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Original article

A Descriptive Study of COVID-19–Related Experiences and Perspectives of a National Sample of College Students in Spring 2020

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A B S T R A C T

Purpose: This is one of the first surveys of a USA-wide sample of full-time college students about their COVID-19–related experiences in spring 2020.

Methods: We surveyed 725 full-time college students aged 18–22 years recruited via Instagram promotions on April 25–30, 2020. We inquired about their COVID-19–related experiences and perspectives, documented opportunities for transmission, and assessed COVID-19's perceived impacts to date.

Results: Thirty-five percent of participants experienced any COVID-19–related symptoms from February to April 2020, but less than 5% of them got tested, and only 46% stayed home exclusively while experiencing symptoms. Almost all (95%) had sheltered in place/stayed primarily at home by late April 2020; 53% started sheltering in place before any state had an official stay-at-home order, and more than one-third started sheltering before any metropolitan area had an order. Participants were more stressed about COVID-19's health implications for their family and for American society than for themselves. Participants were open to continuing the restrictions in place in late April 2020 for an extended period of time to reduce pandemic spread.

Conclusions: There is substantial opportunity for improved public health responses to COVID-19 among college students, including for testing and contact tracing. In addition, because most participants restricted their behaviors before official stay-at-home orders went into effect, they may continue to restrict movement after stay-at-home orders are lifted, including when colleges reopen for in-person activities, if they decide it is not yet prudent to circulate freely. The public health, economic, and educational implications of COVID-19 are continuing to unfold; future studies must continue to monitor college student experiences and perspectives.

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IMPLICATIONS AND CONTRIBUTION

Researchers surveyed a national sample (n = 725) of full-time college students in the USA about their coronavirus disease 2019–related experiences in spring 2020. College students are already restricting their behaviors to protect population health, but more must be done to reduce opportunities for coronavirus disease 2019 transmission by college students.

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The novel COVID-19 pandemic's impact on college students is unprecedented. College students are a priority population for health promotion and disease prevention [1], and universities are unique settings that can affect the health of a larger segment of the population. College campuses are densely populated, with students living in close proximity to others; this means that college students can efficiently transmit communicable diseases

(such as influenza, or COVID-19), creating hot zones for transmission [2].

To the best of our knowledge, we conducted one of the first national surveys to learn what full-time college students' COVID-19–related experiences in the United States of America (USA) were in spring 2020, during the USA's first peak of COVID-19 and when colleges and universities transitioned to remote learning [3]. This study offers insight into college students' health (e.g., COVID-19 symptoms), psychosocial, and economic experiences, as well as their perspectives on COVID-19, that can inform the COVID-19 approaches of public health officials, policy makers, and higher education leaders.

Methods

Study sample

We recruited via Instagram to create a sample of full-time college students aged 18–22 years (mean age: 20.0 years, standard deviation: 1.3) from across the USA. Although internet access disparities have historically been a concern when recruiting internet-based samples [4], being a full-time college student in April 2020 required some internet access, owing to remote learning. Recruitment and enrollment outcomes from previous research indicate that Instagram is an effective strategy to reach diverse youth, given the ability to target ads based on user data and the pervasiveness of social media [5,6]. In fall 2019, more than 80% of college students used Instagram, their most preferred social media platform [7]; as digital activity has increased during the pandemic [8], this proportion is now likely even higher.

Instagram promotions are regular posts (i.e., a photo or video with caption and hashtags) that are typically used to increase brand awareness (e.g., likes, views, shares) and/or sales (e.g., links to merchandise on a website) among a targeted audience. We used Instagram promotions to advertise this study using our Instagram Business Profile account (@3dyouthresearch), which operates via Facebook Ad Manager. We selected the number of days the promotion should run and the amount of money to spend per day. We could also select a more targeted audience, including by age, gender, and location, as well as by “interests” (e.g., hobbies, events). Prices were based on cost per click and determined according to Instagram's internal algorithms, incorporating factors such as the selected audience and ad feedback.

