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## COVID-19 Isolation Compliance among Students and Employees of a Large Public University

Nicolette Harmon

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COVID-19 ISOLATION COMPLIANCE AMONG STUDENTS AND EMPLOYEES OF A  
LARGE PUBLIC UNIVERSITY

By

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A thesis submitted in partial fulfillment  
of the requirements for the

Master of Public Health

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## Abstract

Isolation has been used to prevent the spread of many infectious diseases including COVID-19. The CDC's isolation recommendations have changed over the course of the COVID-19 pandemic, currently infected individuals must stay at home for 5 full days. The CDC cites low compliance rates as one of the reasons for the recent reduction to the number of days in isolation. However, the CDC could only cite studies from other countries due to the lack of studies on isolation compliance in the United States. This study aimed to determine what percentage of UNLV students and staff complied with the isolation guidelines at the time of their first positive COVID-19 lab result, if the percentage of people who complied with the isolation guidelines changed after the CDC updated their recommendations for self-isolation to 5 days, and what reasons prevented UNLV students and staff from complying with the isolation guidelines. An online survey was sent out via email to anyone who reported a positive COVID-19 test result through the UNLV voluntary report form. Any individual who was at least 18 years of age and had a current or previous affiliation with UNLV, either as a student or employee, was eligible to participate in this study. The results of this study will expand on what is known about isolation compliance and will be among the first studies conducted on adults who reside in the United States. Among the 239 subjects who participated in this research, 92.5% reported isolating the full length of time. UNLV employees were more likely to comply with the isolation guidelines than individuals not employed by the university ( $p = 0.001$ ). The top reasons given for non-compliance were having mild symptoms, or none at all, and having a housing situation that required individuals to be in close contact with others. The results of this study show a high rate of compliance to the COVID-19 isolation guidelines by a population of adults in the United States.

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## **Chapter 1: Introduction**

Coronavirus disease 2019 (COVID-19), the disease caused by SARS-CoV-2, emerged out of Wuhan, China at the end of 2019 (Velavan & Meyer, 2020). COVID-19 primarily spreads through respiratory droplets and causes cold and flu-like symptoms (CDC, 2021). In order to slow the spread of disease, the Centers for Disease Control and Prevention (CDC) recommends individuals infected with COVID-19 isolate themselves away from others until they are no longer infectious (CDC, 2022a).

Isolation is used to separate individuals who have contracted an infectious disease from the rest of the population in order to prevent the spread of disease. Isolation is a proven method of disease prevention and is frequently used for infectious diseases such as tuberculosis, diarrheal diseases, and SARS (Reynolds et al., 2007). The amount of time an infected individual is required to isolate is dependent on the incubation and infectious periods of the disease they contracted. Individuals diagnosed with COVID-19 are required to isolate for 5 full days and individuals with severe symptoms may be required to isolate for up to 20 days until symptoms have resolved (CDC, 2022a).

In January 2022, the CDC reduced their recommendation for isolation from 10 days to 5 days citing low isolation compliance, a decrease in well-being, and societal infrastructure as reasons for the change (CDC, 2022b). The CDC cites two studies from the UK that estimated the isolation compliance rates, for infected individuals, to be around 20-25% (Smith et al., 2020; Smith et al., 2021). However, there is limited data available for isolation compliance rates among the United States (US) population. US college campuses have experienced high rates of COVID-19 due to shared living spaces, in-person classes, and other campus activities (Lu et al., 2021). A previous study found that college students, from the UK, were more likely to comply with

isolation guidelines if they experienced symptomatic COVID-19 (Blake et al., 2021). It is unclear whether individuals affiliated with US college campuses complied with isolation guidelines.

The University of Nevada, Las Vegas (UNLV) is a large public university with over 30,000 students and over 4,000 employees (UNLV, 2022a). UNLV students, faculty, and staff have been encouraged to voluntarily report a positive COVID-19 test result in order to help slow the spread of disease (UNLV, 2022b). Over 1,500 out of the 550,000 COVID-19 cases reported in Southern Nevada have been associated with UNLV (SNHD, 2022; UNLV, 2022b). While members of the UNLV community are advised to isolate at home after receiving a positive COVID-19 test result, it is unclear how many people complied with the isolation guidelines put forth by the CDC.

The objectives of this study are to determine if UNLV students and staff complied with isolation guidelines, if the compliance rate changed after the CDC reduced their recommended isolation time period from 10 days to 5 days, and if they were unable to isolate, what reasons or obstacles affected their ability to adhere to public health requirements. This study will also determine if there were any differences in compliance based on gender, age, race, and ethnicity. Collecting information on isolation compliance will help inform university-related policies for COVID-19 and any future public health emergencies.



## **Chapter 2: Background and Significance**

While there is limited data available for COVID-19-related isolation in the United States, compliance to public health guidelines has been studied previously for outbreaks of mumps on college campuses (Soud et al., 2008; Bharti et al., 2021). Soud et al. (2008) conducted a study on isolation compliance during a mumps outbreak at a Kansas university in 2006. Of the 27,000 students enrolled at the university, 132 were advised to remain isolated from others. The study authors found that 75% of students were compliant in isolating the full number of days recommended. The compliance rate among students asked to isolate 1-4 days was 86%. However, the compliance rate dropped to 66% for students asked to isolate 5-9 days (Soud et al., 2008).

In 2017, there was an outbreak of mumps at Penn State University. The study authors found that 81 of 84 cases were fully compliant with the university's test, trace, and isolate efforts. The 3 non-compliant cases refused to provide any information on close contacts they may have had while infectious. However, only 50% of the contact information provided by cases was deemed usable by disease investigators. The main reasons cited for non-compliance were students not wanting to admit they, or their contacts, were at a social event that was prohibited by the university. Students who attended prohibited events were subject to disciplinary action by Penn State University (Bharti et al., 2021).

