Original article

College Student-athletes’ COVID-19 Worry and Psychological Distress Differed by Gender, Race, and Exposure to COVID-19-related Events

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Article history: Received September 12, 2021; Accepted December 22, 2021
Keywords: Gender differences; Race differences; Stress; College students; COVID worry; Psychological distress; Psychological stress

ABSTRACT

Purpose: The purpose of this study was to determine the prevalence of National Collegiate Athletic Association (NCAA) student-athletes’ exposure to COVID-19–related events (e.g., canceled season, diagnosed with COVID) and their psychological distress in April/May 2020.

Methods: The link to the online survey was emailed to NCAA student-athletes by the NCAA Student Athlete Advisory Council and the athletic departments of 80 NCAA institutions. In April–May of 2020, student-athletes (N = 5915; women = 3924) completed the online survey once. The survey included measures of their psychological distress, COVID-19 worry, and their exposure to different COVID-19–related events. To examine differences in exposure to COVID-related events by racial, ethnicity, and gender identities, we conducted logistic regressions. A path analysis examined relationships between COVID-related events, COVID-19 worry, and psychological distress for men and women.

Results: Student-athletes’ exposure to COVID-19 events differed significantly by gender, race, and ethnicity. In addition, 58.7% of women’s and 54.5% of men’s psychological distress variance was explained by the path model and mostly by their COVID-related worry. Student-athletes’ stress was directly related to the changes that occurred in class delivery (i.e., online format) and indirectly by being quarantined. Men’s psychological distress was also related through worry by their sport season being canceled.

Discussion: The general uncertainty and worry about COVID individuals experienced at the beginning of this pandemic primarily explained the athletes’ high levels of psychological distress. As COVID-19 continues to cause quarantines and changes educational experiences, the worry and psychological distress of college students are likely to continue.

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Conflict of interest: The authors have no conflict of interest to declare.

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The COVID-19 pandemic profoundly changed US college students’ lives when universities closed their campuses, forcing them to find alternative housing and to navigate classes that went from in-person to almost completely online. For college student-athletes, most also had to cope with the cancellation of collegiate sports in March 2020 [1] and the resultant loss of a

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https://doi.org/10.1016/j.jadohealth.2021.12.022
primary identity (i.e., being an athlete). This pandemic, and its disruptions to athletes’ lives, would be expected to increase their worries, particularly in its early phases when little was known about its course or infectiousness [2]. Extending from smaller, methodologically limited studies of college student-athletes’ psychological reactions during COVID [3,4], we surveyed nearly 6,000 National Collegiate Athletic Association (NCAA) collegiate athletes from across the United States to examine their experiences of COVID-19–related events (e.g., having to quarantine) and how such experiences related to their COVID worry and psychological distress.

In the aftermath of past disasters, such as the September 11th terrorist attacks and hurricane Katrina, researchers have documented increased worries in individuals’ levels of worry, such as about their own safety and that of family and friends [5,6]. In relation to the current COVID-19 pandemic, in studies of nonathlete adults, worry and psychological distress at the start of the pandemic were found to vary by demographics, such as gender and race [7,8]. Specifically, women reported significantly more fear and worry regarding COVID-19 than men; Hispanics and Asians reported higher levels than their non-Hispanic or non-Asian peers [9]. Across these studies, individuals’ worry also was positively correlated with their reported levels of anxiety or psychological distress. Furthermore, in studies of NCAA division I and III athletes, COVID-related anxiety was positively related to their general anxiety and psychological distress, suggesting that student-athletes also were being affected by the pandemic [3,4]. Although providing important preliminary findings, these initial studies with college student-athletes have been limited by relatively small, homogenous samples (e.g., NCAA division I athletes drawn from a single institution) and by not considering the experiences of athletes who represent traditionally marginalized groups (i.e., Black, Native American/Alaska Native, Asian/Asian American/Pacific Islander, biracial/mixed). Research that addresses these limitations is needed for two reasons. First, social and financial inequities exist across racial/ethnic populations, and such inequities are tied directly to disparities in physical and psychological health [10–12]. Second, without analyses across gender and race/ethnicity, there would be a lack of data to guide how institutions may intervene with, and successfully support, all their student-athletes.