We used four Instagram promotions over 5 days. Each promotion included either (a) the CDC image of the coronavirus [9] or (b) a photo of an empty classroom. Promotions used similar text (i.e., “College Students: Complete an online survey about your experiences during the COVID-19 pandemic. Earn a \$10 gift card!”) and a similar set of hashtags (e.g., #covid_19, #earn-money-from-home, #campusclosed). The first two promotions (age target: 18–22 years; gender: male or female; geographic location: USA) ran from April 24 to 27, 2020, and each reached (i.e., was seen by) more than 12,800 people. We then created two additional promotions that reached more than 6,000 young adults (aged 18–22 years) in the USA, targeting specific geographic locations (e.g., cities with high proportions of people of color, rural states) and diverse colleges (e.g., names of Hispanic-serving institutions and historically black colleges and universities as “interests”); one of these two promotions specifically targeted men because women are more likely to participate in survey research [10]. We spent \$150 on the first

round of promotions (April 25–27, 2020) and an additional \$119 on the second round of promotions (April 28–29, 2020, which was cut short given that we reached capacity).

The four promotions were viewed 41,101 times (because views were summed across ads, some people may have viewed more than one promotion), and 2,887 individuals clicked on the link to the screening questionnaire. Of those, 1,590 non-duplicated individuals started the screening questionnaire (which determined status as a full-time USA college student aged 18–22 years), which was 55.1% of those who viewed the screening questionnaire; and 1,331 nonduplicated individuals completed the screening questionnaire (83.7% of those who started the screening questionnaire). Most ($n = 1,225$, 92.0%) qualified for the study and provided informed consent. To further confirm current college student status, participants provided a .edu email address in the screening questionnaire, to which we sent a link to the full survey. Participants completed the survey via Qualtrics until we reached maximum capacity ($n = 725$); the median time to complete the survey was 34.5 minutes (interquartile range: 26.6–47.4 minutes). All participants received a \$10 Amazon.com gift card within three business days of survey completion; we had a maximum capacity of 725 participants owing to the funds available for incentives. Data collection occurred from April 25, 2020, to April 30, 2020; we prioritized completing data collection before any reopening began (some locations in the USA began to reopen on May 1, 2020).

The study was approved by the Fordham University Institutional Review Board.

Survey measures

We designed most of the survey measures (Appendix Table 1); we also used items from the Stop AAPI Hate Survey [11] to measure discrimination.

Data analyses

Descriptive statistics and chi-square tests were calculated in Stata (StataCorp, College Station, TX), version 16.1. Confidence intervals (95% CIs) were calculated using <http://vassarstats.net/prop1.html>.

Results

Our study sample ($n = 725$) included a relatively even distribution of students by year in school and had racial/ethnic, gender, sexual orientation, political affiliation, and socioeconomic position diversity (Table 1). Participants came from all 50 USA states and Washington DC. Our study was not as diverse as the national full-time college student population [12,13]; this may be because we restricted our sample to full-time college students aged 18–22 years.

In late April 2020, most participants were living with at least one parent (e.g., 73.4% (95% CI: 70.1%–76.5%), living with their mother(s) and/or step-mother(s)) (Appendix Table 2). On average, participants lived with 2.9 other people. Seventeen percent (95% CI: 13.8%–20.7%) of those living with siblings and/or cousins were providing childcare and/or schooling assistance for any younger children in their household, but this varied by gender: 22.2% (95% CI: 9.0%–45.2%) of nonbinary, genderqueer, and transgender participants ($n = 18$), 19.6% (95% CI: 15.4%–24.6%) of female participants ($n = 281$), and only

Table 1
Study sample demographic characteristics (n = 725)

