

Structural and social determinants of mental health inequities among collegiate athletes during the COVID-19 pandemic

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ABSTRACT

Objectives To characterise psychological distress during the COVID-19 pandemic among collegiate athletes and assess whether racial and ethnic differences in psychological distress are attenuated when accounting for inequitable exposure to structural and social determinants of health.

Methods Participants were collegiate athletes on teams competing in the National Collegiate Athletic Association (n=24 246). An electronic questionnaire was distributed by email, open for completion 6 October to 2 November 2020. Multivariable linear regression models were used to assess the cross-sectional associations between meeting basic needs, death or hospitalisation due to COVID-19 of a close contact, race and ethnicity, and psychological distress.

Results Athletes racialised as Black had higher levels of psychological distress than their white peers (B=0.36, 95% CI 0.08 to 0.64). Psychological distress was higher among athletes who had more difficulties meeting basic needs, and who had a close contact die or be hospitalised with COVID-19. After adjusting for these structural and social factors, Black athletes experienced less psychological distress than white peers (B=-0.27, 95% CI -0.54 to -0.01).

Conclusions The present findings provide further evidence of how inequitable structural and social exposures are associated with racial and ethnic differences in mental health outcomes. Sports organisations should ensure the mental health services available for their athletes are appropriate for meeting the needs of individuals experiencing complex and traumatic stressors. Sports organisations should also consider whether there are opportunities to screen for social needs (eg, related to food or housing insecurity), and to connect athletes with resources to help meet those needs.

BACKGROUND

In response to the emergent novel COVID-19 pandemic, in the early spring of 2020 most colleges in the USA temporarily closed their campuses and moved instruction online.¹ Winter and Spring sport seasons were cancelled and athletes moved home. At this time of uncertainty and disruption, psychological distress was elevated among college students,²⁻⁴ with suggestions of similar negative impact on the subgroup of college students who participate on intercollegiate sports teams.^{5,6} As the pandemic continued in the fall of 2020, many college athletes had the opportunity to return to campus with hybrid or online instruction and modifications

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ At a population level, the COVID-19 pandemic caused many disruptions and contributed to worsened psychological distress. Impacts of the pandemic were disproportionately negative among individuals experiencing social and structural determinants of health inequities, such as racism.

WHAT ARE THE FINDINGS?

⇒ College athletes identifying as Hispanic/Latino or Black had experienced more mental health difficulties during the COVID-19 pandemic than their white peers.
 ⇒ Racial and ethnic differences in mental health were largely explained by likelihood of a close contact dying or being hospitalised with COVID-19. Difficulties meeting basic needs (housing and food security) also contributed to racial and ethnic differences in mental health difficulties.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY?

⇒ Organisations providing mental healthcare to athletes should consider assessing whether services can adequately support individuals who have experienced complex and traumatic stressors. Screening for unmet social needs should also be considered.

on athletic activities and access to athletic facilities. Characterising the mental health of collegiate athletes across this time period, and identifying risk modifiers, can inform how organisations involved in athlete welfare approach intervention during the continuing pandemic and in future times of disruption and stress.

Similar to Maslow's hierarchy of needs,⁷ concepts of primary and secondary routines have been used to frame the impact of pandemic-related disruptions on mental health.⁸ Primary routines are those necessary for meeting basic needs (eg, sleeping and eating), while secondary routines relate to individual motivations and preferences (eg, physical activity and sport participation, study and social activities).⁹ During times of acute stress, disrupted primary routines tend to have the most negative impact on mental health.^{10,11} Extant research on the negative mental health impact of the pandemic on athletes has focused on sport-related secondary routine disruptions (eg, to their competitive season



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and team activities).⁵ School-related secondary routine disruptions may also have had a negative impact on collegiate athlete well-being, given evidence about the stress¹² and mental health consequences¹³ of remote learning during the pandemic in non-athlete populations. While not minimising the importance of secondary routines, there is a limited understanding of the impact of the pandemic on athletes who experienced disrupted primary routines, including the structural and social conditions shaping these disruptions.