In the weeks after the classification of COVID-19 as a pandemic and the NCAA’s cancellation of all sports, we surveyed student-athletes about their exposure to COVID-19–related events (i.e., having to quarantine, self or others’ COVID diagnosis, loss of campus housing, cancellation of sport season/championship), their current worry about COVID-19, and their general levels of psychological distress. We hypothesized that student-athletes’ exposure to COVID-19 events would differ across race, gender, and ethnicity in ways similar to what has been found in the general population [7,8]. For example, we expected higher percentages of Black and Latinx student-athletes, than White, to have experiences with being quarantined or diagnosed with COVID-19. Similar to research with nonathlete adults [9,13], we hypothesized that athletes’ level of exposure to COVID-19 events would be related directly to their psychological distress, but also would be indirect through increases in their COVID worry. We tested these indirect effects separately by gender to account for effects that had been found in nonathlete adults [7]. Given our methodology, our purpose was not to test causation, but to understand how, at the beginning of COVID-19, exposure to new and different pandemic-related events was differentially associated with worry and psychological distress. We focused on athletes because, among college students, they experienced not only all the general disruption that occurred within society (e.g., social isolation) and higher education (e.g., move to an online learning format) as a result of COVID-19, but also the unique, and unprecedented, stressors associated with having collegiate sports canceled.

Methods

Participants

Participants were 5915 US collegiate athletes (women = 3924, Mage = 20.0 years, standard deviation = 1.3; men = 1975, Mage = 20.2 years, standard deviation = 1.5); 15 (0.25%) student-athletes selected a gender identity category other than man/woman, including transgender, nonbinary, or prefer not to disclose. The majority identified as White (78%; n = 4614), then Black (13%; n = 745), Asian American (4%; n = 217), Native American (0.5%; n = 27), and biracial/mixed (2%; n = 132); 9% (n = 558) identified as Hispanic/Latinx. Student-athletes represented all three NCAA divisions (DI = 71.6%, DII = 13.4%, and DIII = 14.1%) and every NCAA sport participated, such as soccer (12.0%), track and field (10.5%), football (9.0%), swimming and diving (8.0%), softball (7.4%), basketball (6.8%), volleyball (5.9%), cross country (5.5%), baseball (5.1%), and lacrosse (4.4%), to name a few (For a full list of the sports participants reported engaging in, see Author, et al., 2020). Student-athletes’ sport participation covered all three possible seasons: Fall sports (39%), winter sports (21%), and spring sports (38%). Although spring sports were the most obviously affected, the reality is that many winter sport teams had their conference tournaments disrupted, and Fall sport teams were in the midst of spring training and competitions when they were halted. Thus, athletes across all sport seasons were affected and included in our analyses.

Procedures

On institutional review board approval from our university, we solicited the involvement of NCAA athletic departments at all divisional levels (I, II, and III) to assist in disseminating information about our study to their student-athletes. Participating athletic departments sent their student-athletes a standardized message about the study, including its purpose (i.e., an examination of student-athletes’ psychological well-being during COVID-19) and the survey link; data collection occurred from mid-April to mid-May 2020. For context, in the week before our survey started, the United States became the global leader in related deaths, surpassing Italy, and racial disparities in COVID-19–related deaths were reported by the Chicago Tribune as 68% of COVID-19–related deaths were among Chicago’s Black community [14]. States were changing their quarantine status during April and May, with some reopening and then reclosing [14]. The week before our data collection closed, the unemployment rate in the United States reached 14.7% [14].

