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Individual Correlations of COVID-19 Concerns, Prevention Behaviors, and Experiences Among College Students

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Abstract

Background. The COVID-19 pandemic continues to be a public health crisis, and college campuses and areas in the southern United States (U.S.) are high-risk environments for the spread of the disease. *Purpose.* This study examined variation in COVID-19 concerns, prevention behaviors, and related experiences among college students at a large, public university in the southeast region of the U.S. *Methods.* A sample of 544 undergraduate students completed an online survey in the final weeks of the Fall 2020 academic semester. Subgroup variation in level of COVID-19 concern by history of COVID-19 diagnosis and associations between individual correlations and COVID-19 outcomes were explored. *Results.* Students were most concerned for their loved ones regarding COVID-19 risk. Higher levels of concern were associated with being young, female, and having a mental health condition. Positive associations were found between the level of concern and adherence to hygiene, social distancing, and mask wearing guidelines. A COVID-19 diagnosis was associated with taking all online classes, Greek life or athletic involvement, and having quarantined during the semester. *Conclusion.* Findings highlight student subgroups that may require increased attention when addressing COVID-19 concerns and prevention behavior adherence. Future research should also explore the relationship between COVID-19 concerns and behaviors with vaccination efforts among college students.

Keywords: COVID-19; college students; concerns; prevention; health behavior

Introduction

As of December 2021, there have been over 50 million COVID-19 cases and more than 800,000 COVID-19 related deaths in the United States (U.S.). Over 75% of individuals in the U.S. ages five and older have received at least one dose of the COVID-19 vaccine (Centers for Disease Control and Prevention (CDC), 2021a). There have been notable differences in COVID-19 cases, mortality, and vaccination rates at the state and local levels, highlighting geographic areas with an increased need for prevention and treatment resources and efforts.

When compared to other areas of the U.S., the southeastern region of the U.S. has had some of the highest COVID-19 mortality rates and lowest vaccination rates. Mississippi, Alabama, Louisiana, and Florida all rank in the top ten states for highest death rates from COVID-19, with 348, 334, 321, and 290 total deaths per 100,000 people, respectively (The New York Times, 2021). With about 61% of the U.S. fully vaccinated for COVID-19, Alabama, Mississippi, Louisiana, and Georgia have among the lowest vaccination rates at 47%, 48%, 50%, and 50%, respectively (The New York Times, 2021). With the emergence of new variants and the potential need for multiple booster vaccinations, it remains imperative to continue research to identify and better understand COVID-19 experiences. This is particularly true in the American South.

Communities in the South have faced unique challenges for slowing the spread of COVID-19, and college towns are of particular high risk for disease spread. It has been estimated that the majority of COVID-19 infections originate from adults ages 20 to 49 in the U.S., with a higher estimated contribution of young adults ages 20 to 34 in the southeastern, southwestern, and western regions of the country (Monod et al., 2021). Between June and August 2020, a study by Boehmer et al. (2020) found that young adults ages 20 to 29 had the highest incidence of COVID-19 compared to other age groups. Further, they accounted for more than 20% of all confirmed cases. This same study provided evidence of young adults contributing to community transmission of COVID-19 in the southeastern region of the U.S., with increases in infections among young adults preceding increases among older adults in June 2020 (Boehmer et al., 2020). Additional research has shown a link between presence of a college or university providing in-person instruction with increased COVID-19 cases in the surrounding counties (Andersen et al., 2021; Leidner et al., 2021; Richmond et al., 2020).

As colleges and universities reopened in Fall 2020, increases in positive cases among young adults were also observed with a 55% increase in weekly COVID-19 cases nationally among adults ages 18 to 22 during the period from August 2 to September 5, 2020 (Salvatore et al., 2020). In a study of 30 institutions, 14 colleges and universities experienced a spike in infections during the first two weeks of class in Fall 2020, and 17 campus outbreaks translated to increased infection in the surrounding counties (Lu et al., 2021). Many colleges and universities have implemented prevention plans that include mask wearing, symptom screening, diagnostic testing,

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contact tracing, quarantining, contact tracing, and reducing the number and size of in-person classes to promote physical distancing. While these prevention behaviors can be enforced for students who are on campus property, once off-campus, students have greater autonomy to comply (or not) with COVID-19 prevention behaviors. Notably, a report by Hutchins et al. (2020) indicated that COVID-19 mitigation behaviors are least prevalent among young adults ages 18 to 29 when compared to other adult age groups. Similarly, young adults ages 18 to 24 are less likely to be vaccinated and have the lowest levels of intent to get vaccinated compared to adults in other age groups (Baack et al., 2021).