Structural and social determinants of health may have caused inequitable exposure among athletes to pandemic-related stressors. Emergent data suggest that the health, employment and financial impacts of the pandemic have been disproportionately negative for Black and Hispanic families.^{14–16} Underlying such inequities is systemic racism that across generations has contributed to unequal life opportunities and exposure to unhealthful environmental conditions.¹⁷ Systemic racism helps explain elevated prevalence of risk factors for COVID-19 that include pre-existing chronic health conditions, crowded and intergenerational living arrangements, reliance on public transportation and household-member employment in industries at elevated risk of viral exposure.^{15 18 19} Athletes living or spending time in crowded home environments or with family members who were essential or front-line workers²⁰ may have had heightened concerns about infection. Pre-pandemic family economic challenges, exacerbated by the financial impact of the virus on family member employment, may have contributed to differences in food or housing insecurity and the ability to access healthcare. Such concerns may have been to some extent mitigated when athletes returned to campus for in-person learning.

In a large sample of US collegiate athletes, the present study sought to describe psychological distress 6 months into the COVID-19 pandemic. We tested three hypotheses: that athletes who (1) have a close contact die or be hospitalised from COVID-19, and who (2) have more difficulty meeting basic needs will have more psychological distress, and that (3) differences in these structural and social factors (death or hospitalisation of close contact and difficulties meeting basic needs) will mitigate racial differences in mental health outcomes.

METHODS

Sample and procedure

All college students who were members of an intercollegiate sports team that competes in National Collegiate Athletic Association (NCAA) Division I, II or III were eligible to participate. A confidential questionnaire hosted on QuestionPro survey software was distributed by email using a snowball sampling technique. National Student Athlete Advisory Committee (SAAC) representatives forwarded the link through conference and campus SAACs to student athletes on their campuses. The survey took approximately 15 min to complete and was designed to be accessible by smartphone, tablet or computer. Data collection opened on October 6, 2020 and closed on 2 November 2020. The questionnaire was designed by the NCAA research department in collaboration with the NCAA Sport Science Institute and NCAA Division I, II and III SAACs. The study protocol and questionnaire were approved by the NCAA Research Review Board.

Patient and public involvement

Study questions were driven by needs articulated by participants in the NCAA Summit on Diverse Student-Athlete Mental Health.

Student athletes from each SAAC assisted with pilot testing the instrument prior to distribution.

Equity, diversity and inclusion statement

A census sampling frame was used, and a large sample size targeted, to maximise inclusion of all collegiate student-athlete voices and ensure there were a sufficient number of athletes with minoritised racial and ethnic identities in the sample for adequately powered subgroup analyses. Equity was the explicit focus of the study and assessing pathways through which racial and ethnic mental health inequities may be arising a central feature of the planned analyses. The study was motivated by recommendations from the NCAA Summit on Diverse Student-Athlete Mental Health, and results will be returned to key stakeholders from this Summit for their perspectives on next steps for policy and practice. Study design was informed by Boyd and colleagues guidance about how to appropriately include race in research,²¹ and was situated in the World Health Organization's Social Determinants of Health Framework.²²

Measures

Mental health difficulties

Psychological distress related to internalising symptoms was measured using a scale comprised of eight items from the American College Health Association National College Health Assessment²³ II and two additional items included for purposes of this study to reflect pandemic-relevant mental health difficulties (eg, 'felt a sense of loss'). Participants were asked to indicate how frequently they have felt certain ways (eg, 'felt things were hopeless') within the past month. Response options were constantly, most every day, occasionally, never. All items are presented in table 3. Responses were summed to create a scale with a possible range of 4–40, where higher scores indicate more symptoms of psychological distress. Internal consistency was high (Cronbach's $\alpha=0.91$).

Structural and social determinants of health

Participants responded to six questions about their basic needs: (1) I have a stable housing situation for at least the next 2 months; (2) I feel confident in my ability to manage my exposure to COVID-19; (3) I have access to enough food to meet my needs each day; (4) Healthy food options are reliably available to me; (5) I know how to access mental health support in my area and (6) I know how to access a medical provider for physical health needs in my area. Responses for each item were on a six-point scale, ranging from strongly agree to strongly disagree. Items were summed to create a scale where higher scores corresponded to greater difficulty meeting basic needs. Internal consistency reliability for the six-item scale was adequate (Cronbach's $\alpha=0.76$). Separately, participants were asked whether anyone close to them has been hospitalised or died due to COVID-19, with responses of yes or no.