Athletes provided consent and then voluntarily completed the measures, which took approximately 15 minutes. The scales were presented to participants in a random order using the block randomizer in Qualtrics to avoid any presentation order effects or any incomplete surveys all missing responses on the same scales. They were given the opportunity to enter themselves into a random drawing to win one of four $200 Amazon e-gift cards.
Measures

Given that we collected our data at the beginning of COVID-19 in April 2020, we had to either rely on existing measures that we could modify for this pandemic (e.g., Worry Scale) or develop specific measures based on the experiences being reported in the news in relation to how individuals were being affected by COVID-19 (i.e., COVID-19 exposure). In this process, we also considered the unique experiences of college student-athletes.

Demographics

Participants provided their gender identity (i.e., man, woman, transgender, nonbinary, prefer not to disclose, prefer to self-identify), race, ethnicity, and age, as well as their sport.

Psychological distress

We assessed psychological stress with the 10-item Perceived Stress Scale [15]. For each item, such as “How often have you been upset because of something that happened unexpectedly?”, athletes responded from never (0) to very often (4) based on their experiences over the last two weeks. The total score was the sum of the items; higher scores indicated more perceived stress. Reliability was acceptable within our sample (Cronbach’s alpha = 0.79).

Worry

We adapted three items of the Children’s Worry Scale [5], which has been used with both children and their parents, to address the student-athletes’ worry about the COVID-19 pandemic. The three items were (1) “How worried have you been about the novel coronavirus (COVID-19)?”, (2) “How bothered or upset are you about the novel coronavirus (COVID-19)?”, and (3) “How much do you talk to others about the novel coronavirus (COVID-19)?”. For each item, athletes responded from hardly at all (1) to a lot (4) based on their feelings over the last two weeks; the scale score was the mean of the three items, and higher scores represented more worry. Reliability was acceptable within our sample (Cronbach’s alpha = 0.66; not significantly different from 0.70, F(5914, 11,828) = 0.868, p = 1.00).

COVID-19 exposure

Based on our review of media reports regarding the events that were being experienced in the general population [1,2,16], and specifically among college student-athletes, we identified five key COVID-19-related events, including was your sport season canceled, were you required to leave your campus housing, did you expect that changes in how your academic courses were delivered would negatively affect your school performance, had you (or someone close to you) been quarantined, and had you (or someone close to you) been diagnosed with COVID-19. Athletes responded yes/no to indicate if they had experienced the event since March 1, 2020 up to when they completed our survey. Exposure to an item was based on a yes response.

Plan of analysis

Data passed screening for normality. Data missingness was examined at the item level, and Little’s MCAR test was nonsignificant after accounting for individuals’ gender identity and race/ethnicity identities, supporting that missingness was a missing-at-random process and met the standard for being handled with multiple imputation [17]. We conducted the multiple imputation in PcAux [18] at the item level following best practice recommendations [17,19–21]. Imputing the data improves generalizability and reduces bias compared with using complete data (i.e., listwise deletion) [17].

First, we conducted logistic regression models in SPSS to compare the COVID-19 exposure item endorsements by participants’ self-reported gender, racial, and ethnic identities. The odds of endorsement of the COVID-19 exposure item were calculated for each demographic identity (e.g., racial identity) compared with a reference group within that identity variable (e.g., White when considering race). Odds ratios greater than 1, such as 2, mean the odds of endorsement were twice as high for the analysis group compared with the reference group; a value of 0.50 means the odds of endorsement were 50% less compared with the reference group. Because only 15 student-athletes selected a gender identity other than man or woman, and combining these gender categories into one would be inappropriate and nonrepresentative, we were unable to include these student-athletes in our gender identity-related analyses. Thus, for all analyses, when we report on men or women student-athletes, this refers only to student-athletes who identified as cisgender men or cisgender women.

