42) | 31% (54) | 3.4% (6) | 41.4% (72) |
| Latinx or Hispanic (n=108) | 30.6% (33) | 22.2% (24) | <0% (1) | 46.3% (50) |
| Gender | | | | |
| Man (n=549) | 31.1% (170) | 25.1% (138) | 4% (22) | 40.1% (220) |
| Woman (n=619) | 18.4% (114) | 26.7% (165) | 4.7% (29) | 50.2% (311) |
| Non-binary/Not Prefer to Say (n=15) | 13.3% (2) | 26.7% (4) | 0% (0) | 60% (9) |
| First-generation status | | | | |
| First-generation students (n=377) | 17.8% (67) | 24.9% (94) | 4.8% (18) | 50.9% (192) |
| Non-first-generation students (n=806) | 27.3% (220) | 26.4% (213) | 4.5% (35) | 42.7% (344) |
| Disability status | | | | |
| Students with a disability (n=237) | 26.6% (63) | 40.1% (95) | 6.8% (16) | 26.6% (63) |
| Students without a disability (n=946) | 23.5% (222) | 22.6% (214) | 3.8% (36) | 50.1% (474) |
| Enrollment status | | | | |
| Full-time (n=801) | 24.6% (197) | 26.3% (211) | 4.5% (36) | 45.3% (363) |
| Part-time (n=382) | 23.6% (90) | 25.7% (98) | 4.5% (17) | 46.3% (177) |
| Current instruction mode | | | | |
| Online (n=566) | 23.9% (135) | 24% (136) | 5.5% (31) | 46.6% (264) |
| Online and in-person (hybrid) (n=542) | 23.8% (129) | 28.6% (155) | 3.1% (17) | 44.5% (241) |
| In-person (n=75) | 30.7% (23) | 21.3% (16) | 5.3% (4) | 42.7% (32) |
| Student level | | | | |
| Two-year undergraduate students (n=272) | 26.8% (73) | 22.1% (60) | 6.9% (19) | 44.1% (120) |
| Four-year undergraduate students (n=623) | 24.6% (153) | 25.7% (160) | 4.1% (26) | 45.6% (284) |
| Graduate students (n=288) | 20.1% (58) | 30.9% (89) | 2.4% (7) | 46.5% (134) |
| Total | 24.1% (287) | 26% (309) | 4.5% (53) | 45.4% (540) |

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Data in Table 2 suggests that 45.4% of college students were aware that the COVID-19 vaccine is free, while the remaining 54.6% believed the COVID-19 vaccine would cost at least $1, with 4.5% of the sample believing that the vaccine would cost $200 or more. There were also differences between groups in terms of race, gender, first-generation in college student status, disability status, enrollment status, instruction mode, and student level.

By race, Asian American or Pacific Islander students were most aware that COVID-19 vaccines are free (55.7%), while only 41.4% of Black of African American students, 43.4% of White or Caucasian students, and 46.3% of Latinx or Hispanic students were aware that COVID-19 vaccines are free. By gender, non-binary conforming individuals were most aware that COVID-19 vaccines are free (60%, n=9), while women were much more likely to be aware that COVID-19 vaccines are free (50.2%) than men (40.1%).

First-generation in college students were more likely to be aware that COVID-19 vaccines are free (50.9%) than peers (42.7%), while students with disabilities were least aware of COVID-19 vaccines being free (26.6%) than any other group in the sample. Moreover, 6.8% of students with disabilities believed that COVID-19 vaccines would cost $200 or more, the highest percentage of any other group in the sample. This is especially problematic, as students with disabilities may both be a higher-risk population than peers without disabilities and may have more to gain from taking a vaccine and re-integrating with peers in an on-campus learning environment (Burgess et al., 2021; Kennedy et al., 2011).

Finally, smaller differences were present among students by enrollment status, instruction mode, and level. Full-time students (12 credits or more per semester) were slightly less aware of COVID-19 vaccines being free than their part-time (11 credits or fewer) peers (45.3% versus

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46.3%), while students currently learning in-person were slightly less aware of COVID-19 vaccines being free (42.7%) compared to students learning in hybrid settings (44.5%) and fully online settings (46.6%). Levels of vaccine cost awareness were also similar by student level, as graduate students were most aware of COVID-19 vaccines being free (46.5%) compared to students attending four-year institutions (45.6%) or students attending two-year institutions or community colleges (44.1%).

**Discussion, Implications for Policy and Practice, and Conclusion**

The U.S. Census Bureau's March 2021 findings that revealed millions of U.S. residents believed they would have to pay—either out of pocket or through insurance—for a COVID-19 vaccine, contributing to vaccine hesitancy of these individuals (United States Census Bureau, 2021). Similarly, this study revealed that many college students--potentially half--may believe that the COVID-19 vaccine is not free, and therefore, may be unaffordable. Across the entire sample of 1,183 college student responses, only 45.4% were aware that COVID-19 vaccines are free. As reviewed in the introduction of this study, there are many different types of vaccine hesitancy which can contribute to the delay of disease containment and the eventual achievement of herd immunity (Salmon et al., 2015). Given the U.S. Census Bureau's national study and the college student study at hand, both COVID-19 providers and institutions of higher education must provide clear health communication to both current and prospective students about the costs of the COVID-19 vaccine.