Race and ethnicity

Participants indicated the race and ethnicity with which they identify, selecting all that apply. Response options were: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Pacific Islander, white and other. We report race and ethnicity in four categories: Black, Hispanic/Latino, white, and a heterogeneous 'other' category that includes all individuals who identified as any race other than Black, Hispanic/Latino or white or endorsed combinations of two or more races and/or ethnicities. Reporting race and

ethnicity in a single measure is consistent with federal reporting requirements of the United States Department of Education.

Competing exposures

Athletes indicated whether they participate on a men's team or a women's team, and their current academic standing (freshman, sophomore, junior, senior and already graduated). They also reported their sexual orientation, with response options of straight or heterosexual, gay or lesbian, bisexual or pansexual, questioning or unsure, and prefer not to answer. The latter two categories were combined for analytic purposes. Participants indicated how they were attending classes this term. Response options were fully in-person, hybrid (blend of virtual and in-person), fully virtual and not enrolled in classes. Individuals who responded that they already graduated and/or are not enrolled in classes were excluded from the analytic dataset.

Analysis

Sample descriptive statistics were reported for each variable. To gauge the representativeness of the sample, demographic characteristics theoretically related to psychological distress (sex, year in school, race and ethnicity, and sexual orientation) were inspected relative to the best available data for the underlying distribution of that variable among college athletes. Responses to basic need items were stratified by racial and ethnic category, reporting the percentage of the respective group that agree or strongly agree that the basic need listed was being met. Unadjusted logistic regression reporting ORs was used to test for differences between racial and ethnic groups. To assess whether Black and Hispanic/Latino athletes would be more likely than white peers to have a close contact die or be hospitalised due to COVID-19, differences in proportion answering 'yes' by racial and ethnic group were similarly compared using unadjusted logistic regression. To test the hypothesis that differences in COVID-19 death/hospitalisation and meeting basic needs mitigate racial differences in mental health outcomes, a series of linear regressions was conducted with the psychological distress scale score as the dependent variable in each regression. The dependent variable was moderately skewed (0.89); however,

guidance of the central limit theorem is that continuous variables in very large samples can be modelled linearly.²⁴ Other assumptions of linear regression were met. A minimally sufficient set of confounders for adjustment was identified using a causal directed acyclic graph (figure 1; competing exposures of sex classification of sports team, year in school, sexual orientation and school modality). The first linear regression model contained race and ethnicity, along with demographic competing exposures. The second model added school modality (in person, hybrid and fully virtual) as a modifiable school-level competing exposure to first model. Finally, the third model added hospitalisation or death of a close contact because of COVID-19 and sum on the index of basic needs being met. Multivariate normal imputation was used to impute missing dependent variable data, with the other analytic variables (eg, sex of team, year, sexual orientation, race and ethnicity, death/hospitalisation of a close contact and basic needs) used in the imputation model. An alpha level of 0.05 was used as a threshold for statistical significance. Analyses were completed in STATA V.14.2.

RESULTS

A total of 24 246 collegiate athletes participated in this study, with participation rates of at least 4% of all NCAA athletes on men's teams, and 9% on women's teams. More participants were from women's teams (65%) than men's teams (35%), despite near parity in the underlying student-athlete population.²⁵ Nearly three-quarters (74%) of the sample identified solely as white, 10% as Black and 5% as Hispanic or Latino, with the balance identifying as a different race or ethnicity, or two or more races or ethnicities. This sample has less racial and ethnic diversity than the underlying student-athlete population (62% white, 16% Black and 7% Hispanic or Latino).²⁵ Ninety-one per cent of the sample identified as straight or heterosexual. While there is no census data available of sexual orientation among collegiate athletes, estimates suggest that this rate reflects fewer sexual minority athletes responding than the underlying population.^{26 27} Eight per cent were attending school fully in-person, 61% through a hybrid of in-person and virtual learning, and 31%

