

Variability in Institutional Screening Practices Related to Collegiate Student-Athlete Mental Health

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Context: Universal screening for mental health concerns, as part of the preparticipation examination in collegiate sports medicine settings, can be an important and feasible strategy for facilitating early detection of mental health disorders.

Objective: To assess whether sports medicine departments at National Collegiate Athletic Association (NCAA) member colleges have policies related to identifying student-athlete mental health problems, the nature of preparticipation examination screening related to mental health, and whether other departmental or institutional screening initiatives are in place. I also aimed to characterize the variability in screening by institutional characteristics.

Design: Cross-sectional study.

Setting: College sports medicine departments.

Patients or Other Participants: Team physicians and head athletic trainers at NCAA member colleges (n = 365, 30.3% response rate).

Main Outcome Measure(s): Electronic survey of departmental mental health screening activities.

Results: A total of 39% of respondents indicated that their institution had a written plan related to identifying student-

athletes with mental health concerns. Fewer than half reported that their sports medicine department administers a written or verbal screening instrument for symptoms of disordered eating (44.5%), depression (32.3%), or anxiety (30.7%). The strongest predictors of mental health screening were the presence of a written plan related to identifying student-athlete mental health concerns and the employment of a clinical psychologist. Additionally, Division I institutions and institutions with a greater ratio of athletic trainers to student-athletes tended to engage in more screening.

Conclusions: The substantial among-institutions variability in mental health screening suggests that opportunities exist to make these practices more widespread. To address this variability, recent NCAA mental health best-practice guidelines suggested that institutions should screen for a range of mental health disorders and risk behaviors. However, at some institutions, staffing deficits may need to be addressed to allow for implementation of screening-related activities.

Key Words: best practices, psychology, disordered eating, depression, anxiety

Key Points

- Fewer than half of US collegiate sports medicine departments have written plans for identifying student-athletes with mental health concerns or screening student-athletes for mental health disorders.
- The strongest predictors of mental health screening were the presence of a written plan and the employment of a clinical psychologist.

A focus of the medical care provided in sport settings is understandably on physical dimensions of health, such as injury prevention, identification, and management. However, these represent only 1 axis of athlete wellness. The World Health Organization defines *health* as a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity.¹ For health care providers in sport settings, protecting and treating the mental health of athletes is an important goal in and of itself. Mental health is also often inextricably linked to physical health, a relationship that is true at the population level and that may manifest uniquely for athletes in a triadic reciprocal relationship with athletic performance. For example, some evidence suggests an elevated risk of injury and diminished athletic performance among athletes experiencing symptoms of depression^{2,3} or eating disorders⁴ or among those who abuse alcohol.⁵ In some instances, the directionality of these associations may be reversed: an athlete's psychological response to injury or

performance pressures might precipitate or exacerbate existing mental health vulnerabilities, such as depression, anxiety, disordered eating, or substance abuse.^{6–10} As evidence about these associations is correlational, directionality cannot be stated definitively.

Estimates indicate that more than 20% of adults will experience a mental illness in a given year, with the highest rates among young adults, many of whom are in college.¹¹ The limited recent data specifically about collegiate student-athletes suggest prevalence is relatively similar to that in nonathlete populations, with current depression estimates of between 17% and 21%^{12,13} and 25% of females meeting the criteria for subclinical disordered eating.¹⁴ A concern among both athletes and nonathletes is the often high degree of comorbidity among mental health disorders; for example, athletes engaging in disordered eating will often also experience problematic levels of anxiety,¹⁵ and athletes with depressive symptoms may be at elevated risk for abusing alcohol.¹⁶

Although primary prevention is always desirable, secondary prevention—early identification and treatment—of mental health disorders can play an important role in harm reduction, to the extent that it helps limit both the duration of symptoms and the progression to more severe symptoms. In the collegiate setting, sports medicine health care providers have an important role in secondary prevention. Many adolescents and emerging adults do not receive annual preventive care from community health care providers.¹⁷ School-based sports medicine clinicians, including team physicians and athletic trainers (ATs), are often the health care professionals with whom collegiate student-athletes are in the most regular contact. Consequently, they are well positioned to help with early identification and referral of student-athletes who have clinical and subclinical mental health conditions.¹⁸

Recommendations have been made to train sports medicine clinicians, including ATs, in how to recognize mental health disorders.^{18–20} However, because many mental health disorders, particularly in their subclinical stages, are difficult for an observer to detect, early identification and treatment are often largely contingent on the symptomatic individual's seeking help. Unfortunately, low levels of help seeking for mental health concerns are an endemic problem.^{21,22} Identification is further complicated by the fact that many behaviors or symptoms associated with mental health disorders are often difficult to distinguish from desirable or normative athlete behaviors.⁸ For example, rigid eating and exercise behaviors that in reality are symptoms of disordered eating may be attributed to being a dedicated athlete.²³ Symptoms of depression such as excessive fatigue may be attributed to rigorous training.¹⁹ Consequently, universal screening of all members in a given population (such as all collegiate student-athletes at a given institution) for symptoms of or risk factors for common mental health disorders can be one important approach to early identification.^{24,25}