Second, given that past research has consistently found mean differences in perceived worry and psychological distress between men and women [3,4,7,8,22], we conducted a two-group (i.e., men and women) path analysis to examine both the indirect relationships of COVID-19 exposures to psychological distress through worry and moderation of these relationships by gender identity; because differences emerged in our racial and ethnic comparisons on COVID event exposure (see results), we controlled for these two variables in the path analysis. We used path analysis, rather than structural equation model analysis, because the COVID exposure items were single indicator items, and we could not account for any measurement error within them [23]. Methodologists have shown that the measurement and reliability characteristics of model variables can affect the quality of parameter estimates [24,25]. Gonzalez and Mackinnon’s [26] simulation research supported the fact that, whether variables are manifest or latent, the model will be able to capture the significant relationships, although such relationships may be slightly attenuated. Given the lack of reliability information on the COVID exposure items, we were willing to accept slight attenuation, rather than use a mixed structural equation modeling in which the items’ measurement error could produce model misfit and altered parameter estimates that were not controllable or predictable [26]. First, we fit the saturated path model with all direct and indirect paths uniquely estimated in both groups (i.e., men and women). Second, we tested homogeneity of the regression coefficients across the two-group path model with the nested model chi-square difference test (Δχ² ≤ 0.05). Third, the nonsignificant paths were pruned, also based on the nested model chi-square test (Δχ² ≤ 0.05). Bias-corrected accelerated 95% confidence intervals (CIs) were determined with 10,000 samples for direct and indirect effects. Finally, model
| COVID-19 item | Actual n (%) item endorsed | B    | S.E. | Wald  | p     | Exp(B) | 95% C.I. for Exp(B) |
|--------------|---------------------------|------|------|-------|-------|--------|---------------------|
| **Gender**   |                           |      |      |       |       |        |                     |
| Man (reference group) | 1,230 (62%) | 0.20 | 0.058 | 11.96 | <.001 | 1.22   | 1.090 1.366        |
| Woman       | 2622 (67%)                |      |      |       |       |        |                     |
| **Race**    |                           |      |      |       |       |        |                     |
| White/Caucasian (reference group) | 3,081 (67%) | -0.42 | 0.080 | 26.970 | <.001 | 0.66   | 0.563 0.772        |
| Black/African-American | 424 (57%) |      |      |       |       |        |                     |
| Native American/Alaska Native | 19 (70%) | 0.17 | 0.423 | 0.168 | .682  | 1.19   | 0.519 2.722        |
| Asian/Asian American/Pacific Islander | 147 (68%) | 0.050 | 0.149 | 0.114 | .796  | 1.05   | 0.786 1.407        |
| Mixed/Biracial | 80 (61%) | -0.26 | 0.181 | 2.084 | .149  | 0.77   | 0.540 1.098        |
| **Ethnicity** |                           |      |      |       |       |        |                     |
| Non-Hispanic/Latinx (reference group) | 3,474 (65%) | 0.197 | 0.096 | 4.206 | .040  | 1.22   | 1.009 1.470        |
| Hispanic/Latinx | 386 (69%) | 0.175 | 0.096 | 4.206 | .040  | 1.22   | 1.009 1.470        |
| **COVID-19 item 2: Were you required to leave your campus housing and move in somewhere else due to the virus?** | | | | | | | |
| Gender |                           |      |      |       |       |        |                     |
| Man (reference group) | 1,161 (59%) | -0.07 | 0.056 | 1.637 | .201  | 0.931  | 0.834 1.039        |
| Woman       | 2,239 (57%)                |      |      |       |       |        |                     |
| Race |                           |      |      |       |       |        |                     |
| White/Caucasian (reference group) | 2,650 (57%) | 0.23 | 0.081 | 7.672 | .006  | 1.253  | 1.068 1.469        |
| Black/African-American | 468 (63%) |      |      |       |       |        |                     |
| Native American/Alaska Native | 10 (37%) | -0.83 | 0.400 | 2.473 | .039  | 0.438  | 0.200 0.958        |
| Asian/Asian American/Pacific Islander | 117 (54%) | -0.14 | 0.139 | 0.085 | .771  | 0.949  | 0.670 1.345        |