A large portion of the research on COVID-19 among college students has focused on the effects of the pandemic on student mental health (X. Wang et al., 2020). Less emphasis has focused on understanding differences in COVID-19 exposure, infection, prevention behaviors, and related experiences among student subgroups. A growing amount of research has explored demographic and other correlations of COVID-19 experiences in the general population. Data collected by the Centers for Disease Control and Prevention (CDC) suggests that racial and ethnic minority groups are often disproportionately represented among COVID-19 cases and deaths (CDC, 2021b), which has been confirmed in other research (Arrazola et al., 2020; Stokes et al., 2020). While men and women appear to have a similar prevalence of COVID-19 (Stokes et al., 2020), men are disproportionately represented among COVID-19 deaths (CDC, 2021b). Additionally, individuals with certain underlying medical conditions are at increased risk for severe COVID-19 illness (CDC, 2021c), and recent diagnosis of a mental health disorder is associated with increased risk for COVID-19 infection (Q. Wang et al., 2020).

More research is needed on the correlations of COVID-19 experiences among college students, with additional consideration given to context-specific variables such as living with roommates and participating in extracurricular activities. Prior research has found that living with an ill housemate is associated with increased risk of influenza-like illness among college students (Guh et al., 2011). Vang et al. (2021) examined an outbreak of COVID-19 cases at a university and found that transmission likely occurred in on- and off-campus living settings and gatherings, particularly fraternities and sororities. Additionally, a study by Wilson et al. (2020) found that 18 COVID-19 case clusters at a university were linked to a residence hall, off-campus apartment, fraternity or sorority, or an athletic team.

Both the southeastern region of the U.S. and college campuses have been identified as high-risk environments for COVID-19. Research is needed on the correlations of COVID-19 experiences among college students attending school in the southeastern region of the U.S. in order to inform prevention and treatment efforts tailored to unique student subgroups. Accordingly, the current study aims to: 1) explore college students' level of concern about the COVID-19 pandemic, and 2) assess how college students' individual characteristics (i.e., demographic characteristics,

student characteristics, and health conditions) are associated with COVID-19 concerns, prevention behaviors, and COVID-19 experiences.

Methods

Study Sample and Data Collection

In the final weeks of the Fall 2020 academic semester, a link to an online survey was emailed to a panel of 5,000 undergraduate students enrolled at a large, public university in the southeastern region of the U.S. Daily for one week, a recruitment announcement and the survey link were also included in a campus-wide email newsletter. The survey included 60 questions, taking about 15 minutes to complete. Data collection was open for 2.5 weeks, with three reminder emails sent to the original participant panel. Participants were eligible for participation if they were over the age of 18 and currently enrolled as an undergraduate student at the main university campus. Participants could choose to enter themselves into a raffle, and 20 students received a \$25 gift card for their participation. Students provided informed consent prior to their participation in the study, and approval was obtained by the university's Institutional Review Board.

A total of $n=664$ participants responded to the survey, with $n=82$ participants excluded for not meeting eligibility criteria or not providing responses to key variables of interest. Of the final sample of $n=582$, the current study further excluded those who had been diagnosed with COVID-19 prior to the beginning of the fall semester for an analytic sample of $n=544$ students. As compared to the demographic characteristics of the total university student population, the analytic sample was similar with respect to race/ethnicity. However, the analytic sample had a higher proportion of female students. The sample was near evenly distributed by class standing with 24% freshmen, 19% sophomores, 25% juniors, and 32% seniors.

Measures

Survey questions in the current study measuring health conditions and COVID-19 concerns, prevention behaviors, and experiences were adapted with permission from the Healthy Minds Study (The Healthy Minds Study, 2020). The Healthy Minds Study is an annual survey of college students in the U.S. that measures mental health, health service utilization, and related factors. In partnership with the American College Health Association, the Healthy Minds Network developed a set of survey items focusing on students' experiences with the COVID-19 pandemic, which were first included as a survey module in Spring 2020.