Most of the research on COVID-19 related isolation compliance was conducted in the spring of 2020. A study by Smith et al. (2020) found that 75.1% of individuals, who either had symptoms or lived with someone who was symptomatic, reported leaving the house within the first 24 hours after the onset of illness. However, a study of Iranian adults, who were recently hospitalized with COVID-19, reported 89.4% of study participants fully complied with isolation

guidelines (Foroozanfar et al., 2020). High compliance rates (81%) were also observed among homeless individuals who were housed in a hotel in San Francisco, CA for the duration of their COVID-19 isolation (Fuchs et al., 2021).

Studies by Steens et al. (2020) and Smith et al. (2021) examined compliance to COVID-19 isolation guidelines over time and published conflicting results. Steens et al. (2020) conducted their study on Norwegian adults (18 or older) from April 2020 to July 2020. 25% of study participants received at least one request to isolate, from which only 36% reported adhering to the request. The percentage of individuals who complied with isolation requirements declined over time from 66% in April 2020 to 33-38% from May to July of 2020. However, it is unclear the length of time compliant study participants remained in isolation since the study authors defined compliance as at least one full day in isolation (Steens et al., 2020).

Smith et al. (2021) examined isolation compliance in adults from the UK and found an improvement in compliance rates over time from April 2020 through January 2021. The compliance rate from April - October 2020 was 20.2% and increased to 42.5% from October 2020 - January 2021. During the last week of January 2021, the number of study participants reporting compliance to isolation increased to 51.8%. Study participants were considered compliant if they adhered to a full 10 days of isolation (Smith et al., 2021).

Previous studies have found gender differences in adhering to the COVID-19 isolation guidelines. Several studies noted women were more likely to agree with and follow isolation guidelines (Coroiu et al., 2020; Lou et al., 2020; Smith et al., 2020; Smith et al., 2021; Losalzo & Giannini, 2022). However, Foroozanfar et al. (2020) and Fuchs et al. (2021) found men to be more compliant with isolation guidelines than women.

Age-related differences in compliance were also noted in several studies. Many studies found younger adults (18-24 years of age) to be the least likely to comply with isolation guidelines (Coroiu et al., 2020; Fuchs et al., 2021; Smith et al., 2021). However, Steens et al. (2020) found younger adults to have consistently higher rates of compliance from April 2020 until January 2021.

There are several reasons for non-compliance to COVID-19 isolation guidelines noted in the published literature. Individuals reported being less likely to isolate if they did not agree with public health guidelines, had mild or no symptoms, were caring for a family member, had an inadequate financial support system, and had the belief that isolation would worsen their mental health (Foroozanfar et al., 2020; Smith et al., 2020; Steens et al., 2020; Patel et al., 2021). However, Blake et al. (2021) noted that university students in the UK were more likely to adhere to isolation guidelines if they were concerned about asymptotically spreading COVID-19 to older adults.

This study will provide data on compliance to isolation guidelines among US adults. This will also determine what barriers prevented non-compliant individuals from following these guidelines. The public health response to COVID-19 varied with each country. Therefore, it is important to understand the overall compliance rate to isolation guidelines among US adults in order to inform future policy. Additionally, there is conflicting information in the published literature in regard to compliance by gender and age groups. Therefore, this study will include both students and employees of UNLV in order to provide data on compliance by age in addition to gender. Finally, this study will assess adherence to COVID-19 isolation guidelines from 2020 to the present. To the best of our knowledge, there is no data for isolation compliance past January of 2021 (Smith et al., 2021).

## **Chapter 3: Methods**

### **Research Questions**

- 1) What percentage of UNLV students, faculty, and staff isolated after receiving their first positive lab result for COVID-19?
- 2) Did the rates of compliance change after the CDC reduced the isolation guidelines from 10 days to 5 days?
- 3) If UNLV students, faculty, and staff were unable to isolate, what factors affected their ability to adhere to public health requirements?
- 4) Are younger adults (18-24 years of age) and males less likely to adhere to the COVID-19 isolation guidelines than older adults and females?

### **Hypotheses**

- 1) There will be a higher rate of compliance among individuals who received their first positive COVID-19 test result after the CDC changed the isolation guidelines compared to individuals who tested positive before the change.
- 2) Younger adults aged 18-24 and males will have significantly higher rates of non-compliance to the COVID-19 isolation guidelines compared to older adults and females.

### **Research Design**

This study was a brief, cross-sectional online survey administered via Qualtrics XM. A link to the survey (see Appendix B) was sent out via email to university students, faculty, and staff who reported a positive COVID-19 test result through the UNLV voluntary report form. The survey remained open for two weeks from September 26-October 10, 2022. An email reminder to complete the survey was sent out on October 3, 2022, one week after the survey was initially distributed. The inclusion criteria for this study were as follows: 1) participants must be

18 years of age or older, 2) had a current or previous affiliation with the University of Nevada, Las Vegas, and 3) answered “yes” to having received a positive COVID-19 test result.