The preparticipation examination (PPE) has long been considered an important resource for recognizing health conditions that preclude safe participation in sport.^{26–29} Increasingly, the PPE is being acknowledged as an important tool for screening and referral related to a wider range of health problems, including mental health disorders.^{26–33} The National Athletic Trainers' Association (NATA) has previously suggested that between-institutions disparities in the PPE can result in inadequate protection of the health and safety of all student-athletes and encouraged the medical community to adopt a standardized and validated PPE instrument.³⁰ This is not just a concern for US collegiate athletes: a similar concern about worldwide variability in PPE content was recently raised in a consensus statement²⁷ by the American College of Sports Medicine and the Fédération Internationale de Médecine du Sport.

Effective screening, however, is not simply a function of having athletes complete appropriate instruments. Although it is important to know the prevalence of mental health disorders in a given population (for example, to justify increasing resource allocation), the US Preventive Services Task Force³⁴ recommended that screening for depression should be accompanied by a system for follow up after a positive result. According to the NATA, physicians play a role in discussing the screening results with athletes and determining whether referral to a mental health professional

is warranted.³⁰ A clinical psychologist or other mental health professional, if available in the sports medicine setting, could conduct this follow up directly. This important process requires an appropriately trained health professional in the sports medicine setting and time for the clinician to engage in this phase of the screening and referral process. In the absence of sufficient staffing for appropriate follow up, screening may be of limited use. A multistep process of this nature, potentially involving many stakeholders for implementation, is likely facilitated by having an established institutional protocol that clarifies stakeholder roles and coordinates action.

At US colleges, the resources dedicated to counseling and student health and the ratio of students to mental health care professionals vary substantially.³⁵ Sports medicine departments tend to be funded by the institution's athletic department, resulting in substantial among-institutions variability in athletics budgets, with Division I institutions tending to have larger budgets than Division II or III institutions.³⁶ This institutional variability may have important implications for the thoroughness of the PPE and may be patterned by division of competition: some institutional administrators may believe that it does not make sense to screen for health problems if you lack adequate personnel to deal with the results of these screening activities. Further, making changes in screening practices and developing new protocols takes time, and these may be less likely to occur in resource-constrained environments. In these settings, focusing on the core safety goal of the PPE may be considered a rational use of the time that sports medicine staff members have available.

The early identification of mental health disorders can be an important strategy for reducing their health burden. Recommendations have been made for mental health screening as part of the PPE in collegiate sports medicine settings.^{16,33} However, as yet, no information is available about whether institutions are engaging in screening, the disorders for which they are screening, and whether these actions vary by institutional characteristics such as division of competition, size of school, or sports medicine staffing. The purpose of my study was to test the hypotheses that Division I institutions would have more comprehensive screening programs than Division II and III institutions; that institutions with established screening-related plans or policies would be more likely to screen for mental health disorders, independent of division of competition; and that institutions with more staffing in sports medicine (measured as the ratio of clinicians to student-athletes and the presence or absence of a clinical psychologist) would engage in more screening than institutions with less staffing.

METHODS

Sample and Procedures

Supervising sports medicine clinicians at all 1076 NCAA member institutions were contacted via an e-mail distribution service of the NCAA Sport Science Institute. Individuals were eligible for inclusion if they were a head AT or a team physician providing patient care to student-athletes through their institution's sports medicine department. A total of 365 clinicians completed the survey (307 ATs, 54 physicians; 4 respondents did not supply

credentials), for an overall response rate of 30.3% (35.6% AT response rate, 15.7% physician response rate). All participants provided informed consent before viewing the survey questions. Survey questions were hosted on the Qualtrics platform (Provo, UT) and completed during September 2014. The Harvard School of Public Health Institutional Review Board approved the research activities.

Measures

Questions were asked in 4 general categories: sports medicine department policy, preparticipation screening, other screening initiatives, and institutional characteristics. Questions were reviewed for content and clarity by a subset of the sports medicine clinicians and mental health professionals from NCAA colleges who comprise the NCAA Mental Health Task Force.

Sports Medicine Department Policy. Respondents were asked whether their sports medicine department had a written plan for identifying student-athletes with potential mental health concerns. Response options were *yes*, *no*, and *I don't know*.

Preparticipation Examination Screening. Respondents were asked whether their institution's PPE involved questioning student-athletes (either verbally or in writing) as to whether they had ever been diagnosed with an eating disorder, depression, or anxiety. Respondents were also asked to indicate if the PPE involved administering a screening tool (either verbally or in writing) that assesses whether athletes are symptomatic or at risk for an eating disorder, depression, anxiety, alcohol abuse, prescription drug abuse, or illegal drug use.