| Mixed/Biracial | 74 (56%) | -0.05 | 0.178 | 0.085 | .771  | 0.949  | 0.670 1.345        |
| **Ethnicity** |                           |      |      |       |       |        |                     |
| Non-Hispanic/Latinx (reference group) | 3,108 (58%) | -0.18 | 0.089 | 3.906 | .048  | 0.838  | 0.704 0.999        |
| Hispanic/Latinx | 301 (44%) |      |      |       |       |        |                     |
| **COVID-19 item 3: Do you expect that the changes your school has made in how classes are delivered will negatively affect your academic performance this semester?** | | | | | | | |
| Gender |                           |      |      |       |       |        |                     |
| Man (reference group) | 911 (46%) | -0.05 | 0.055 | 0.944 | .331  | 0.948  | 0.850 1.056        |
| Woman       | 1,760 (45%)                |      |      |       |       |        |                     |
| Race |                           |      |      |       |       |        |                     |
| White/Caucasian (reference group) | 2,073 (45%) | 0.11 | 0.079 | 1.940 | .164  | 1.116  | 0.956 1.303        |
| Black/African-American | 355 (47%) |      |      |       |       |        |                     |
| Native American/Alaska Native | 11 (41%) | -0.17 | 0.393 | 0.183 | .669  | 0.845  | 0.391 1.826        |
| Asian/Asian American/Pacific Islander | 117 (54%) | 0.36 | 0.139 | 6.811 | .009  | 1.439  | 1.095 1.891        |
| Mixed/Biracial | 51 (39%) | -0.26 | 0.181 | 1.995 | .158  | 0.774  | 0.543 1.104        |
| **Ethnicity** |                           |      |      |       |       |        |                     |
| Non-Hispanic/Latinx (reference group) | 2,430 (45%) | -0.04 | 0.089 | 0.158 | .691  | 0.965  | 0.810 1.150        |
| Hispanic/Latinx | 248 (44%) |      |      |       |       |        |                     |
| **COVID-19 item 4: Have you, or someone close to you, been quarantined due to the possibility of having the COVID-19 virus?** | | | | | | | |
| Gender |                           |      |      |       |       |        |                     |
| Man (reference group) | 295 (15%) | -0.05 | 0.085 | 0.360 | .548  | 0.950  | 0.804 1.123        |
| Woman       | 670 (15%)                |      |      |       |       |        |                     |
| Race |                           |      |      |       |       |        |                     |
| White/Caucasian (reference group) | 1,476 (32%) | -0.05 | 0.085 | 0.360 | .548  | 0.950  | 0.804 1.123        |
| Black/African-American | 230 (31%) |      |      |       |       |        |                     |
| Native American/Alaska Native | 9 (33%) | 0.06 | 0.409 | 0.024 | .876  | 1.066  | 0.478 2.378        |
| Asian/Asian American/Pacific Islander | 75 (35%) | 0.12 | 0.146 | 0.657 | .418  | 1.126  | 0.845 1.499        |
| Mixed/Biracial | 49 (37%) | 0.23 | 0.183 | 1.578 | .209  | 1.258  | 0.879 1.801        |
| **Ethnicity** |                           |      |      |       |       |        |                     |
| Non-Hispanic/Latinx (reference group) | 1,705 (32%) | 0.006 | 0.095 | 0.004 | .947  | 1.006  | 0.835 1.213        |
| Hispanic/Latinx | 179 (32%) |      |      |       |       |        |                     |
| **COVID-19 item 5: Have you, or someone close to you, been diagnosed with the COVID-19 virus?** | | | | | | | |
| Gender |                           |      |      |       |       |        |                     |
| Man (reference group) | 295 (15%) | 0.03 | 0.077 | 0.120 | .729  | 1.027  | 0.883 1.195        |
| Woman       | 596 (15%)                |      |      |       |       |        |                     |
| Race |                           |      |      |       |       |        |                     |
| White/Caucasian (reference group) | 670 (15%) | 0.28 | 0.103 | 7.487 | .006  | 1.327  | 1.084 1.625        |
| Black/African-American | 137 (18%) | 0.73 | 0.441 | 2.700 | .100  | 2.064  | 0.870 4.901        |
| Native American/Alaska Native | 7 (26%) | 0.06 | 0.194 | 0.084 | .771  | 1.058  | 0.724 1.546        |
| Asian/Asian American/Pacific Islander | 33 (15%) | 0.17 | 0.237 | 0.485 | .486  | 1.180  | 0.741 1.878        |
| Mixed/Biracial | 22 (17%) | 0.17 | 0.237 | 0.485 | .486  | 1.180  | 0.741 1.878        |
After pruning the nonsignificant paths to worry and psychological distress, representing the total amount of variance the model explained.