Individual Characteristics

Demographic characteristics. Standard measures assessed age, sex, race/ethnicity, and sexual orientation. Due to comparatively low prevalence of certain response options, race/ethnicity was recoded into White, African American/Black, Asian American/Asian, and other race/ethnicity categories, with other race/ethnicity including those who identified as American Indian/Alaskan

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Native, Hispanic/Latin(x), Native Hawaiian/Pacific Islander, Middle Eastern/Arab/Arab American, more than one race/ethnicity, and other race/ethnicity. Sexual orientation was dichotomized into heterosexual/straight and other sexual orientation groups, with other sexual orientation including students who identified as lesbian, gay, bisexual, queer, questioning, or other sexual orientation. Participants also indicated whether they were currently employed for pay and if employed whether they were working from home or outside the home.

Student characteristics. Participants provided information on the format of their fall semester classes (all online or both in-person and online), whether they were involved in Greek life, and if they were a student athlete at the intercollegiate, club, or intramural level. Participants were also asked if their main place of residence for the semester was off-campus or on-campus (in a residence hall or fraternity/sorority house) and how many roommates they had. Number of roommates was recoded as 0, 1, and 2+ categories.

Health conditions. Dichotomous variables were created to represent whether participants had been diagnosed or treated for a physical health condition other than COVID-19 or a mental health condition in the past year. Participants selected from a list of twelve physical health conditions (e.g., diabetes, asthma) and 10 mental health conditions (e.g., depression, anxiety).

COVID-19 concerns. Participants were asked to indicate their level of concern for eleven pandemic-related statements (see Table 1). Response options included not at all (1), slightly (2), moderately (3), very (4), and extremely (5). Concern items were analyzed separately as ordinal variables, and a mean score for each individual concern item was also computed. An overall continuous concern score was computed for each participant by taking the mean of all concern items assessed.

COVID-19 prevention behaviors. Participants were assessed on their adherence to guidelines for three different prevention behaviors: hygiene, social distancing, and wearing a face mask in public when it was not required. Dichotomous variables were computed to represent following guidelines for hygiene and social distancing [very closely (1) or somewhat closely/not closely/not all (0)] as well as wearing a face mask [all the time (1) or most of the time/sometimes/rarely/never (0)].

COVID-19 experiences. Students indicated whether they had quarantined because of exposure to someone with COVID-19 since the start of the semester. Participants also indicated whether they had COVID-19 since the semester started: 1) yes, confirmed by a test; 2) probably (e.g., a healthcare provider told me that I likely had COVID-19, but it was not confirmed by a test); 3) maybe (e.g., I have had symptoms consistent with COVID-19, but it was not confirmed by a test); and 4) no (no symptoms or other reason to think I have had it). Participants who had a positive diagnosis confirmed by a test were coded as having had COVID-19.

Statistical Analysis

SPSS Version 26.0 was used for all analyses, with an alpha level of 0.05. Descriptive statistics were computed for all variables of interest. Bivariate analyses compared mean scores for individual concern items between participants with and without a history of a COVID-19 diagnosis. Multivariate linear and logistic regression models were used to predict COVID-19 concerns, prevention behaviors, and experiences from all other variables assessed, with all predictors simultaneously entered into the models.

Results

Descriptive statistics for the study sample and all study variables are provided in Table 2. The sample had a mean age of 20.6 years and was 74% female, 79% White, and 88% heterosexual/straight.

COVID-19 Concerns

Table 1 outlines participants' level of concern around eleven statements regarding the COVID-19 pandemic, separated by those with and without a history of a COVID-19 diagnosis. Based on the concern item means, students appeared to be most concerned about their loved ones dying from COVID-19 and the uncertainty of the future. Comparatively, students appeared to have the lowest levels of concern about their personal sense of safety and security and contracting COVID-19 either for the first time or again. Although the raw data show that students with a history of a COVID-19 diagnosis had generally higher concern levels related to the pandemic than those without a history of COVID-19, bivariate analyses yielded no statistically significant differences between these groups.