Measure	Percent	National data on full-time college students in the USA
College year in April 2020		
First year	27.4%	40.0%
Sophomore	25.8%	28.4%
Junior	22.8%	12.4%
Senior	22.6%	16.9%
Other	1.4%	2.4%
Race/ethnicity (checked all that applied)		
African-American/black	8%	13.6%
Hispanic/Latinx	13.9%	18.9%
Native American or Alaska Native	1%	.7%
Asian/Asian American or Pacific Islander	24.3%	7.1%
Middle Eastern	1.5%	(not listed)
White	63.2%	56.0%
Other	.6%	(not listed)
Two or more races	15.6%	3.7%
Gender		
Female	60.7%	56.7%
Male	34.8%	43.3%
Nonbinary, genderqueer, or gender nonconforming	2.8%	(not listed)
Trans male/trans man	1.4%	(not listed)
Different identity	.4%	(not listed)
Sexual orientation		
Heterosexual or straight	71.6%	86.2%
Bisexual	12.6%	4.1%
Gay or lesbian	6.6%	2.7%
Questioning	3.3%	1.0%
Pansexual	2.1%	(not listed)
Asexual	1.1%	(not listed)
Another sexual identity	.4%	2.0%
Prefer not to respond	0%	4.1%
Immigration status		
Participant was born outside of the U.S.	11.4%	13.0%
At least one of participant's parents were born outside of the U.S.	40.8%	20.6%
Political party affiliation		
Democrat	48.3%	52%
Republican	14.3%	23%
Independent	14.3%	25%
Other (e.g., Green Party, Libertarian Party)	5.3%	(not listed)
No party preference	17.7%	(not listed)
Socioeconomic position		
Receives financial aid to attend school	68.3%	82.8%
Family's typical annual household income (pre-COVID-19)		
Less than \$26,000	13.1%	21.3%
\$26,000–\$53,399	20.6%	20.4%
\$54,000–\$99,999	28.8%	24.5%
\$100,000–\$249,000	31.7%	29.4%
\$250,000 and above	5.8%	4.5%
First-generation college student	26.1%	56%
Financial independence		
Independent from family members and no dependents	26.1%	23.2%
Independent from family members with dependents	2.6%	12.1%
Dependent on family members, no one relies on them	66.2%	62.0%

(continued)

Table 1
Continued

Measure	Percent	National data on full-time college students in the USA
Dependent on family members and other(s) rely on them	5.1%	2.7%
Currently classified as an essential worker	12.7%	

Race/ethnicity proportions add up to more than 100% because participants could select all categories with which they identified. For the national data, 3.7% of all full-time college students in the U.S. identified two or more races.

The family household income comparison data were only available for students who are dependents of their families, whereas our data include both students who were dependents and students who were financially independent.

National data on full-time college students came from multiple sources. College year, race/ethnicity, gender, immigration status, financial aid, family income, first-generation status, and financial independence data were from the U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey and the 2015–16 National Postsecondary Student Aid Study. Sexual orientation data were from the National Survey of Student Engagement (2017). Political party data came from the 2018 Survey of America's College Students, Panetta Institute for Public Policy.

COVID-19 = coronavirus disease 2019.

11.7% (95% CI: 7.5%–17.7%) of male participants (n = 154) provided such care (*p*-value for chi-square test of female and gender minority participants vs. males = .03).

For many, their current living arrangements differed from their typical college housing. Because the 2020 Census was also unfolding during spring 2020, we asked participants if they knew if they were counted in the 2020 Census; 67.7% (95% CI: 64.2%–71.0%) said yes, 26.3% (95% CI: 23.3%–29.7%) did not know, and 6% (95% CI: 4.4%–7.9%) said no. The 491 who said yes were counted a total of 534 times. The most common overlaps were being counted both at their college dorm and their family's household (n = 31) and at both an off-campus residence and family household (n = 10).

COVID-19 health experiences

Symptoms and testing. More than one-third of participants (35.3%, 95% CI: 31.9%–38.9%) experienced COVID-19–related symptoms (as established by the CDC [14] and/or emerging research) since February 2020. Among those who experienced any symptoms (n = 256), 4.7% (95% CI: 2.7%–8.0%) got tested for COVID-19, 9.8% (95% CI: 6.7%–14.0%) attempted to get tested but were not successful and 85.6% (95% CI: 80.1%–89.3%) did not attempt to get tested. Of the 12 people who experienced symptoms and got tested, two tested positive, nine tested negative, and one did not yet have results. (Among those who did not experience any symptoms (n = 469), .9% (95% CI: .3%–2.2%) were tested for COVID-19, .6% (95% CI: .02%–1.9%) attempted to get tested but were not tested, and 98.5% (95% CI: 97.0%–99.3%) did not attempt to get tested. Of the four people who did not have symptoms but got tested for COVID-19, one tested positive, two tested negative, and one did not yet have results.)