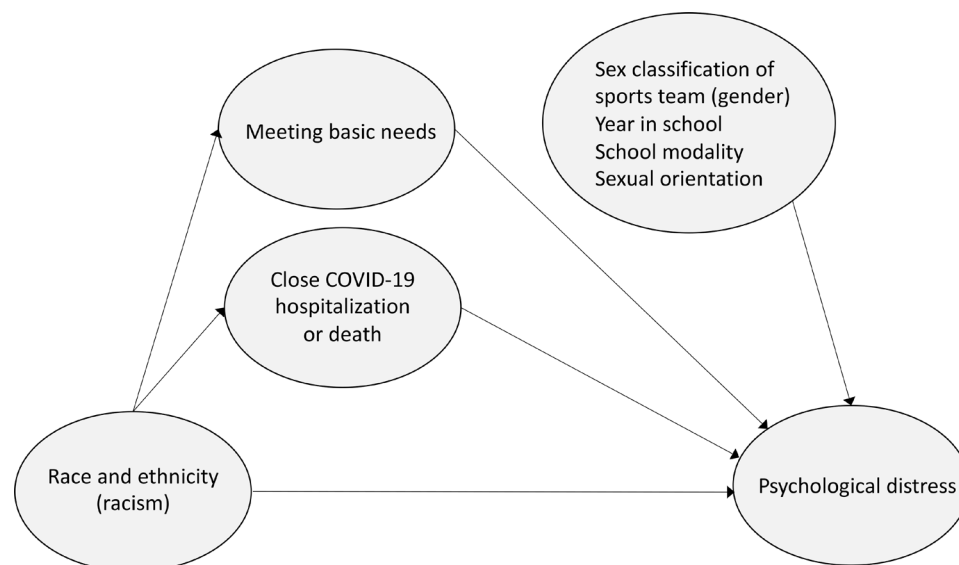


Figure 1 Directed acyclic graph showing the implicitly assumed causal association between social determinants of health and psychological distress. Confounders and potential associations are displayed.

Table 1 Descriptive characteristics of survey respondents (n=24 246)

| | N (%) or mean (SD) |
|--|--------------------|
| Sex classification of sports team | |
| Men's | 8494 (35.1%) |
| Women's | 15 679 (64.9%) |
| Missing | 73 |
| Race and ethnicity | |
| White | 17 878 (74.0%) |
| Black | 2377 (9.8%) |
| Hispanic/Latino | 1106 (4.6%) |
| Other race or ethnicity | 2812 (11.6%) |
| Missing | 73 |
| Current academic standing | |
| Freshman | 7087 (29.3%) |
| Sophomore | 6015 (24.8%) |
| Junior | 5985 (24.7%) |
| Senior | 5143 (21.2%) |
| Missing | 16 |
| Sexual orientation | |
| Straight or heterosexual | 22 102 (91.3%) |
| Gay or lesbian | 563 (2.3%) |
| Bisexual or pansexual | 921 (3.8%) |
| Questioning or unsure | 210 (0.9%) |
| Prefer not to answer | 402 (1.7%) |
| Missing | 48 |
| Schooling modality | |
| Fully in-person | 1837 (7.8%) |
| Hybrid | 14 346 (61.1%) |
| Fully virtual | 7306 (31.1%) |
| Missing | 757 |
| Has anyone close to you been hospitalised or died due to COVID-19? | |
| Yes | 1968 (8.5%) |
| No | 21 240 (91.5%) |
| Missing | 1038 |
| Basic needs index | |
| | 11.0 (4.1) |
| Missing | 1038 |

fully virtually. Additional descriptive characteristics of the sample are presented in [table 1](#).