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Table 1. Concerns related to the COVID-19 pandemic among college students, by history of COVID-19 diagnosis

History of COVID-19 Diagnosis ^a	Level of Concern										Mean Item Score	
	Not at All		Slightly		Moderately		Very		Extremely		No	Yes
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes		
	%										<i>Mean (1-5)</i>	
Concern Item												
How long the COVID-19 pandemic will last	5.5	3.5	10.1	5.3	20.4	24.6	30.9	31.6	33.2	35.1	3.8	3.9
How many more people will become infected with COVID-19	13.7	10.5	13.9	14.0	25.4	31.6	25.0	28.1	22.1	15.8	3.3	3.3
How many more people will die as a result of COVID-19	8.6	12.3	14.9	12.3	22.7	12.3	25.8	24.6	27.9	38.6	3.5	3.7
Your personal sense of safety and security	23.5	24.6	18.7	21.1	21.2	17.5	19.7	15.8	16.8	21.1	2.9	2.9
Contracting COVID-19	23.7	-	23.3	-	20.4	-	14.1	-	18.5	-	2.8	-
Contracting COVID-19 again	-	42.1	-	14.0	-	12.3	-	12.3	-	19.3	-	2.5
People you care about contracting COVID-19	5.5	10.5	11.1	8.8	18.5	14.0	26.1	17.5	38.9	49.1	3.8	3.9
People you care about dying from COVID-19	6.7	7.0	8.2	5.3	14.5	14.0	20.4	8.8	50.2	64.9	4.0	4.2
Not being able to spend time with people you care about	6.1	5.3	9.5	5.3	18.1	17.5	31.5	29.8	34.9	42.1	3.8	4.0
Missing school milestones and events (e.g., sporting events, performances, graduation, etc.)	8.4	5.3	11.6	7.0	17.9	14.0	22.3	24.6	39.9	49.1	3.7	4.1
Uncertainty of the future	6.7	7.0	7.4	7.0	17.0	14.0	19.7	17.5	49.2	54.4	4.0	4.1

^aSince the start of the semester, $n=60$ students had received a positive diagnosis for COVID-19 and $n=483$ students had not.

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Correlates of COVID-19 Concerns

As seen in Table 2, being young, female, and having a mental health condition were all associated with higher concern scores. Additionally, in comparison to White students, African American/Black and Asian American/Asian students had higher concern scores. There were positive associations between adherence to all three prevention behaviors and the concern score.

Correlates of COVID-19 Prevention Behaviors

Half of the sample (50%) closely followed hygiene guidelines, 34% closely followed social distancing guidelines, and 29% always wore a mask in public when it was not required. Adhering to hygiene guidelines was associated with being African American/Black, having one roommate, having an increased concern score, and adhering to social distancing guidelines (see Table 2). Adhering to social distancing guidelines was associated with having an increased concern score and adhering to hygiene and mask wearing guidelines, while adhering to social distancing guidelines was less likely among those involved in Greek life and those with more than two roommates. Adhering to mask wearing guidelines was associated with being African American/Black, being Asian American/Asian, identifying as a sexual orientation other than heterosexual/straight, having an increased concern score, and adhering to social distancing guidelines. Adhering to mask wearing guidelines was less likely among those employed outside their home.

Correlates of COVID-19 Experiences

From the start of the semester, $n=60$ students (11%) had received a positive diagnosis for COVID-19, and $n=179$ students (33%) had quarantined due to exposure to COVID-19. As seen in Table 2, significant predictors for quarantine included being Asian American/Asian, taking classes both in-person and online, being involved in Greek life, and having a history of a positive COVID-19 diagnosis. Taking classes all online, being involved in Greek life, being a student athlete, and having quarantined sometime during the semester were significant predictors of receiving a positive COVID-19 diagnosis since the semester started.