Behaviors when symptomatic. Among those who had any symptoms (n = 256), 46.9% (95% CI: 40.9%–53.0%) stayed at home exclusively while they had symptoms (Table 2). An additional

Table 2

Activities of participants who had any COVID-19–related symptoms (n = 256) while experiencing symptoms

Activity	Percent
Stay at home exclusively	46.9
Stay home more than usual but not exclusively	35.5
Attend class	30.1
Go to work	14.5
Attend social gatherings	13.7
Run errands such as grocery shopping	30.1
Exercise outside	23.0
Seek health care remotely (via phone, web interface, and/or telehealth)	8.2
Visit a healthcare professional and/or hospital	9.8
Travel more than 50 miles	12.1

COVID-19 = coronavirus disease 2019.

35.5% (95% CI: 29.9%–41.2%) stayed at home more than usual (but not exclusively). Nevertheless, many were still in public: 30.1% (95% CI: 24.8%–36.0%) reported attending class, 14.5% (95% CI: 10.7%–19.3%) went to work, and 13.7% (95% CI: 10.0%–18.4%) attended social gatherings. Only 16.4% (95% CI: 12.4%–21.4%) sought health care (remotely and/or in person).

Opportunities for COVID-19 transmission

Social contact. Participants attended a variety of in-person social gatherings of different sizes since March 1, 2020 (Table 3). For most group categories (250+, 50–249, 10–49 people), academic programming was the most common type of gathering (e.g., 47.5% (95% CI: 40.4%–54.8%) of the 181 ≥ 250-person gatherings). For gatherings of 2–9 people (not including people from the participant's household), social events were the most common activity.

Almost two-thirds of participants (62.8%, 95% CI: 59.2%–66.2%) traveled ≥50 miles at least once in March 2020, for a total of 531 trips (Appendix Table 3). In comparison, only 15.2% (95% CI: 12.7%–18.0%) of participants traveled ≥50 miles at least once in April 2020, for a total of 108 trips. In both March and April 2020, the majority of these trips were by car: 65.0% (95% CI: 60.8%–68.9%) of trips in March and 89.8% (95% CI: 82.7%–94.2%) of trips in April.

Table 3

Attendance at in-person social gatherings since March 1, 2020

	Gathering size			
	>250 people	50–249 people	10–49 people	2–9 people (not counting people in household)
Present at any gathering	16.6%	33.0%	50.2%	54.6%
Number of gatherings attended, by type of gathering and size				
Academic programming	86	185	283	127
Social event (e.g., party, bar/club, spring break)	54	99	155	203
Major milestone ceremonies (e.g., wedding, quinceanera, bar/bat mitzvah, funeral)	7	13	25	31
Routine religious gathering	16	38	34	35
Other gathering with people from outside of household	18 (e.g., political rally, work event)	26 (e.g., school cafeteria, work, grocery store/errands, playing sports/gym)	46 (e.g., work, grocery shopping, sports, political activities (campaigning, voting), volunteering, vacation, being on campus, family)	185

Approximately three-quarters (77.2%, 95% CI: 74.1%–80.1%) of participants reported behaviors in compliance with CDC-recommended social distancing (i.e., 6 feet away from anyone outside your household) over the last 4 weeks (effectively, April 2020) (Table 4). Notably, 25.0% (95% CI: 22.0%–28.3%) reported being within 6 feet of family and friends for whom they were not providing care. Participants also estimated the number of people of whom they had been within 6 feet across different categories and had the most uncertainty for the number of essential workers to whom they were exposed. Only 4.3% (95% CI: 3.0%–6.0%) of participants were in close contact with people they knew to have COVID-19 symptoms.