A list of eligible study participants was generated by the UNLV Contact Tracing Team. The university’s contact tracing team contacts anyone who reports a positive COVID-19 test result through the UNLV voluntary report form in order to determine if they were on campus while infectious and to give them the recommended isolation guidelines. The Contact Tracing Team uses a password protected Google spreadsheet to store the personal information of any individual who fills out the report form, which is also password protected. A link to the survey was sent out to participants via email by the UNLV Contact Tracing Team on behalf of the study’s researchers. Three identical surveys were created for data collection: one for students, one for faculty, and one for staff. Separate surveys were created in order to ensure appropriate categorization of individuals by their affiliation with UNLV. Researchers gave the UNLV Contact Tracing Team links to each of the surveys to send out to the corresponding group via email. There were 1,043 students, 155 faculty, and 279 staff eligible for participation in this study. Several emails were returned to the contact tracing team due to invalid email addresses. Emails were returned due to data entry errors by the individuals filling out the report form or because they were former employees of the university who listed their UNLV email address as their primary address. The survey was distributed to 1,032 students, 155 faculty, and 262 staff.

Upon clicking the survey link from the email, participants were directed to the introduction block of the survey which contained an information sheet for this study (see Appendix A). The information sheet gave participants a brief description of the study and information about the risks involved with participating in this research. Participants were also informed their responses would be anonymous since no identifiable information was collected

for this study. Potential participants were able to choose to participate by clicking the “next” arrow.

The survey consisted of 11 questions designed to ask study participants about their experiences after testing positive for COVID-19. A response was required for every question in the survey. The first question asked participants if they had ever tested positive for COVID-19. Any respondents who answered “no” to this question were directed to the end of the survey. The next three questions of the survey asked participants for their age, gender, and race/ethnicity. The age and gender questions were open text fields. The race/ethnicity question was multiple choice with the following answer options: American Indian/Alaskan Native (Non-Hispanic), Asian or Pacific Islander (Non-Hispanic), Black or African American (Non-Hispanic), Hispanic or Latino/a (any race), White (Non-Hispanic), and other.

The remainder of the survey asked participants questions about the first time they received a positive test result for COVID-19. While some participants may have received multiple test results, this study focused only on the first positive result. Participants were asked whether or not they had symptomatic COVID-19 at the time they received their first positive COVID-19 test result. Respondents were also asked to provide the month and year of their first positive COVID-19 test result. This information was used in order to determine if their first infection occurred before or after the CDC reduced the isolation guidelines to 5 days. Participants were asked if they were enrolled in any UNLV courses or employed at the university at the time of their first positive COVID-19 test. Information on affiliation with the university was collected in order to determine if there were any differences in isolation compliance among students, faculty, and staff.

Respondents were then asked if they isolated after receiving the positive test result. This question had three answer choices: “Yes, I isolated for the full length of time”, “I isolated for some of the time”, and “No, I did not isolate at all”. If a respondent did not select “Yes, I isolated for the full length of time”, they were asked which factors affected their ability to isolate. There were 16 possible factors to choose from and participants were able to check all of the responses that applied to them.

Participants who selected “No, I did not isolate at all” were directed to the end of the survey after answering what factors affected their ability to isolate. Anyone who reported isolating for at least some of the time were shown the final question of the survey. The final question asked participants how many days they isolated after becoming sick or receiving their first positive COVID-19 test if they did not become sick. A text field was provided for respondents to enter a numerical value from 0 to 30. This question was included to determine if participants actually complied with the guidelines at the time of their first positive test result. After all participants answered their final question, they were able to review all of their responses before clicking the “next” arrow to submit the survey. Responses were not recorded for anyone who did not complete the entire survey.

This study was determined to be exempt by the UNLV Institutional Review Board. Participants were informed via email that the UNLV Contact Tracing Team was only sending the survey out and had no access to the responses. The researchers were the only ones with access to the data for this study. The “anonymize responses” setting in Qualtrics XM was enabled to prevent the website from collecting IP addresses, which could lead to the identification of participants. The survey was conducted on Qualtrics XM, which is a password protected website. The data from Qualtrics was imported into a password protected Google sheet for data analysis.

## **Analytical Methods**

### ***Data Preparation***

The predictor variables were measured as categorical variables and coded for data analysis. Age was collected as a continuous variable and categorized into 5 groups: 1 = 18-24 years old, 2 = 25-34 years old, 3 = 35-44 years old, 4 = 45-54 years old, and 5 = 55 years or older. Gender was categorized into 3 groups: 1 = male, 2 = female, and 3 = other. Respondents who wrote their gender as male or the letter “m” were categorized as male. Respondents who wrote their gender as female, the letter “f”, or woman were categorized as female. The five responses that did not fit either of these categories were categorized as other.

Race/ethnicity was categorized into 6 groups: 1 = American Indian/Alaskan Native, 2 = Asian or Pacific Islander, 3 = Black/African American, 4 = Hispanic or Latino/a, 5 = White, and 6 = other. Affiliation with UNLV was categorized into 3 groups: 1 = student, 2 = faculty, and 3 = staff. Symptoms, enrolled in classes, and employment at UNLV were dichotomized into 1 = yes and 0 = no for each variable.

Survey respondents were split into two groups based on the month and day of their first positive test result: 0 = before January 2022 and 1 = January 2022 or later. Responses were split into 2 groups to assess whether there was a difference in compliance rate before and after the isolation guidelines changed from 10 days to 5 days. Six responses were excluded from analysis of test dates due to providing an incomplete or invalid entry. Examples of incomplete and invalid entries include only entering a month for positive test result date or providing a date that was before the start of the COVID-19 pandemic.

The number of days participants reported isolating was collected and analyzed as a continuous variable. Responses to whether or not participants isolated were categorized into 3



groups: 1 = Yes, I isolated for the full length of time, 2 = I isolated for some of the time, and 3 = No, I did not isolate at all. The reasons participants could select for not complying to the isolation guidelines were separated into 16 dichotomous variables with 0 = no and 1 = yes as the answer choices for each variable.