**Results**

With respect to the five COVID-19 events, for the full sample, student-athletes had their sport season/championship canceled (65%), were required to leave campus housing (58%), were expected to have their academic performance negatively affected (45%), had been personally, or someone close to them had been, quarantined (32%), and had been personally, or someone close to them had been, diagnosed with COVID-19 (15%). Regarding race, gender identity, and ethnicity, we present only significant differences from the logistic models here (Table 1).

For the COVID-19 event, having sport season/championship canceled, both women and Latinx student-athletes were 1.22 times more likely to have had this happen than men and non-Latinx student-athletes, respectively; Black student-athletes were 0.66 times less likely to have experienced sport season cancellation. Black student-athletes were 1.25 times more likely, and Native American (0.44) and Latinx (0.84) less likely, to have been required to leave their campus housing than White student-athletes. Only one racial effect emerged for academic performance being negatively affected: Asian American student-athletes were 1.16 times more likely to have had this happen than men and non-Latinx student-athletes. For being quarantined, women student-athletes were 1.16 times more likely to have experienced this than men student-athletes. Finally, Black (1.33) and Native American (2.06) student-athletes were more likely to have been diagnosed with COVID-19 than White student-athletes.

**Path analysis**

First, we ran the saturated (i.e., all direct and indirect regression paths specified) two-group (i.e., men and women) path model, which fit perfectly as expected ($\chi^2 = 0.00$, comparative fit index (CFI) = 1.00; Tucker Lewis Index (TLI) = 1.00; Standardized Root Mean Square Residual (SRMR) = 0.00; Root Mean Square Error of Approximation (RMSEA) = 0.00). Second, we conducted an omnibus test of homogeneity of the regression coefficients (i.e., constraining coefficients to equality across men and women) to determine if gender identity was a moderator; the nested chi-square test was significant ($\Delta \chi^2 = 67.035, p < .001$), indicating that the relationships among the variables were moderated by gender identity. We then conducted nested chi-square tests of the individual regression paths. After pruning the nonsignificant paths to worry and psychological distress for men and women in this two-group path model, the final model fit was very good and nonsignificantly different from the saturated model ($\chi^2 = 16.784, CFI = 0.999$; TLI = 0.999; SRMR = 0.010; RMSEA = 0.008). As different paths were nonsignificant for the women’s and men’s portions of the two-group model, we report the results for the women’s portion of the model first and the men’s portion second.

In the final model for the women student-athletes, their expectations that their academic performances would be negatively affected were related directly, and significantly, to their psychological distress ($b = 1.70, 95\% \text{ BCA CI } [1.269, 2.117]$); such expectations were also indirectly related to psychological distress through increases in COVID worry ($b = 1.162, 95\% \text{ BCA CI } [0.677, 1.648]$). The only other COVID event that contributed significantly was being quarantined, which was indirectly related to their psychological distress through increases in COVID worry ($b = 1.047, 95\% \text{ BCA CI } [0.529, 1.572]$). Thus, three COVID exposure items (i.e., season canceled, housing change, and having COVID diagnosis) were not related significantly to the women student-athletes’ worry or psychological distress. Overall, these significant direct and indirect effects accounted for 58.7% of the variance in psychological distress (Figure 1A).