Racial and ethnic differences in social and structural determinants of health

Differences were observed by racial and ethnic categories in the percent of respondents agreeing or strongly agreeing that basic needs were met ([table 2](#)). Needs with the largest racial

and ethnic differences were for housing security (93% of white athletes as compared with 88% of Black (OR=0.54, 95% CI 0.47 to 0.62) and 88% of Hispanic athletes (OR=0.57, 95% CI 0.47 to 0.69)), and food security (87% of white athletes as compared with 78% of Black athletes, (OR=0.51, 95% CI 0.46 to 0.57)). Nine percent of participants indicated that someone close to them had been hospitalised or died due to COVID-19. This exposure was more likely among Black (14%) and Hispanic/Latino (13%) athletes as compared with white athletes (7%) (OR=1.99, 95% CI 1.74 to 2.26 for Black vs white, and OR=1.82, 95% CI 1.51 to 2.20 for Hispanic/Latino vs white).

Racial and ethnic differences in psychological distress

[Table 3](#) reports the percent of respondents experiencing specific symptoms of psychological distress 'most every day' or 'constantly' in each time period, stratified by racial and ethnic category and presented separately for men's and women's teams. There were racial and ethnic differences for all symptoms except for 'felt overwhelming anxiety' and 'felt sad'. In each case, symptom prevalence was highest among Black or Hispanic/Latino participants. For example, reporting feeling like 'things were hopeless' was more likely among Black (14% of men's team participants and 20% of women's team participants) as compared with white participants (9% and 15%, respectively).

In a linear regression model adjusting for competing demographic exposures (men's or women's team, year in school and sexual orientation; [table 4](#), Model 1), Black athletes had psychological distress scores that were 0.36 points higher (95% CI 0.08 to 0.64) than white athletes, and athletes with racial identities other than Black, Hispanic/Latino or white (eg, Asian, Native American, Pacific Islander, etc) had psychological distress scores that were 0.51 points higher (95% CI 0.26 to 0.77). Participants on women's sports teams had psychological distress scores that were an average of 2.70 points higher than participants on men's sports teams (95% CI 2.52 to 2.87), and individuals with sexual orientations other than straight or heterosexual had notably elevated psychological distress scores (B=1.88, 95% CI 1.35 to 2.40 for gay or lesbian, and B=3.25, 95% CI 2.83 to 3.67 for bisexual or pansexual).

When also controlling for school modality (Model 2), athletes with racial identities other than Black, Hispanic/Latino or white had psychological distress scores that were 0.47 points higher (95% CI 0.22 to 0.72) than white athletes. Both hybrid and virtual schooling were associated with more mental health difficulties than fully in-person learning (B=0.40, 95% CI 0.10 to 0.71 for hybrid, and B=1.07, 95% CI 0.74 to 1.39 for virtual).

Table 2 Per cent of respondents agreeing or strongly agreeing with statements about basic needs being met, by race and ethnicity and ORs for unadjusted logistic regression comparing black and Latino or Hispanic athletes to white athletes (n=22 007)

| | White | Black | Latino or Hispanic | Black vs white OR (95% CI) | Latino or Hispanic vs white OR (95% CI) |
|--|----------------|--------------|--------------------|----------------------------|---|
| I have a stable housing situation for at least the next 2 months | 16 115 (92.9%) | 1979 (87.7%) | 937 (87.9%) | 0.54 (0.47 to 0.62) | 0.57 (0.47 to 0.69) |
| I feel confident in my ability to manage my exposure to COVID-19 | 12 709 (73.5%) | 1666 (74.2%) | 835 (78.4%) | 1.03 (0.93 to 1.14) | 1.30 (1.12 to 1.51) |
| I have access to enough food to meet my needs each day | 15 096 (87.2%) | 1744 (77.5%) | 898 (84.4%) | 0.51 (0.46 to 0.57) | 0.79 (0.67 to 0.94) |
| Healthy food options are reliably available to me | 11 857 (68.4%) | 1431 (63.6%) | 719 (67.7%) | 0.79 (0.73 to 0.87) | 0.96 (0.85 to 1.10) |
| I know how to access mental health support in my area | 12 342 (71.3%) | 1526 (68.1%) | 754 (71.2%) | 0.84 (0.77 to 0.92) | 1.00 (0.87 to 1.14) |
| I know how to access a medical provider for physical health needs in my area | 14 755 (85.3%) | 1850 (82.6%) | 866 (81.7%) | 0.82 (0.73 to 0.92) | 0.77 (0.66 to 0.91) |