The outcome variable for this study was whether or not participants complied with the isolation guidelines at the time of their first COVID-19 test result. Compliance was determined based on participants' answers to question #9 on the survey. Any respondent who selected "Yes, I isolated for the full length of time" was designated as compliant, while participants who selected the other two answer choices were designated as noncompliant. Compliance was dichotomized as 0 = non-compliant and 1 = compliant. The initial data analysis plan for determining compliance was to compare the number of days spent in isolation to the test date in order to see if participants complied with the guidelines at the time of their first COVID-19 test result. However, the inconsistencies in subject responses noted previously would have led to a reduction in the number of responses included data analysis. Therefore, it was more feasible to use participants' self-reported compliance as the outcome variable.

### ***Statistical Analysis***

Mean, standard deviation, frequencies, and percentages were used to measure the descriptive statistics of the study population. The exact binomial 95% upper and lower confidence interval was calculated for the overall isolation compliance rate. For univariate analysis, race and gender categories were condensed to account for small samples sizes. Race was condensed into 5 categories: 2 = Asian or Pacific Islander (non-Hispanic), 3 = Black/African American (non-Hispanic), 4 = Hispanic (all races), 5 = White (non-Hispanic), and 6 = American Indian/Alaskan Native (non-Hispanic) or other. Gender was dichotomized into 1 = male and 2 =

female. The 5 respondents who identified as other were excluded from univariate analysis of gender.

The Chi Square Test of Independence was used to determine if there was an association between the predictor variables on the dichotomous outcome of compliance. The age categorical variable was condensed into 1 = 18-24 years of age and 2 = 25 years or older for this test to increase the frequencies in each cell. Fisher's Exact Test was used to determine the exact 2-sided p-value for all predictor variables except race/ethnicity. The Likelihood Ratio approximate p-value was used for race/ethnicity due to the contingency table being larger than 2x2. The bootstrapping method was used for the race/ethnicity compliance table due to small numbers reported in some of the cells. Cramer's V was reported for each Chi Square test. The Mann-Whitney U Test and Kruskal-Wallis Test were used to determine if there was any association between the number of days spent in isolation and age, gender, and race/ethnicity. The statistical software SPSS version 28.0 was used for data analysis.

## Chapter 4: Results

240 total responses were recorded for this study in the 2 weeks the survey was open. The overall response rate for this study was 16.5%. The response rate among students was 10.1%, 30.3% among faculty, and 31.1% among staff. One response was excluded due to the respondent reporting they had never received a positive COVID-19 test result. The demographic characteristics of the 239 eligible participants in the study population are shown in Table 1. Sixty-nine (28.9%) study participants reported being between the ages of 18-24, 55 (23.0%) were 25-34 years of age, 45 (18.8%) were 35-44 years of age, 38 (15.9%) were 45-54 years of age, and 32 (13.4%) respondents were 55 years of age or older. The majority of participants were female (67.4%), followed by male (30.5%), and 2.1% provided other responses for gender identity. Respondents were predominantly White (49.8%), followed by Hispanic (18.0%), Asian or Pacific Islander (17.2%), Black/African American (10.5%), other (3.3%), and American Indian/Alaskan Native (1.3%). The study population was made up of 105 students (43.9%), 47 faculty (19.7%), and 87 staff (36.4%). 100 (41.8%) study participants reported being enrolled in courses at UNLV at the time of their first positive COVID-19 test result. 155 (64.9%) study participants were employed at UNLV at the time of their first COVID-19 test result.

Table 1. Descriptive Characteristics of Study Population

<b>Demographics</b>	<b>Study Population (N = 239)</b>
<b>Age</b>	
18-24 years	69 (28.9)
25-34 years	55 (23.0)
35-44 years	45 (18.8)
45-54 years	38 (15.9)
55 years or older	32 (13.4)
<b>Gender</b>	
Male	73 (30.5)
Female	161 (67.4)
Other	5 (2.1)
<b>Race</b>	
American Indian/Alaskan Native, Non-Hispanic	3 (1.3)
Asian or Pacific Islander, Non-Hispanic	41 (17.2)
Black/African American, Non-Hispanic	25 (10.5)
Hispanic or Latino/a, Any Race	43 (18.0)
White, Non-Hispanic	119 (49.8)
Other	8 (3.3)
<b>Affiliation with University</b>	
Student	105 (43.9)
Faculty	47 (19.7)
Staff	87 (36.4)
<b>Enrolled in Classes</b>	
Yes	100 (41.8)
No	139 (58.2)
<b>Employed at University</b>	
Yes	155 (64.9)
No	84 (35.1)

All data are displayed as n (%). One response was excluded from analysis due to not meeting the inclusion criteria for this study.

Table 2 shows the descriptive characteristics of illness and adherence to the isolation guidelines at the time participants received their first positive COVID-19 test result. 90.8% of respondents reported having symptoms compared to only 9.2% who indicated they were not experiencing symptoms at the time of their first positive COVID-19 test result. 221 (92.5%) respondents indicated they isolated for the full length of time, 17 (7.1%) isolated for some of the

time, and only 1 (0.4%) participant did not isolate at all. The exact binomial confidence interval for overall compliance was 92.5% (88.36-95.48%). 49 (20.5%) participants indicated their first positive COVID-19 test result occurred before January of 2022 compared to 184 (77.0%) having a test date of January 2022 or later. The mean number of days the study population reported isolating was  $8.97 \pm 4.52$  days.