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Table 2. Associations between individual characteristics and COVID-19 concerns, prevention behaviors, and experiences among college students ($n=544$)

	COVID-19 Concerns	COVID-19 Prevention Behaviors			COVID-19 Experiences		
		Very Closely Following Guidelines For:			Quarantine	Positive Diagnosis	
	Concern Score	Hygiene	Social Distancing	Mask Wearing			
<i>n (%) or Mean ± SD</i>	β (SE)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	
Individual Characteristics							
Age (18-63)	20.6 ± 3.8	-0.02 (0.01)*	1.01 (0.95, 1.07)	1.04 (0.97, 1.11)	1.05 (0.98, 1.12)	1.01 (0.95, 1.07)	0.97 (0.83, 1.13)
Sex							
Male	140 (25.7)	Reference	Reference	Reference	Reference	Reference	Reference
Female	404 (74.3)	0.22 (0.09)*	1.06 (0.65, 1.71)	1.57 (0.91, 2.69)	0.96 (0.56, 1.67)	1.50 (0.88, 2.54)	0.69 (0.29, 1.65)
Race/Ethnicity							
White	432 (79.4)	Reference	Reference	Reference	Reference	Reference	Reference
African American/Black	65 (11.9)	0.27 (0.13)*	2.14 (1.01, 4.53)*	1.61 (0.78, 3.32)	2.86 (1.45, 5.65)*	1.15 (0.57, 2.38)	0.97 (0.26, 3.62)
Asian American/Asian	22 (4.0)	0.54 (0.20)*	0.85 (0.28, 2.61)	1.28 (0.43, 3.87)	4.38 (1.46, 13.08)*	3.82 (1.39, 10.48)*	-
Other race/ethnicity	25 (4.6)	0.22 (0.18)	0.86 (0.33, 2.25)	1.08 (0.39, 2.96)	0.87 (0.30, 2.48)	0.69 (0.22, 2.15)	-
Sexual Orientation							
Heterosexual/straight	478 (87.9)	Reference	Reference	Reference	Reference	Reference	Reference
Other orientation	66 (12.1)	0.08 (0.12)	0.94 (0.49, 1.78)	1.41 (0.73, 2.72)	2.21 (1.18, 4.13)*	1.10 (0.57, 2.13)	1.10 (0.33, 3.74)
Employment							
Not employed	348 (64.0)	Reference	Reference	Reference	Reference	Reference	Reference
Employed from home	26 (4.8)	0.19 (0.18)	0.42 (0.16, 1.10)	1.84 (0.68, 4.97)	0.74 (0.26, 2.09)	0.61 (0.21, 1.80)	2.22 (0.48, 10.21)
Employed outside home	170 (31.3)	0.01 (0.09)	0.69 (0.44, 1.09)	1.01 (0.61, 1.68)	0.51 (0.31, 0.87)*	1.12 (0.70, 1.81)	0.98 (0.45, 2.16)
Class Format							

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All online	185 (34.0)	Reference	Reference	Reference	Reference	Reference	Reference
In-person and online	359 (66.0)	-0.02 (0.08)	0.95 (0.61, 1.47)	1.28 (0.78, 2.10)	0.65 (0.40, 1.07)	1.73 (1.07, 2.81)*	0.31 (0.15, 0.65)*
Greek Life Involvement							
No	357 (65.7)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	186 (34.3)	-0.03 (0.09)	0.88 (0.55, 1.41)	0.52 (0.30, 0.90)*	0.85 (0.49, 1.48)	2.10 (1.30, 3.39)*	3.13 (1.40, 6.98)*
Student Athlete							
No	501 (92.1)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	43 (7.9)	-0.15 (0.14)	0.99 (0.46, 2.14)	1.01 (0.41, 2.54)	1.03 (0.42, 2.53)	0.57 (0.24, 1.39)	4.05 (1.26, 13.02)*
Main Residence							
Off campus	361 (66.4)	Reference	Reference	Reference	Reference	Reference	Reference
On campus	183 (33.6)	0.04 (0.09)	0.91 (0.57, 1.48)	0.95 (0.56, 1.61)	1.01 (0.60, 1.70)	1.03 (0.63, 1.70)	0.85 (0.35, 2.03)
Roommates							
0	52 (9.6)	Reference	Reference	Reference	Reference	Reference	Reference
1	166 (30.5)	-0.12 (0.14)	2.24 (1.04, 4.84)*	0.49 (0.22, 1.06)	1.28 (0.59, 2.80)	0.99 (0.45, 2.19)	0.96 (0.22, 4.27)
2+	326 (59.9)	0.07 (0.13)	1.93 (0.92, 4.06)	0.37 (0.18, 0.79)*	1.04 (0.49, 2.19)	1.22 (0.58, 2.61)	0.76 (0.18, 3.22)
Past-Year Physical Health Condition							
No	467 (86.6)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	72 (13.4)	0.08 (0.11)	1.21 (0.66, 2.21)	1.65 (0.88, 3.08)	1.34 (0.71, 2.52)	1.13 (0.61, 2.10)	0.91 (0.30, 2.78)
Past-Year Mental Health Condition							
No	406 (74.6)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	138 (25.4)	0.25 (0.09)*	0.90 (0.56, 1.44)	1.03 (0.61, 1.75)	0.82 (0.48, 1.41)	0.93 (0.56, 1.55)	1.05 (0.46, 2.37)
COVID-19 Concerns							
Concern Score (1-5)	3.6 ± 0.9	-	1.91 (1.50, 2.43)*	1.46 (1.12, 1.91)*	1.42 (1.08, 1.88)*	0.96 (0.75, 1.23)	1.40 (0.90, 2.16)