In the final model for the men student-athletes, three COVID events contributed significantly, either directly or indirectly, to psychological distress. As with the women, expecting to have a negative academic outcome was related directly to more psychological distress ($b = 1.40, 95\% \text{ BCA CI } [0.793, 1.985]$). Being quarantined ($b = 1.094, 95\% \text{ BCA CI } [0.386, 1.777]$) and having their sports canceled ($b = 1.82, 95\% \text{ BCA CI } [1.129, 2.477]$) were indirectly related to psychological distress through higher levels of worry. Thus, two COVID exposure items (i.e., housing change and COVID diagnosis) did not significantly relate to the men’s worry or psychological distress. Overall, these significant direct and indirect effects accounted for 54.5% of the variance in psychological distress (Figure 1B).

**Discussion**

Our first purpose was to examine student-athletes’ rates of exposure to five different COVID-19–related events—sport season canceled, were required to leave campus housing, expected to have their academic performance negatively affected by course delivery changes, had been personally, or someone close to them had been, quarantined, and had been personally, or someone close to them had been, diagnosed with COVID-19—one to two months after the declaration of a pandemic and the cancellation of collegiate sports. Given the NCAA’s decisions regarding sport participation and the pedagogical shifts instituted across US colleges/universities, it is not surprising that so many student-athletes reported having their sport seasons canceled (65%), needing to find off-campus housing (58%), and expecting their academic performance to be negatively affected by their schools’ shift to an online/virtual modality (45%).
these events, differences due to gender identity, race, and ethnicity did emerge. With regard to sport seasons being canceled, differences were based on gender identity, race, and ethnicity, all of which may be explained through the demographics of the athletes who were participating in spring sports. For example, sport season/championship cancellation was less likely for Black and men student-athletes than for White and women student-athletes. Over a third of Black athletes (37.4%) and men athletes (37.5%) play football, which is considered a Fall sport and thus not directly canceled by the pandemic [27]. Related to the increased experience of sport cancellation among Latinx/Hispanic athletes, baseball (canceled spring sport) accounts for 9% of all Latinx/Hispanic student-athletes. Thus, the identity-related differences seen in our study regarding sport season/cancellation experience may have been due to the demographics of the sports that were most directly affected.

With regard to being displaced in their living situations, Black student-athletes were disproportionately affected, which is consistent with what was occurring in the broader society [28]. From the start of the COVID-19 pandemic and into the summer and Fall of 2020, unemployment rates increased disproportionately for Black and Latinx communities, as well as for women [29]. Increased unemployment led to increased rates of poverty and food insecurity [30,31]. The effects that COVID-19 had on historically marginalized communities amplified existing racial inequalities in health and health care access, poverty, employment, housing, and food insecurity that have been caused by systemic racism [30-32].

As we collected our data within one to two months of COVID-19 being declared a pandemic within the United States, we were a bit alarmed by the percentages of student-athletes, themselves or someone close to them, who had either been quarantined

Figure 1. Regression models with significant predictors of psychological distress and worry over COVID-19 for women and men student-athletes after controlling for race and ethnicity.
(32%) or diagnosed (15%) due to COVID-19. Similar to the larger US population, disproportionate effects emerged by gender and race across these two events [33]. For example, women student-athletes were more likely to have been quarantined, whereas the Black and Native American student-athletes were more likely to have experienced a COVID-19 diagnosis. To date, the longer-term effects of such disproportionate exposure rates have been devastating for nonathlete adults’ physical and psychological well-being, including higher rates of death [34,35]. Longitudinal studies are needed to determine if student-athletes’, whether themselves or in relation to their families, experiences with COVID-19 illness lead to similar detrimental effects to their longer-term physical and psychological health.