Table 2. Descriptive Characteristics of Illness and Adherence to Isolation Guidelines at Time of Receiving First Positive COVID-19 Test Result

<b>Variables</b>	<b>Study Population (N = 239)</b>
<b>Symptomatic</b>	
Yes	217 (90.8)
No	22 (9.2)
<b>Complied with Isolation Guidelines?</b>	
Yes, for the full length of time	221 (92.5)
Some of the time	17 (7.1)
No, not at all	1 (0.4)
<b>Date of First Positive Test Result</b>	
Before January 2022	49 (20.5)
January 2022 or later	184 (77.0)
<b>Number of Days in Isolation</b>	$8.97 \pm 4.522$

All data are displayed as mean  $\pm$  standard deviation or n (%). 6 subject responses were excluded from analysis of test date due to incomplete information entered for month and year of first positive COVID-19 test result.

The 18 respondents who reported not isolating for the full length of time, after receiving their first positive COVID-19 test result, were asked to select all of the reasons they were unable to isolate from a list of 16 answer choices. Table 3 shows a breakdown of which responses were selected by participants. “My housing situation required me to be in close contact with other people” and “I received test results too late to matter” were the most frequently selected reasons with 8 (44.4%) respondents selecting each option. Five (12.2%) respondents indicated they did

not isolate the full length of time due to having mild symptoms or none at all. Four (9.8%) respondents said they did not think it was important to isolate or they ran out of food or other supplies during their isolation. Three (7.3%) respondents selected each of the following answer choices: “university policies and class accommodations prevented me from isolating”, “I had nowhere to self-isolate”, and “I had to get food or other supplies during my isolation”. Two (4.9%) respondents reported primary caregiver responsibilities prevented them from isolating the full length of time. Finally, one respondent said their employer (not UNLV) required them to work while they had COVID-19. Six answer choices were not selected by any of the study participants.

Table 3. Frequency of Reasons Given for Being Unable to Isolate for the Full Length of Time

<b>Factors Affecting Ability to Isolate</b>	<b>Reasons Selected for Not Isolating (% of respondents)</b>
University policies and class accommodations prevented me from isolating	3 (16.7)
University housing requirements/accommodations prevented me from isolating	0 (0)
My housing situation required me to be in close contact with other people	8 (44.4)
I had nowhere to self-isolate	3 (16.7)
I had primary caregiver responsibilities	2 (11.1)
I had to attend a public event	0 (0)
I did not think it was important to isolate	4 (22.2)
The isolation requirements were unclear to me	0 (0)
I did not agree with the isolation guidance provided by SNHD	0 (0)
It was too stressful being isolated from family/friends	0 (0)
I had mild symptoms or none at all	5 (27.8)
My employer (not UNLV) required me to work	1 (5.6)
I had to get food or other supplies before I could start my isolation	3 (16.7)
I ran out of food or other supplies during my isolation	4 (22.2)
I received test results too late to matter	8 (44.4)
None of these factors	0 (0)

All data are displayed as n (%).

A multi-response crosstabulation test was conducted to determine the descriptive characteristics of the 18 individuals who reported not isolating for the full length of time after

receiving their first positive COVID-19 test result (Table 4). Of the 18 respondents, 16 were female and 2 were male. 12 students, 1 faculty member, and 5 staff reported they did not isolate for the full length of time. Half of the respondents indicated they were adults between the ages of 18-24, followed by adults 25-34 years of age (5), adults 35-44 years of age (3), and adults 45-54 years of age (1). All of the adults who reported their age as 55 or older isolated for the full length of time. A third of respondents who did not isolate for the full length of time were White (6), followed by Hispanic (5), Black/African American (4), Asian or Pacific Islander (2), and American Indian/Alaskan Native or other (1).

Table 4. Frequency Statistics of the 18 Individuals Who Reported Not Isolating for the Full Length of Time

<b>Demographics</b>	<b>Count</b>
<b>Affiliation</b>	
Student	12
Faculty	1
Staff	5
<b>Gender</b>	
Male	2
Female	16
<b>Age</b>	
18-24 years	9
25-34 years	5
35-44 years	3
45-54 years	1
<b>Race/Ethnicity</b>	
Asian or Pacific Islander, Non-Hispanic	2
Black/African American, Non-Hispanic	4
Hispanic or Latino/a, Any Race	5
White, Non-Hispanic	6
American Indian/Alaskan Native or other	1

Univariate analysis was performed to determine if there was an association between each of the predictor variables on isolation compliance (Table 5). There was an association between being a UNLV employee and complying with the isolation guidelines ( $p = 0.001$ ). UNLV employees were more likely to comply with the isolation guidelines than individuals not employed by the university. Gender ( $p = 0.065$ ), age ( $p = 0.056$ ), race ( $p = 0.275$ ), having symptoms ( $p = 0.222$ ), test date ( $p = 0.339$ ), and being enrolled in UNLV class ( $p = 0.164$ ) had



no association with complying to the isolation guidelines. The Kruskal-Wallis Test determined there was no difference between the 5 age categories and the number of days spent in isolation ( $p = 0.936$ ). Finally, the Mann-Whitney U Test determined no difference between males and females in the number of days they spent in isolation ( $p = 0.828$ ).