We also asked about exposure to prepared food obtained, by themselves and/or members of their household, via pickup or delivery. In the last 4 weeks, more than half of participants (54.8%, 95% CI: 51.1%–58.4%) reported that neither they nor any household members had food delivered, 29.0% (95% CI: 25.8%–32.4%) had delivery 1–3 times, and 16.3% (95% CI: 13.8%–19.1%) had delivery at least once per week. Pickup was more common: in the last 4 weeks, 22.8% (95% CI: 19.9%–25.6%) never picked up food, 45.8% (95% CI: 42.2%–49.4%) collected pickup 1–3 times, and 31.4% (95% CI: 28.2%–34.9%) collected pickup at least once per week.

Hygiene behaviors. Participants generally followed public health guidance when the survey was conducted, but incompletely (Appendix Table 4). For example, more than three-quarters of people reported never coughing or sneezing into their hands or without covering their mouth at all, and almost half reported never touching their eyes, nose, and/or mouth without first washing their hands when outside their home. Approximately half (50.8%, 95% CI: 47.1%–54.4%) always wore a face mask or covering in public. However, while 72.5% (95% CI: 69.2%–75.7%) reported always washing their hands for the recommended duration of ≥20 seconds and/or using hand sanitizer that is ≥60% alcohol after being in a public place, only 37.6% (95% CI: 34.2%–41.2%) always do so after blowing their nose, and only 31.3% (95% CI: 28.0%–34.8%) always do so after coughing or sneezing.

Sheltering in place. Almost all (94.8%, 95% CI: 92.9%–96.2%) participants had sheltered in place or stayed at home (leaving

Table 4
Physical distancing behaviors in April 2020

Within 6 feet of:	Counts	More details
No one	36	
Only household members	524	
Nonhousehold members for whom I am caring	37	Among those who answered yes, average number of contacts: 2.4 (range: 0–10) 0% were uncertain about number of contacts
Nonhousehold family members, significant other, or friends for whom I am not providing care	181	Among those who answered yes, average number of contacts: 3.8 (range: 0–20) .6% were uncertain about number of contacts
Coworkers	71	Among those who answered yes, average number of contacts: 12.7 (range: 0–100) 4.2% were uncertain about number of contacts
People providing essential services	234	Among those who answered yes, average number of contacts: 12.7 (range: 0–1,000) Note: 13.2% were uncertain about number of contacts in this category
Other members of the public	92	

When calculating the number of contacts, if participants provided a range (e.g., 50–100), we took the midpoint (e.g., 75); if participants only offered a lower range (e.g., “20+”), we used the lower range number (e.g., 20). If participants did not offer a number (e.g., “unknown” or “a lot”), we did not include these responses, so these are underestimates.

only for essential services, essential work, and/or exercise) in spring 2020. Among those who had sheltered in place at any time ($n = 687$), 98.3% (95% CI: 97.0%–99.0%) were currently doing so when they completed the survey. Of the 1.8% (95% CI: 1.0%–3.0%) who had stopped sheltering in place, approximately half had stopped in the first half of April and the rest had stopped in the second half of April.

More than half of participants (53.1%, 95% CI: 49.5%–56.7%) started sheltering in place before any state had an official stay-at-home order (California was the first, on March 19), and more than one-third started sheltering in place before any region had an official stay-at-home order (the San Francisco Bay Area was the first, on March 17) (Table 5). Most participants (81.1%, 95% CI: 78.1%–83.8%) last ate at a dine-in setting before any municipality or state had an official stay-at-home order (before March 17).

Psychosocial and economic experiences

Perceived impact. Participants who received financial aid for college were more concerned about COVID-19’s economic (chi-square test p -value = .01) and emotional (chi-square test p -value = .01) impacts on their lives than those who did not receive financial aid, but the daily responsibility impacts were relatively similar (chi-square test p -value = .25) (Appendix Table 5). Less than one-quarter of participants (24.2% [95% CI: 20.7%–28.2%] of those receiving financial aid [$n = 495$] and 21.7% [95% CI: 16.9%–27.5%] of those not receiving financial aid [$n = 230$]) reported that COVID-19 had changed their postcollege career plans.