Table 3 Per cent of respondents experiencing listed symptoms of mental health disorders most every day or constantly by race and ethnicity, separately by participants on men's and women's sports teams

| Sex classification of sports team* | White | Black | Hispanic/Latino | P value† |
|--|--------------|-------------|-----------------|----------|
| Felt things were hopeless | | | | |
| Men | 495 (9.2%) | 146 (14.3%) | 47 (10.6%) | <0.001 |
| Women | 1735 (15.5%) | 218 (19.6%) | 122 (21.1%) | <0.001 |
| Felt overwhelmed by all you had to do | | | | |
| Men | 1412 (26.2%) | 303 (29.9%) | 138 (31.1%) | 0.008 |
| Women | 5714 (50.9%) | 548 (49.2%) | 321 (55.5%) | 0.046 |
| Felt mentally exhausted | | | | |
| Men | 1077 (20.0%) | 248 (24.3%) | 92 (20.8%) | 0.008 |
| Women | 4252 (37.9%) | 454 (40.9%) | 246 (42.7%) | 0.012 |
| Felt lonely | | | | |
| Men | 610 (11.3%) | 150 (14.7%) | 52 (11.7%) | 0.010 |
| Women | 2294 (20.4%) | 261 (23.6%) | 142 (24.5%) | 0.005 |
| Felt sad | | | | |
| Men | 561 (10.4%) | 112 (11.0%) | 45 (10.2%) | 0.840 |
| Women | 2427 (21.6%) | 238 (21.5%) | 132 (22.9%) | 0.766 |
| Felt so depressed it was difficult to function | | | | |
| Men | 249 (4.6%) | 80 (7.9%) | 26 (5.9%) | <0.001 |
| Women | 919 (8.2%) | 146 (13.2%) | 71 (12.3%) | <0.001 |
| Felt overwhelming anxiety | | | | |
| Men | 588 (10.9%) | 114 (11.2%) | 55 (12.4%) | 0.633 |
| Women | 3258 (29.0%) | 321 (28.9%) | 183 (31.7%) | 0.374 |
| Felt overwhelming anger | | | | |
| Men | 301 (5.6%) | 93 (9.1%) | 34 (7.7%) | <0.001 |
| Women | 802 (7.2%) | 116 (10.4%) | 60 (10.4%) | <0.001 |
| Felt a sense of loss | | | | |
| Men | 413 (7.7%) | 109 (10.7%) | 33 (7.5%) | 0.004 |
| Women | 1437 (12.8%) | 163 (14.7%) | 86 (14.9%) | 0.082 |
| Experienced sleep difficulties | | | | |
| Men | 927 (17.3%) | 206 (20.4%) | 72 (16.3%) | 0.040 |
| Women | 3054 (27.3%) | 355 (32.0%) | 190 (32.9%) | <0.001 |

*Participants reported whether they participate on a men's or women's sports team rather than their personal gender identity.

† χ^2 test for differences in proportions by race and ethnicity.

Association between social and structural factors and psychological distress

When risk of close contact hospitalisation or death and basic needs were added to the regression model (Model 3), Black athletes had with lower psychological distress scores ($B = -0.27$, 95% CI -0.54 to -0.01) than white athletes. Athletes with a close contact who died or was hospitalised due to COVID-19 had psychological distress scores that were 1.11 points higher (95% CI 0.83 to 1.38) than their peers who did not experience such events. Additionally, for every one-point higher score on the basic needs variable (indicating greater difficulty meeting basic needs), athletes had psychological distress scores that were 0.51 points higher (95% CI 0.50 to 0.53).

DISCUSSION

All college athletes experienced academic and athletic disruptions because of the COVID-19 pandemic however, some athletes experienced more fundamental difficulties related to housing and food insecurity, access to medical care and family health and safety. As hypothesised, athletes who had more difficulties meeting basic needs, and who had a close contact die from or be hospitalised with COVID-19, had more frequent symptoms of psychological distress.