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COVID-19 Prevention Behaviors							
Very Closely Following Hygiene Guidelines							
No	272 (50.1)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	271 (49.9)	0.45 (0.08)*	-	4.06 (2.52, 6.54)*	1.61 (0.99, 2.62)	1.36 (0.84, 2.19)	0.75 (0.34, 1.64)
Very Closely Following Social Distancing Guidelines							
No	358 (65.9)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	185 (34.1)	0.25 (0.09)*	3.97 (2.47, 6.39)*	-	3.67 (2.27, 5.94)*	0.83 (0.49, 1.40)	0.89 (0.35, 2.28)
Always Wears a Mask When Not Required							
No	381 (71.2)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	154 (28.8)	0.21 (0.09)*	1.54 (0.94, 2.53)	3.66 (2.25, 5.96)*	-	1.19 (0.70, 2.01)	1.45 (0.62, 3.40)
COVID-19 Experiences							
Quarantine							
No	364 (67.0)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	179 (33.0)	-0.02 (0.09)	1.37 (0.85, 2.19)	0.85 (0.50, 1.43)	1.17 (0.70, 1.98)	-	26.86 (10.43, 69.20)*
Positive Diagnosis							
No	483 (89.0)	Reference	Reference	Reference	Reference	Reference	Reference
Yes	60 (11.0)	0.17 (0.14)	0.92 (0.45, 1.88)	0.74 (0.32, 1.72)	1.37 (0.61, 3.08)	27.85 (10.96, 70.74)*	-

* $p < 0.05$ **Note.** SD = standard deviation; SE = standard error; AOR = adjusted odds ratio; CI = confidence interval.

Higher concern scores indicate higher levels of concern related to the COVID-19 pandemic.

Estimates are adjusted for all other predictors.

There were no students who identified as Asian American/Asian or other race/ethnicity who had been diagnosed with COVID-19.

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Discussion

This study adds to the growing body of research on COVID-19 among college students and among individuals residing in the southeastern region of the U.S. Specifically, we examined college students' level of concern about the COVID-19 pandemic and individual characteristics associated with COVID-19 concerns, prevention behaviors, and COVID-19 experiences.

Of the concerns assessed, students had the highest level of concern about people they loved dying from COVID-19. This finding is consistent with prior research which found that college students are more concerned about the health implications of COVID-19 for their families than for themselves (Cohen et al., 2020). Of note, concern levels did not differ between students who had and had not been diagnosed with COVID-19, suggesting that how students feel about the pandemic might not significantly shift based on personal experience with the disease. Being female and younger was associated with increased levels of concern, which aligns with prior research findings that women report greater pandemic-related fear than men (Alsharawy et al., 2021; Fitzpatrick et al., 2020) and that young adults have relatively low engagement in prevention behaviors compared to other adults (Hutchins et al., 2020; Baack et al., 2021).

The results of this study suggest that concern regarding the pandemic can lead to positive health behaviors, such as higher rates of following hygiene, social distancing, and mask wearing guidelines. However, caution should be taken when exploring this as a potential avenue for health promotion among college students. While raising awareness of the risk and consequences of the pandemic is imperative and may increase prevention behavior adherence (Harper et al., 2021), the mental health implications of fear-based messaging should be considered. A study by Kecojovic et al. (2020) found that college students with higher levels of concern about COVID-19 also had higher levels of anxiety and somatization, and X. Wang et al. (2020) cited uncertainty regarding the pandemic as a leading reason for increased stress among college students. Similarly, the current study found that students with a mental health disorder had higher levels of concern compared to those without a mental health disorder.