Regarding our second purpose, we considered how exposure to the five COVID-19 events might relate to the student-athletes’ levels of psychological distress—directly, but also indirectly through increased worry about COVID. For both men and women student-athletes, over 50% of their psychological distress variance was explained, primarily by their heightened worry about COVID-19. Our results are similar to those reported a study of student-athletes drawn from a single NCAA division I institution [4]. In that study, the authors found that COVID-19 anxiety, a measure similar to our COVID-19 worry, was related to higher levels of psychological distress, anxiety, and depression (r ranged from 0.45 to 0.46). That our student-athletes’ psychological distress was explained not only through their direct experience of COVID-19 events, but their general worry about COVID-19, parallels findings from research on other community-wide traumatic events [5,6].

Of the five COVID-19 events, two were particularly relevant in understanding the student-athletes’ psychological distress, regardless of gender identity. Not surprisingly, having been quarantined (themselves or someone close to them) due to COVID-19 was related to the athletes experiencing more psychological distress indirectly through increases in COVID-19 worry. In a study conducted during the same timeframe with adults drawn from 41 countries, the authors found that worry about COVID-19 was related to higher levels of psychological distress as measured by the Perceived Stress Scale [36]. Furthermore, for both the men and women student-athletes, believing that changes in course delivery would have a negative effect on their academic performances was associated directly (and for women also indirectly) with significant increases in their psychological distress. This finding makes sense given that the student-athletes were still in their academic terms when we collected our data and, like college students in general, were adapting to this completely new modality for learning [16] with little to no training or resources to make that transition easier and more effective.

Although our data were cross-sectional and based on self-report, which is consistent with other research conducted after the immediate onset of the COVID-19 pandemic [4,36], our study represents one of the largest studies to examine student-athletes’ exposure to COVID-19–related events and their relationship to COVID worry and psychological distress. Representing every geographic region in the United States, our data are robust and generalizable. Because our data were collected in April/May 2020, they represent a snapshot of what was occurring in the lives of student-athletes as the pandemic was unfolding and causing changes within collegiate sports and the delivery of higher education. Since that time, it is likely the prevalence of these COVID-19 exposure events has only increased and student-athletes (or their families) have experienced even more stressors (e.g., hospitalization, death, job loss). Additional research is needed to track student-athletes’ experiences of COVID-19 events over the course of the pandemic, determine the frequency (and disproportionality) of such exposures based on gender, race, and ethnicity, and test whether such exposures are related to changes in psychological well-being and mental health concerns over time.

As researchers have noted [37–39], the COVID-19 pandemic and its ripple effects (e.g., social distancing, sport cancellations, quarantining) have affected athletes’ psychological well-being. Thus, the professionals who support them as athletes and students and young adults (e.g., sport psychologists, athletic trainers, coaches, faculty, academic counselors) must be aware of how these vulnerable individuals are being affected and be ready to provide assistance and support (e.g., mental health counseling), even if intervening must be carried out virtually to minimize the physical health risks of being in-person. Specific to college student-athletes, the Clinical/Counseling Sport Psychology Association has recommended that athletic department professionals who are part of the student-athletes’ support systems (e.g., athletic trainers, sport psychologists) conduct mental health screenings regularly with student-athletes for early identification, and treatment, of psychological concerns and coordinate with licensed mental health professionals in the their communities to meet the mental health needs of their student-athletes, particularly if there is a lack of in-house mental health care available [40]. In addition to the Clinical/Counseling Sport Psychology Association’s specific recommendations, professional organizations, such as the Association for Applied Sport Psychology (COVID-19 Resource Center | Association for Applied Sport Psychology) (e.g., The COVID-19 Pandemic: Tips for Athletes, Coaches, Parents, and the Sport Community), have provided recommendations and support references for athletes of all ages and for their coaches, other support staff, and parents. Health professionals who work within collegiate sports can take advantage of such resources to better plan for how they will assist their student-athletes through this unfolding, and not yet ending, pandemic.

Acknowledgments

The authors would also like to thank the colleges and universities across the United States who participated in this study as well as the NCAA.

Funding Sources

This work was supported by the University of North Texas (UNT) through a College of Liberal Arts & Social Sciences (CLASS) grant as well as the UNT Center for Sport Psychology.

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