Table 5. Chi Squared Analysis of the Association Between the Predictor Variables on Isolation Compliance Rate

Predictor Variable	Compliant	Non-Compliant	Likelihood Ratio	Cramer's V	p-value
<b>Gender</b>			-	0.125	0.065 <sup>a</sup>
Male	71	2			
Female	145	16			
<b>Age</b>			-	0.133	0.056 <sup>a</sup>
18-24 years of age	60	9			
25 years or older	161	9			
<b>Race</b>			4.587	0.146	0.275
Asian or Pacific Islander, Non-Hispanic	39	2			
Black/African American, Non-Hispanic	21	4			
Hispanic, Any Race	38	5			
White, Non-Hispanic	113	6			
American Indian/Alaskan Native or other	10	1			
<b>Symptoms?</b>			-	0.074	0.222 <sup>a</sup>
Yes	202	15			
No	19	3			
<b>Test Date</b>			-	0.068	0.339 <sup>a</sup>
Before January 2022	44	5			
January 2022 or later	173	11			
<b>Enrolled in Classes?</b>			-	0.079	0.164 <sup>a</sup>
Yes	90	10			
No	131	8			
<b>Employed at UNLV?</b>			-	0.222	0.001 <sup>a</sup>
Yes	150	5			
No	71	13			

<sup>a</sup>p-value was determine using Fisher's Exact Test.

## Chapter 5: Discussion

The results of this cross-sectional study show 92.5% of participants isolated for the required length of time after receiving their first positive COVID-19 test result. The 92.5% compliance rate has an exact binomial confidence limit between 88.36-95.48%. This confidence interval does not overlap with the limited data available in the US which shows 58.4% of participants adhered to all of the COVID-19 guidelines (Levy et al., 2022). This suggests the current study's findings, for compliance rates, are statistically higher than what has previously been observed in the United States.

The high compliance rate observed in this study is inconsistent with the findings of previous studies. The reason for this may be due to the university's contact tracing team following up with every individual who reported their positive test result to the university. Participants who were eligible for this study were sent a letter, from the university, detailing the requirements for isolating at home and were told when they could end their isolation. This is consistent with the findings published by Foroozanfar et al. (2020). In the Foroozanfar et al. (2020) study, 89.4% of the subjects complied with the isolation guidelines after receiving a phone call each day reminding them to stay in isolation. In the studies that published low compliance rates, many of the study participants never received direct guidance on how long they should isolate. These findings indicate public health authorities may not be effective in communicating their guidelines to the public since lower compliance rates were observed in studies where participants were not given guidance on isolating.

The reasons study participants gave for non-compliance are consistent with what is published in the literature. Respondents indicated receiving their test result too late to matter and having a housing situation that required them to be in close contact with others were the primary

reasons they were unable to isolate. Gender, age, and test date had no effect on whether an individual isolated for the required time period. However, participants who were UNLV employees were more likely to adhere to the isolation guidelines than individuals who were not employed by UNLV at the time they received their first positive COVID-19 test result. This could be due to the fact that many UNLV employees were allowed to work from home while dealing with a COVID-19 infection. Employees who have a positive COVID-19 test result are excluded from all of UNLV's campuses during their infectious period. However, this has not been the case at every workplace. Research participants from this study, and previous studies, report being required to go into work as a reason they were unable to comply with the isolation guidelines.

The results from this study show that following up with cases to ensure they are isolating and allowing employees to work from home may contribute to higher rates of compliance to the isolation guidelines. The university's contact tracing team is responsible for relaying the current public health guidelines and responding to any questions or concerns cases have about isolating. Many cases report being confused about the guidelines since they have changed throughout the course of the COVID-19 pandemic. Confusion about the current guidelines may be a widespread problem, which may contribute to individuals not adhering to them. Consequently, changing the guidelines may have also meant that people no longer trusted in them and therefore did not adhere to the recommendations for isolation.

This research has several limitations. First, the sample size for this study was relatively small with only 240 participants. The response rate was much lower than expected with the survey being distributed to over 1,500 individuals who were given 2 weeks to complete it. The survey was sent to anyone who had filled out the UNLV voluntary report form since it was

created in March 2020. Over 1,000 of the 1,500 eligible participants were students at the university. However, the list of potential participants included former students who may no longer use their university email addresses. Additionally, the response rate among faculty and staff was also low. The low response rate in these groups was unexpected given the low employee turnover rate among UNLV faculty and staff. A larger sample size is needed to confirm the study results.

Second, the demographics of the study population were not representative of the UNLV population. For example, nearly half of the survey respondents reported their race/ethnicity as white and non-Hispanic. During the Fall 2021 semester, individuals who identified as white and non-Hispanic made up only 28% of the UNLV student population (UNLV, 2022a). It is unclear why a lower response rate was seen among minority students. Additionally, the study population was 67% female compared to 31% male. While the majority of the UNLV student population is female, the percentage (57%) is much lower than what was observed in the study population (UNLV, 2022a).

Finally, this study was subject to recall and reporting biases. The online survey was the only method of data collection for this study. Therefore, researchers had to rely on study participants to provide accurate information on their experiences with COVID-19. Participants were asked to recall their first experience with testing positive for COVID-19, which may have been over two years ago. The study's researchers attempted to minimize recall bias by only asking participants about their first time testing positive for COVID-19, which would have been their most memorable experience with the virus. Additionally, participants may have been hesitant to admit if they did not isolate for fear of getting in trouble for breaking the law.

Researchers attempted to minimize reporting bias by not collecting any information that could identify study participants and notifying participants that the survey was anonymous.

Despite the limitations of this study, the findings of this research are still valid. While this study's sample size was small, the high compliance rate seen from these individuals has been observed in a larger group with other public health policies. Of the 1,500 individuals who filled out the voluntary report form, the vast majority reported receiving the primary series of the COVID-19 vaccine and a booster shot. This shows that the target population for this study was following the public health guidelines. Additionally, the majority of this study's participants (77%) reported receiving their first positive test result this year. This indicates recall bias may not have had a significant effect on the results. However, the low response rates from minority students may have affected the results of this study. This study may have missed any differences in compliance rates among race/ethnicity groups due to the small sample sizes in some of the racial groups.