Strict adherence to prevention behaviors in this sample was low, with 50%, 34%, and 29% of students closely adhering to hygiene, social distancing, and mask wearing guidelines, respectively. These estimates are lower than those found in prior studies of young adults (Czeisler et al., 2020) and college students (Cohen et al., 2020), but it is difficult to compare prevalence of prevention behaviors in this sample to prior research given differences in the timing and location of data collection and the measures used to assess health behavior. Many prior studies assessed prevention behaviors during the onset of the pandemic in Spring 2020, and changes in health behavior can be hypothesized after students returned to campus in Fall 2020, when data from the current study was collected.

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In this sample, race/ethnicity was significantly associated with prevention behaviors. Compared to White students, African American/Black students were more likely to follow hygiene guidelines, and both African American/Black and Asian American/Asian students were more likely to follow mask wearing guidelines. This finding may be due to increased levels of pandemic-related concern among non-White individuals (Fitzpatrick et al., 2020; Orom et al., 2021), a finding also found in the current study, which may stem from racial/ethnic disparities in COVID-19 cases and deaths in the general population (Yancy, 2020; CDC, 2021b). Prior research in the general adult population has also found that non-White individuals are more likely to engage in COVID-19 prevention behaviors when compared to White individuals (Bruine de Bruin et al., 2020; Orom et al., 2021; Hearne et al., 2021) as well as change their health behaviors to protect themselves during the pandemic (Papageorge et al., 2021).

Of note, Asian American/Asian students in the current study were not only more likely to engage in mask wearing than White students, but they were also more likely to have quarantined due to exposure to COVID-19. This finding might be due to cultural differences between Asian American/Asian students and their peers of other racial/ethnic groups that make them more cautious. In Asian countries, there is a long history of using protective masks and isolating when ill and during public health crises. According to Ren et al. (2021) this is primarily based in the idea of collective action to promote the common good.

Particular student groups appear to be less likely to engage in certain prevention behaviors. Being heterosexual/straight and being employed outside the home were both associated with decreased likelihood of following mask wearing guidelines. LGBTQ+ individuals are at high-risk for COVID-19 (Heslin et al., 2021) and may rely heavily on mask wearing to continue receiving needed social support (Salerno et al., 2020), potentially contributing to an increased likelihood of engaging in prevention behaviors. While many employers have required their employees to wear masks in the workplace during the pandemic, the assessment question used in the current study specifically asked about wearing masks when not required. Our finding that students employed outside the home were less likely to follow mask guidelines is consistent with a study by Papageorge et al. (2021) which found that people who transitioned to telework were more likely to change their behavior to protect themselves from COVID-19 than those who continued to work outside the home. Lastly, as compared to those living alone, students with one roommate had increased engagement in hygiene behaviors, perhaps as a means of protecting themselves when sharing a living space. Students with two or more roommates appeared to have more difficulty adhering to social distancing guidelines.

Class format and extracurricular involvement were notable predictors of exposure to and diagnosis of COVID-19 in the current study. This is potentially due to increased contact with members of the university community and movement around campus. Taking in-person as opposed to all online classes was associated with increased risk for COVID-19 exposure and the

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need to quarantine, confirming research findings on COVID-19 spread during the reopening of colleges and universities in Fall 2020 (Walke et al., 2020).

Student athletes were four times as likely to have had COVID-19 than non-athletes, which could be explained by high levels of social contact with teammates and athletic staff. Frequent required testing in order to be able to participate in athletic events and travel could also explain the increased likelihood of contracting COVID-19.

Prior research has linked involvement in Greek life with the spread of COVID-19 (Vang et al., 2021) and other infectious diseases (Iuliano et al., 2009). These findings align with findings from the current study that involvement in Greek life was associated with decreased social distancing and the increased likelihood of COVID-19 exposure and diagnosis. Interestingly, students taking all online classes were more likely to have had COVID-19, potentially because they opted for fully online learning after their diagnosis.