A wealth of pre-COVID-19 research has found that organizations--especially ones with national reach, such as the U.S. federal government--needs to provide accurate, updated information regarding vaccine efforts, even if that information has already been shared with the

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general public (Eskola et al., 2015). In summer of 2020, the Centers for Disease Control and Prevention (CDC), in partnership with the U.S. federal government, announced that COVID-19 vaccines would be covered by emergency funds and that U.S. residents, regardless of immigration status, could get a COVID-19 vaccine for free (Centers for Disease Control and Prevention, 2021). However, that message may not be shared as frequently or broadly after one year into the pandemic, as people may have received false information regarding vaccine costs after the CDC made its announcement (Sauer et al., 2021). As a result, individuals may have forgotten that COVID-19 vaccines are free for U.S. residents, or these individuals may have developed vaccine hesitancy due to misinformation surrounding vaccine cost.

This vaccine hesitancy due to cost may prove detrimental to both college students as well as institutions of higher education. In this study, differences did exist between student groups, with students with disabilities—perhaps the student population most at-risk for adverse COVID-19 effects and vaccine effects—being least aware that COVID-19 vaccines are free for U.S residents. In these cases, students with disabilities may already have some level of Salmon et al.'s (2013) *manmade hesitancy*, and in addition, these students may incorrectly perceive COVID-19 vaccines as unaffordable. The same can be argued for low-income students and especially those from first-generation in college student backgrounds and communities of color, as these groups may already feel minoritized by institutions of higher education, and thus, be averse to taking a vaccine to return to a physical campus. From here, both government organizations and institutions of higher education must communicate with minoritized populations, especially students with disabilities, low-income students, and students of color, to communicate vaccine costs and guide these students toward credible scientific sources of knowledge regarding COVID-19 and any vaccine side effects.

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Partnering with community organizations and local agencies could help facilitate vaccination efforts within higher education institutions.

The fundamental idea of raising knowledge and awareness through the sharing of credible medical sources has been key to lowering vaccine hesitancy for years (Jarrett et al., 2015). However, this information must be shared on a continual basis and reach the largest distribution channels available, such as public addresses by government officials, prominent placement on the websites for the CDC and U.S. federal government, and through multiple modes of digital (text messaging, email, social media) and physical communication (word of mouth from health-care workers) (Jarrett et al., 2015). Focused on higher education, institutions of higher education must also communicate this information, as many of these institutions served as mass vaccination sites in large, urban areas during the first months of the COVID-19 vaccination campaign in the United States (Redden, 2018). Yet, after reviewing the communication from several institutions of higher education, all authors of this study did not have vaccine cost communicated to them through institutional channels. In fact, one member of the research team was asked to bring their health insurance card, even though the CDC informed the public that vaccine providers cannot require health insurance for COVID-19 vaccines, as they are free regardless of insurance status.

Additionally, after reviewing the CDC's 2021 announcement that COVID-19 vaccines would be free, the CDC's "Key Things to Know" about the COVID-19 vaccine website, there is no mention of vaccine cost or the vaccine being free in the list of "Key Things to Know" (Centers for Disease Control and Prevention, 2021, para. 1). In fact, the CDC only mentioned that "COVID-19 vaccines are more widely accessible" (para. 5) without any other mention of cost in the main menu. Not until the 33rd paragraph of the website does the CDC mention "Cost of Vaccines" (para.

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31) and that "federal government is providing the vaccine free of charge to all people living in the United States, regardless of their immigration or health insurance status" (Centers for Disease Control and Prevention, 2021, para. 33). Here, organizations like the CDC and institutions of higher education should consider prioritizing the free nature of the vaccine to promote information awareness and lower vaccine hesitancy among at-risk and minoritized student populations.

Moreover, health communications surrounding COVID-19 vaccines could consider excluding information related to health insurance or vaccine requirements, as asking individuals to bring a health insurance card may erroneously signal that the COVID-19 vaccine is not free and that insurance is required, when it is not. As a result, the messages from government, healthcare, and educational institutions could simplify COVID-19 vaccine messaging to:

1.) COVID-19 vaccines are safe,

2.) COVID-19 vaccines are effective, and

3.) COVID-19 vaccines are free.

Simplifying this message may assuage cost-related vaccine hesitancy among many groups of U.S. residents and college students, particularly those from low-income backgrounds, communities of color, and students with disabilities. If institutions of higher education seek to re-open their doors safely via COVID-19 vaccine requirements, vaccine messaging should be simple, emphasize the free nature of the vaccine, and be communicated regularly through multiple communication channels to reach students on every platform possible. One current development is the on-campus vaccine site, which may make vaccine information more readily available to hesitant United States college students (The University of Texas at Austin, 2021)

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Granted, college students may experience any one of Salmon et al.'s (2015) vaccine hesitancies, but COVID-19 vaccine hesitancy related to cost can be immediately mitigated through clear, consistent communication to relevant stakeholders. In addition, institutions of higher education simply cannot assume their students understand COVID-19 policies from their federal government, evidenced by the high percentages of college students being unaware that the COVID-19 vaccine is free. Ultimately, for college students to remain on their path to graduation and for institutions of higher education to remain fiscally healthy, COVID-19 vaccine policies and practices must be communicated clearly and consistently, otherwise cost related vaccine hesitancy may come at the cost of U.S. society's public health and the education of its populace.

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