The study authors attempted to increase the number of survey responses by emphasizing in the recruiting email that this survey would only take 5-10 minutes to complete and would be anonymous. Response rates were particularly low among students (10.1%) despite the fact that this group made up the majority of eligible participants for this study. The majority of respondents indicated their first positive test result occurred in 2022 which suggests the timing of the lab result may have been a factor in the low response rate. The contact tracing team may not have had up to date contact information for potential participants who reported their first positive test result in 2020 or 2021. Future studies may be able to increase the response rates, from potential participants, by following up with cases within a few weeks to see if they were able to adhere to the guidelines.

The results of this study show UNLV students, faculty, and staff adhered to the CDC's COVID-19 isolation guidelines. UNLV employees were more likely to isolate than individuals not employed by the university. Additionally, the results of this study show there are no differences in compliance among demographic groups at UNLV. These findings suggest that the university's policies may have been effective in getting students, faculty, and staff to follow the CDC's COVID-19 guidelines. The university's contact tracing team may have played a role in getting people to adhere to the guidelines by providing them with letters excluding them from any of UNLV's campuses until the end of their isolation period. Further research is needed to confirm these results by recruiting a larger, more representative study population. However, these results suggest having policies in place to encourage sick students and employees to stay at home will increase the likelihood they adhere to public health guidelines and mitigate the spread of disease.

Overall, the results of this study show a high rate of compliance to the COVID-19 isolation guidelines by a population of adults in the United States. This study was among the first to determine compliance rates within the United States. Determining whether or not people are following the current recommendations is important in order to prepare for future public health emergencies. Future studies on this topic should start at the beginning of a public health emergency in order to limit recall bias and increase the odds of getting potential participants to participate in the research.

**Appendix A**  
Information Sheet for Exempt Research

EXEMPT RESEARCH STUDY  
INFORMATION SHEET

Department of Epidemiology and Biostatistics

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TITLE OF STUDY: COVID-19 ISOLATION COMPLIANCE AMONG STUDENTS AND EMPLOYEES OF A LARGE PUBLIC UNIVERSITY

INVESTIGATOR(S) AND CONTACT PHONE NUMBER: DR. BRIAN LABUS (702) 895-2649 AND NICOLETTE HARMON (702) 774-0200

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The purpose of this study is to determine if UNLV students, faculty, and staff were able to adhere to the CDC's isolation recommendations for COVID-19. You are being asked to participate in the study because you meet the following criteria: you are a UNLV student, faculty, or staff member who tested positive for COVID-19 and completed the UNLV COVID-19 voluntary report form.

If you volunteer to participate in this study, you will be asked to do the following: to complete an online survey about your experiences with testing positive for COVID-19. This survey does not collect personally identifiable information. Your responses will remain anonymous and cannot be traced back to you. You will only be asked to provide general demographic information (i.e., age, gender etc.). A response is required for each question. If you feel uncomfortable answering any of the survey questions, you may choose to discontinue the survey and your responses will not be recorded.

This study includes only minimal risks. The study will take 5-10 minutes of your time. You will not be compensated for your time.

For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact the UNLV Office of Research Integrity – Human Subjects at 702-895-0020, or via email at [IRB@unlv.edu](mailto:IRB@unlv.edu).

Your participation in this study is voluntary. You may withdraw at any time. You are encouraged to ask questions about this study at the beginning or any time during the research study.

**Participant Consent:**

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

**Appendix B**  
Survey Questions

**Introduction Block:** Information Sheet for Exempt Research

**Survey Block**

\* = required

Q1. Have you ever received a positive COVID-19 test result? \*

- Yes
- No

[If NO is selected; Skip to end of survey]

Q2. Age: \*

Text field

Q3. Gender: \*

Text field

Q4. Race/Ethnicity: \*

- American Indian/Alaskan Native, Non-Hispanic
- Asian or Pacific Islander, Non-Hispanic
- Black/African American, Non-Hispanic
- Hispanic or Latino/a, any race
- White, Non-Hispanic
- Other

Q5. Did you experience symptomatic COVID-19 at the time of your first positive COVID-19 test result? \*

- Yes
- No

Q6. What is the month and year of your first positive COVID-19 test result? \*

Text field

Q7. Were you enrolled in any UNLV courses at the time of your first positive COVID-19 test result? \*

- Yes
- No



Q8. Were you employed by UNLV at the time of your first positive COVID-19 test result? (employment includes student workers, Graduate Assistants, temporary staff, etc.) \*

- Yes
- No

Q9. Did you isolate yourself at the time of your first positive COVID-19 test result? (leaving the house for medical care is not considered breaking isolation) \*

- Yes, I isolated for the full length of time
- I isolated for some of the time
- No, I did not isolate at all

[IF YES is not selected, direct to Q10]

Q10. What factor(s) affected your ability to self-isolate at the time of your first positive COVID-19 test result? (Check all that apply.) \*

1. University policies and class accommodations prevented me from isolating
2. University housing requirements/accommodations prevented me from isolating
3. My housing situation required me to be in close contact with other people
4. I had nowhere to self-isolate
5. I had primary caregiver responsibilities
6. I had to attend a public event
7. I did not think it was important to isolate
8. The isolation requirements were unclear to me
9. I did not agree with the isolation guidance provided by SNHD
10. It was too stressful being isolated from family/friends
11. I had mild symptoms or none at all
12. My employer (not UNLV) required me to work
13. I had to get food or other supplies before I could start my isolation
14. I ran out of food or other supplies during my isolation
15. I received test results too late to matter
16. None of these factors

[IF NO is not selected for Q9, show Q11]

Q11. How many days did you self-isolate after becoming sick or receiving a positive COVID-19 test result if you did not become sick? \*

Text field

Click SUBMIT to record survey responses.