Level of stress. More than one-third of the sample agreed (9.8%, 95% CI: 7.8%–12.2%) or somewhat agreed (29.2%, 95% CI:

26.1%–32.7%) with the statement, “I am so anxious about COVID-19 that I can’t pay attention to anything else.” We also asked participants about their level of stress regarding COVID-19’s health, educational, and economic implications, for themselves, their families, and American society (Appendix Table 6). Participants were much more concerned about COVID-19’s health implications for their families and for American society than themselves, but much more concerned about COVID-19’s educational implications for themselves than for their families (and slightly more concerned about themselves than American society). They were most concerned about COVID-19’s economic implications for American society, then their families, and then themselves.

Employment. Most participants (61.7%, 95% CI: 58.1%–65.1%) were employed in February 2020, but only 32.4% (95% CI: 29.1%–35.9%) were currently employed (i.e., in late April 2020). More than half (52.6%, 95% CI: 47.9%–57.2%) of those employed in February 2020 ($n = 447$) were no longer employed in late April 2020; 8.3% (95% CI: 5.6%–12.1%) of those who were not employed in February 2020 ($n = 278$) were employed in late April 2020 (some participants mentioned, for example, taking on gig work as a food delivery driver). Among those who were employed in both February 2020 and late April 2020 ($n = 212$), 44.8% (95% CI: 38.3%–51.5%) had had their take-home pay decreased owing to the COVID-19 pandemic.

Discrimination. Relatively few (9.2%, 95% CI: 7.3%–11.6%) reported experiencing discrimination related to the coronavirus outbreak. Most of the people who reported experiencing discrimination ($n = 67$) were Asian or Asian-American (65.7%; 95% CI: 53.7%–75.9%). Of the people who experienced discrimination ($n = 67$), 62.7% (95% CI: 50.7%–73.3%) suspected it was because of their race/ethnicity, 16.4% (95% CI: 9.4%–27.1%) suspected it was because of their face mask or clothing, and the rest suspected it was because of gender, language, religion, food, or something else.

Perspectives about COVID-19

Participants were very open to continuing current restrictions (i.e., restrictions as of April 25–30, 2020) to reduce pandemic spread. Only 2.3% (95% CI: 1.5%–3.7%) wanted the current restrictions to be lifted immediately. Approximately one-third

Table 5
Timing of sheltering in place and eating in dine-in settings ($n = 725$)

Time	When started sheltering in place	When last ate at a dine-in setting
December 2020	0%	1.0%
January 2020	0%	3.0%
February 2020	1.6%	15.2%
March 1–8, 2020	4.0%	18.2%
March 9–15, 2020	27.2%	43.7%
March 16–18, 2020	20.3%	
March 19–22, 2020	22.4%	12.4%
March 23–29, 2020	11.4%	2.3%
March 30–31, 2020:	3.0%	.3%
April 1–5, 2020	3.6%	1.0%
April 6–12, 2020	2.1%	
April 13–30, 2020	3.4%	2.0%
Other/could not remember	.3%	.9%
Never	5.2%	0%

(36.5%, 95% CI: 33.0%–40.0%) thought the restrictions should be lifted in the next month, 23.6% (95% CI: 20.6%–26.8%) thought the restrictions should be lifted in 1–2 months, 9.9% (95% CI: 8.0%–12.3%) thought the restrictions should be lifted in >2 months, and 27.7% (95% CI: 24.6%–31.1%) thought the restrictions should be lifted only once a vaccine or treatment became available.

Participants had more trust in more local levels of government (i.e., state more than federal, local more than state) for doing everything possible to prevent the spread of COVID-19 and providing trustworthy information about COVID-19 (Appendix Table 7). Nevertheless, for each level of government, a relatively small proportion of participants had complete trust.

Participants also expressed some optimism (Appendix Figure 1). More than three-quarters (78.9%, 95% CI: 75.8%–81.7%) were inspired by seeing how other people are working hard to respond to this crisis, and almost half (49.5%, 95% CI: 45.9%–53.2%) agreed that we are all in this together and feel more connected to the rest of the country. They also noted the power of politicians, with 89.5% (95% CI: 87.1%–91.6%) noticing how consequential political leaders' decisions are for people's everyday life through this pandemic. They also saw the helpful things that young people like them could do for their communities in times like this (73.3% [95% CI: 70.0%–76.3%] agreed).