Contrary to hypotheses, no significant associations were found between having a physical health condition and COVID-19 concern, prevention behavior, exposure, or diagnosis. It is well-known that specific underlying health conditions such as obesity, cardiovascular disease, chronic lung diseases, and diabetes are associated with severe illness and death from COVID-19 (CDC, 2021d; Stokes et al., 2020). It is possible that young adults with physical health conditions feel they are at low risk for a severe case of COVID-19 due to their young age, and prior research supports the notion that prevalence of severe COVID-19 outcomes (e.g., hospitalization and death) increases with age regardless of underlying health conditions (Stokes et al., 2020). However, it should be noted that COVID-19 hospitalizations are six times higher, and deaths are twelve times higher, among those with underlying conditions compared to those with none (Stokes et al., 2020).

Study findings should be considered in light of its limitations. This research was conducted at a single university, limiting the generalization of the results. Additionally, the study sample may not reflect the university's population, as only undergraduate students were assessed and the sample was majority female. Due to the rapidly changing nature of the pandemic, the results of this study should be interpreted based on the context of when and where the research was conducted (final weeks of the Fall 2020 semester and in the southeastern U.S.). The cross-sectional study design does not allow for causal effects to be analyzed, highlighting the need for future longitudinal research conducted at multiple colleges and universities.

Implications for Research and Practice

Despite these limitations, this study adds to the growing field of research on the individual correlations of COVID-19 experiences, with particular attention paid to the high-risk nature of

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college campuses and the southeastern region of the U.S. As the pandemic enters its third year, prevention behaviors such as hygiene practices, social distancing, and mask wearing continue to be important tools for preventing the spread of COVID-19. Study results suggest that educating college students on the reality of pandemic severity and the risk to themselves and others could be a useful strategy for increasing and maintaining the use of prevention behaviors, particularly as colleges and universities ease behavior mandates.

A notable study of the general population by Clark et al. (2020) found that beliefs that taking health precautions are effective and concern for one's own health are important predictors of COVID-19 prevention behavior, including following government rules, taking health precautions, and encouraging other people to do the same. Students should be presented with evidence of the effectiveness of prevention behaviors such as wearing masks and getting vaccinated, and universities should continue to consider mandating COVID-19 prevention behaviors when appropriate to control the spread of COVID-19 (Chu et al., 2020).

There is an emerging line of research exploring the theoretical factors that drive prevention behavior during the COVID-19 pandemic, which could play an important role in designing public health messaging campaigns and intervention efforts moving forward. Researchers have used the Multi-Theory Model of Health Behavior Change [MTM; (Sharma, 2015)] to explain the initiation and sustenance of handwashing and mask wearing behavior among college students. Davis et al. (2021) found that behavioral confidence (i.e., confidence of engaging in a health behavior) was the MTM construct that most strongly predicted initiation of mask wearing, and emotional transformation (i.e., one's ability to direct emotions toward behavioral change) was the strongest predictor of the intent to continue wearing a mask. MTM was also used to explain handwashing behavior among college students in a study by Sharma et al. (2021), which found similar results. The use of health behavior theory might be particularly salient when designing targeted educational programs for college student subgroups identified in the current study as less likely to engage in prevention behaviors, such as employed students and students involved in Greek life. Future research should examine the effectiveness of intervention programs grounded in health behavior theory that promote COVID-19 prevention behaviors among high-risk student subgroups.

Universities should continue to provide opportunities for academic and social events that adhere to current public health guidelines. These guidelines include meeting ventilation and cleaning standards in campus spaces and holding activities outdoors in areas that can promote physical distancing (CDC, 2021e). Ideally, providing such opportunities will allow students to learn, receive needed social support, and participate in extracurricular activities while minimizing risk to health and safety. Efforts should be made to emphasize the importance of limiting the frequency and size of large social gatherings, especially when physical distancing is not possible.

Clear, accurate, and transparent messaging to the campus community should provide health information, promote healthy behavior, and link to resources. For example, signs about prevention strategies containing visual cues (e.g., the correct way to wear a mask) should be posted in highly visible locations such as building entrances. Additionally, university protocol should be consistently updated to align with the state of the pandemic and current research, and COVID-19 vaccinations should be encouraged and readily provided to faculty, staff, and students. As college students continue to experience pandemic fatigue, it is imperative that colleges and universities remain vigilant in their efforts to decrease COVID-19 spread on campus and to the surrounding communities.

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