Consistent with pre-pandemic data,²⁸ Black and Hispanic/Latino athletes had more frequent symptoms of psychological distress than white athletes. They were also more likely than their white peers to experience challenges meeting basic needs and to have a close contact die or be hospitalised from COVID-19. These findings provide further evidence of how inequitable structural and social conditions are associated with racial and ethnic inequities in mental health outcomes, consistent with a broader literature on the impact of systemic racism on mental health.^{6 29 30}

Notably, when accounting differences in these inequitable structural and social conditions, not only were race and ethnicity variables not associated with higher levels of psychological distress, but Black athletes had lower levels of psychological distress. This is consistent with literature in other contexts emphasising the resilience of Black populations who have experienced inequality and discrimination.³¹ Mechanisms typically centre adaptive social processes and positive aspects of racial socialisation and identification, including values of generativity, and collective narratives of redemption.³¹ At an individual level, others have encouraged building from these social assets in strengths-based and culturally competent mental health services and preventive interventions.³² However, such individually focused efforts

Table 4 Linear regression describing the association between athlete characteristics and mental health scale sum

| | Model 1 B (95% CI) | Model 2 B (95% CI) | Model 3 B (95% CI) |
|---|-----------------------|-----------------------|-------------------------|
| Race and ethnicity | | | |
| White | (ref.) | (ref.) | (ref.) |
| Black | 0.36 (0.08 to 0.64) | 0.27 (−0.01 to 0.55) | −0.27 (−0.54 to <−0.01) |
| Hispanic/Latino | 0.31 (−0.08 to 0.69) | 0.25 (−0.14 to 0.63) | 0.01 (−0.36 to 0.37) |
| Other | 0.51 (0.26 to 0.77) | 0.47 (0.22 to 0.72) | 0.23 (<−0.01 to 0.47) |
| Sex classification of sports team | | | |
| Men's sports team | (ref.) | (ref.) | (ref.) |
| Women's sports team | 2.70 (2.52 to 2.87) | 2.76 (2.59 to 2.93) | 2.67 (2.51 to 2.83) |
| Current academic standing | | | |
| Freshman | (ref.) | (ref.) | (ref.) |
| Sophomore | 1.08 (0.86 to 1.29) | 1.03 (0.82 to 1.25) | 0.72 (0.51 to 0.92) |
| Junior | 1.31 (1.09 to 1.53) | 1.28 (1.06 to 1.50) | 0.91 (0.70 to 1.12) |
| Senior | 1.50 (1.27 to 1.73) | 1.46 (1.23 to 1.69) | 1.03 (0.82 to 1.25) |
| Sexual orientation | | | |
| Straight or heterosexual | (ref.) | (ref.) | (ref.) |
| Gay or lesbian | 1.88 (1.35 to 2.40) | 1.86 (1.34 to 2.39) | 1.63 (1.13 to 2.12) |
| Bisexual or pansexual | 3.25 (2.83 to 3.67) | 3.34 (2.92 to 3.76) | 2.86 (2.46 to 3.25) |
| Questioning, unsure or prefer not to answer | 1.68 (1.16 to 2.20) | 1.71 (1.20 to 2.22) | 1.14 (0.66 to 1.62) |
| School modality | | | |
| In-person | -- | (ref.) | (ref.) |
| Hybrid | -- | 0.40 (0.10 to 0.71) | 0.23 (−0.06 to 0.52) |
| Virtual | -- | 1.07 (0.74 to 1.39) | 1.27 (0.96 to 1.57) |
| Close COVID-19 hospitalisation or death | | | |
| No | -- | -- | (ref.) |
| Yes | -- | -- | 1.11 (0.83 to 1.38) |
| Meeting basic needs | | | |
| | -- | -- | 0.51 (0.50 to 0.53) |

must not detract from efforts to change the unjust social and structural conditions that expose minoritised groups to heightened sources of stress.