Discussion

This is one of the first national studies of full-time college students in the COVID-19 era and provides an important first look at diverse young adult (aged 18–22 years) college students' COVID-19–related experiences and perspectives.

Public health implications

We found that a low proportion of college students with COVID-19 symptoms got tested and that less than half of those with symptoms stayed at home exclusively while symptomatic. Furthermore, students' hygiene behaviors in April 2020 suggest they are protecting themselves (e.g., washing their hands) but could do more to prevent transmission to others (e.g., wearing a mask). Returning to extensive in-person academic instruction will require widespread testing and contact tracing [15]. However, contact tracing among college students will be challenging and require creative solutions because students participate in a myriad of activities with many different people and participants struggled to recall the number of the people with whom they had close contact (within 6 feet).

Because many participants restricted their behaviors before official stay-at-home orders went into effect, they may continue to do so after stay-at-home orders are lifted per their own risk calculations. For example, more than one-quarter thought that the restrictions in place in late April 2020 (i.e., stay at home/shelter in place almost everywhere in the USA) should be maintained until a vaccine or treatment becomes available. This suggests that some students may not return to campus in person, if a vaccine or treatment is not yet available. In addition, because more than half of participants expressed high stress regarding their family's health, students may opt to stay on campus during some of the shorter breaks, rather than risk bringing COVID-19 home.

College students' behaviors changed rapidly this spring, leading to increased isolation from their established social and

academic communities, and all domains of their lives were affected, including economically. We found that many participants were stressed owing to COVID-19. It will be essential to monitor the mental health sequelae of COVID-19.

Social implications

As unemployment skyrockets nationwide, college students are also affected: most of those employed in February 2020 were no longer employed in April 2020, and among those still employed, almost half were earning less. We anticipate that college student unemployment will increase further in the summer and also into the next academic year if fewer campus jobs exist. In addition, college students' educational and career plans may shift. Given the finding that students were largely inspired by others (including young people) who are working hard during the crisis, they may be inspired to join public service efforts for public health that others have recommended creating [16].

While relatively few participants reported experiencing discrimination related to COVID-19, most of the students who were discriminated against were Asian or Asian-American. As the COVID-19 pandemic continues, and as antiracism movements expand in response to George Floyd's death, it will be important to continue to monitor changes in racist attitudes, perceived discrimination, and who experiences discrimination.

We also note that the 2020 U.S. Census may overcount college students. We found that students who knew that they were counted reported being counted more than once, on average. This is likely because many college students had left campus by Census Day (April 1, 2020), but colleges still sent counts of students in dorms earlier that spring to the Census [17]. However, undercounts are also plausible, particularly for less privileged college students who may have been transient as they were determining a noncollege residence. This must be examined further to inform how 2020 U.S. Census data are used for resource allocation.

Limitations

We also note important limitations of this study. First, our survey population was more advantaged than all full-time college students. This may be because we used Instagram to recruit participants. It is possible that some of the most disadvantaged college students had very limited access to internet for their schoolwork and could not afford to use any of their internet bandwidth toward using Instagram or participating in our survey. Second, we restricted our sample to only full-time college students. Part-time college students may be even more negatively affected by COVID-19 because they are more likely to have had more COVID-19–related disruptions that increased financial and familial responsibilities; we encourage future researchers to specifically study this population. Third, owing to the breadth of topics covered, we did not measure all topics deeply. For example, we encourage future researchers to more comprehensively explore college students' employment patterns (including why students lost jobs), into summer 2020 (given emerging anecdotal reports of summer employment opportunities being lost) and the subsequent academic year.

In conclusion, the public health, economic, and educational implications of COVID-19 are continuing to unfold, in a rapidly changing world. COVID-19's impacts are occurring inequitably; we encourage future researchers to look at these outcomes by social factors. We encourage government leaders and leaders

of institutions of higher education to use these findings to inform their planning for supporting college students in the COVID-19 era.

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Supplementary Data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jadohealth.2020.06.009>.

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