**End of survey message**

We thank you for your time spent taking this survey.

Your response has been recorded.

For more information about COVID-19, please visit the [UNLV Novel Coronavirus webpage](https://www.unlv.edu/coronavirus).  
(<https://www.unlv.edu/coronavirus>)

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## Curriculum Vitae

**Nicolette Harmon**  
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### EDUCATION

**Master of Public Health – Epidemiology and Biostatistics** **December 2022**  
University of Nevada, Las Vegas

**Bachelor of Science – Biology** **May 2013**  
Loyola Marymount University, Los Angeles, CA

### PROFESSIONAL EXPERIENCE

**COVID-19 Disease Investigator** **Jan 2022 – present**  
University of Nevada, Las Vegas

- Conducts COVID-19 disease investigations for UNLV students, staff, and faculty to obtain information on place exposures and close contacts on UNLV campuses.
- Provides cases and close contacts with isolation and quarantine guidelines to slow the spread of COVID-19 within the UNLV community.
- Conducts audits of previously completed interviews to ensure proper completion of all disease investigations.

**Graduate Research Assistant** **Aug 2021 - Dec 2021**  
University of Nevada, Las Vegas

- Collaborated with Principal Investigator and other researchers on research study design and protocols.
- Developed survey questionnaires and other tools to be utilized in COVID-19 research studies.
- Collaborated with Principal Investigator and other researchers in the writing of research papers for COVID-19 studies.

**COVID-19 Contact Tracing Supervisor** **Aug 2020 - Aug 2021**  
University of Nevada, Las Vegas

- Supervised a team of up to 30 disease investigators to assist the Southern Nevada Health District in COVID-19 contact tracing efforts for Las Vegas, NV.
- Provided guidance to disease investigators on how to conduct sensitive or difficult interviews with confirmed COVID-19 cases.
- Trained new hires on how to conduct disease investigation interviews, data entry of interviews into database, and intrapersonal skills to build and maintain trust with cases and other employees.
- Conducted quality assurance to ensure proper completion of COVID-19 disease investigations

**Research Coordinator III****Mar 2019 - Aug 2020****Research Coordinator II****Jan 2018 - Mar 2019**

Cleveland Clinic Lou Ruvo Center for Brain Health, Las Vegas, NV

- Maintained knowledge of research protocols to coordinate the proper execution of all study related procedures.
- Served as a liaison between investigators, research personnel, and other study personnel to assist in protocol interpretation, enrollment, and compliance.
- Assisted with the development of training and educational materials for assigned research protocols.
- Maintained regulatory documents, data capture and monitoring plans to ensure proper completion of study procedures in a timely manner.

**Clinical Research Coordinator I****Nov 2016 - Dec 2017**

Radiant Research/Synexus-US, Las Vegas, NV

- Maintained thorough knowledge of study protocols including requirements for patient visits, obtaining informed consent, laboratory procedures, and drug accountability procedures.
- Responsible for completion of all study documentation forms, including case report forms and patient charts.
- Conducted patient care visits and assured all procedures were conducted in compliance with the study protocol.
- Collaborated with Principal Investigator to ensure patients receive medical evaluation as needed.
- Communicated with Clinical Research Associate to facilitate data monitoring and database cleanup.

**Research Assistant****Jul 2015 - Nov 2016**

Radiant Research / Synexus-US, Las Vegas, NV

- Assisted staff with clinical research study related procedures such as source documentation, obtaining vital signs and ECGs, blood specimen collection and processing, and shipping lab specimens per study protocol.
- Assisted study coordinators with patient recruitment, maintaining logs, and filing in charts.
- Ensured Principal Investigator and research staff reviewed study related reports in a timely manner in order to adhere to proper compliance protocols.

**Back-up Training Coordinator****Feb 2015 - Jul 2015**

Grifols-Biostat, Las Vegas, NV

- Assisted in directing training within Plasma Collection Center by partnering with the Regional Training staff to ensure training compliance is met.
- Supervised and coordinated the work of designated trainers throughout the center to ensure adherence to standard operating procedures.
- Supported management in implementation of corrective actions to eliminate regulatory deficiencies in training.

**Designated Trainer / Phlebotomist****Mar 2014 - Jul 2015**

Grifols-Biostat, Las Vegas, NV



- Identified suitable donors, through health screenings, for plasma donations.
- Monitored plasma donors to ensure proper health throughout procedure, while building relations and providing excellent customer service.
- Trained and mentored new hires on all facets of phlebotomy and plasma donation operations and procedures.

**Laboratory Teaching Assistant**

**Jan 2013 - May 2013**

Loyola Marymount University, Los Angeles, CA

- Taught molecular biology concepts to undergraduate students to assist in comprehension of course materials.
- Trained students in molecular biology laboratory techniques necessary to pass laboratory class.
- Supervised student experiments to ensure proper compliance to laboratory protocols.
- Graded student homework assignments to evaluate comprehension level of course materials.

**Undergraduate Researcher**

**Jan 2012 – May 2013**

Loyola Marymount University, Los Angeles, CA

- Performed molecular biology experiments to evaluate the genetic response to cold shock of *Saccharomyces cerevisiae* and *Saccharomyces paradoxus*.
- Mentored and trained new research team members in proper completion of laboratory experiments and data entry techniques.
- Conducted quality assurance reviews of data collected by team members to ensure proper completion and documentation of laboratory protocols.
- Analyzed and presented research results to peers at scientific conferences.