Implications for policy and practice

Results of this study raise questions about what steps sports organisations can take to reduce racial and ethnic mental health inequities. An important first step is recognising that organisations are racial structures, and organisational actions (or lack of action) may serve to worsen, maintain or help address inequities.³³ To the extent equity and anti-racism are organisational values, one way these values may be put into practice is through heightened financial and logistical support for individuals struggling to meet basic needs. This would be an example of prioritising equity (eg, providing different supports to different groups to create more equal opportunities). While athletes across different racial and ethnic identities would benefit from such an approach, there is likely to be relatively greater benefit to athletes who have been subject to systemic racism. Practically speaking, this may start with screening for social determinants of health using a validated screening tool,^{34 35} potentially in conjunction with other sport setting screening initiatives. This is an approach gaining traction in healthcare settings.³⁶ Social workers or others with skills in care coordination or patient navigation can then help connect individuals with the necessary resources that are available on their campus and in their community. Such an approach is broadly consistent with evidence in other domains about the benefits of intervening on contextual factors that shape primary routines in times of stress.³⁷

Sports organisations should also consider whether the mental health services available for participating athletes are adequate to meet the needs of those who have experienced traumatic stressors. The very large effect size for the association between hospitalisation or death and psychological distress observed in the present sample underscores that such events are potentially traumatic. Beyond the pandemic, many Black athletes experience interpersonal racism and racial trauma that impacts their mental health,^{38 39} and across all racial identities, many athletes (and college students, generally) experience traumatic stressors such as sexual abuse and exposure to interpersonal violence. Sports organisations, and governing bodies that make policy for sports organisations, can recommend that all clinicians providing mental healthcare to athletes in their setting have licensure that includes competencies in trauma-informed care, and can encourage or incentivise relevant continuing education training.⁴⁰ Organisations can also attend to racial and ethnic diversity in their staffing practices. In other settings, patient-oriented communication is more likely when there is racial concordance between the patient and their healthcare provider,^{41 42} and this can contribute to higher quality care.^{43 44} Recent scholarship has highlighted lack of racial diversity in sports medicine settings as a problem to address.⁴⁵ Resources such as the Equity Agenda Guideline⁴⁶ can help with a comprehensive approach to staff recruitment and retention, as can guidance from the NCAA Summit on Diverse Student-Athlete Mental Health.⁴⁷

More broadly, the present study provides an example application of how social and structural determinants of health can be studied responsibly and productively in sports medicine settings. We followed the guidance of Boyd and colleagues about how

to appropriately include race in research.²¹ Namely, this meant defining race in a sociopolitical framework,²² specifying conceptually why it is being measured in this study, naming racism—rather than race—as a risk factor and specifying its form (ie, systemic racism), discussing implications of findings for policy, and citing experts, particularly individuals of colour. The study of health inequities in sports medicine settings lags behind other disciplines,⁴⁸ and we hope that others conducting research in the sports medicine field will adopt Boyd and colleagues' guidance as one important step forward.

Limitations

Low response rates mean that findings may not be generalisable to all collegiate athletes, and it is possible that participants and non-participants were meaningfully different in terms of psychological distress. The sample was over-represented in terms of non-Hispanic white, female student athletes. We only looked for differences in three racial and ethnic categories (Black, white and Hispanic/Latino); other racial and ethnic groups have different experiences of racism that may have impacted their mental health; however, the cell sizes are too small for adequately powered analyses. Hispanic/Latino individuals may also identify as white or Black; however, the way this dataset was coded those individuals who endorsed multiple races were classified as 'other'. The heterogeneous nature of the 'other' category meant that caution is needed in its interpretation. Findings of significantly higher psychological distress in this group of athletes point to the importance of further research to understand their potentially varied lived experiences and needs. Finally, we acknowledge the inherent limitations of self-report survey measures, and the potential for under-reporting of both symptoms of psychological distress and social and structural determinants of health inequities for reasons, including socially desirable responding and common method bias.

CONCLUSION

Racial and ethnic differences in athlete psychological distress during the pandemic were explained by inequitable exposures to structural and social determinants of health. This included differences in food and housing insecurity, healthcare access and death/hospitalisation within the athlete's close network. These findings challenge organisations involved in athlete welfare to consider structural and social solutions to mental health inequities, including meeting heightened social needs, and ensuring mental healthcare resources are appropriate for athletes who have experiencing complex and traumatic stress.

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