Other Screenings. Respondents were asked whether, outside of the PPE, their sports medicine department or athletic department conducted any screening initiatives for the following health concerns: eating disorders, depression, anxiety, problematic alcohol use, prescription drug abuse, or illegal drug use. For all questions, line-item responses were *yes*, *no*, and *I don't know*.

Screening Index Score. An index of all institutional screening activities related to student-athlete mental health was created. For each of the 6 mental health concerns, a score of 1 was recorded if the respondent indicated that screening for that disorder or behavior occurred in the PPE or through another sports medicine or athletic department screening initiative (or both). Responses were summed to create a 6-item measure with a possible range of 0 to 6.

Institutional Characteristics. Respondents were asked to indicate the division of competition in which the majority of their teams compete (Division I, II, or III). They were also questioned about the approximate number of student-athletes at their institution and how many full-time (or full-time equivalent) ATs and physicians their sports medicine department employed. The ratio of athletes per AT and physician was calculated from this information. Additionally, respondents indicated whether their sports medicine department employed a clinical psychologist in a full-time or part-time capacity.

Data Analysis

I used Pearson χ^2 tests of independence to assess differences by division of competition in the proportion of respondents at institutions with a written policy for

identifying student-athlete mental health problems that included a verbal or written screening instrument for specific mental health concerns in the PPE, screened for student-athlete mental health disorders outside of the PPE, and employed a clinical psychologist in the sports medicine department. One-way analyses of variance were used to assess differences by division of competition in the mean screening index scores and staffing ratios. Subsequently, I conducted linear regression analyses to determine whether screening index scores differed by division of competition and staffing. Bivariate linear regression analyses were first performed on the independent variables of division of competition, ratio of student-athletes to ATs, ratio of student-athletes to physicians, and whether the department had a written policy for identifying student-athlete mental health problems. Subsequently, multivariable linear regression was conducted, including all predictors in the model. Finally, logistic regression analyses were calculated to separately determine the odds that an institution screened for specific mental health concerns: eating disorder, depression, anxiety, alcohol abuse, prescription drug abuse, and illegal drug use. Screening for each of the listed mental health concerns was the dependent variable in its own model, with the predictors in each model being division of competition, staffing ratios, employment of a clinical psychologist, and whether the department had a written policy for identifying student-athlete mental health disorders. Stata (version 12.1; StataCorp LP, College Station, TX) was used for all analyses, and an α value of .05 was considered the threshold for statistical significance.

RESULTS

Individual and institutional characteristics of the sample are reported in detail in Table 1. Most of the respondents were head ATs (85.0%, $n = 307$), and more than half worked at an NCAA Division I institution (53.4%, $n = 195$). On average, respondents indicated that their sports medicine department employed 6.1 full-time equivalent ATs and 1.0 full-time equivalent physician. On average across the full sample, there were 100.7 student-athletes per AT and 376.4 student-athletes per physician. Analyses of variance demonstrated among-divisions differences in the ratio of athletes to ATs and to physicians, with the lowest ratios in both categories at Division I institutions and the highest at Division III institutions. A total of 38.3% of sports medicine departments employed a clinical psychologist in a full-time or part-time capacity, with greater likelihood of such employment in Division I (55.5%) as compared with Division II (23.2%) or Division III (14.7%). Additional detail is provided in Table 1.

Fewer than half of the responding clinicians (39.0%) noted that their institution had a written plan for identifying student-athletes with mental health concerns. Pearson χ^2 tests of independence showed differences by division, with more than half of respondents from Division I institutions (55.4%) indicating the presence of such a policy, as compared with 21.2% of respondents from Division II and 20.0% from Division III. A majority of respondents, which did not differ by division, stated that the PPE included questions about whether the student-athlete had previously been diagnosed with an eating disorder (84.7%), depression (79.2%), or anxiety (75.8%). A smaller fraction of

Table 1. Individual and Institutional Characteristics of Sample of Sports Medicine Clinicians Caring for Student-Athletes at US Colleges (N = 365)

Characteristic	Value
Individual	
Sex, % (n) ^a	
Male	71.9 (261)
Female	28.1 (102)
Position, % (n) ^a	
Head athletic trainer	85.0 (307)
Team physician	15.0 (54)
Age, y (mean ± SD)	26.4 ± 9.73
Institution	
National Collegiate Athletic Association division of competition, % (n)	
I	53.4 (195)
II	19.5 (71)
III	27.1 (99)
No. of students (mean ± SD)	12813 ± 18678
No. of student-athletes (mean ± SD)	449 ± 216
Sports medicine staffing (mean ± SD)	
Full-time equivalent athletic trainers	6.1 ± 4.39
Full-time equivalent physicians	1.0 ± 1.92
Ratio of student-athletes to sports medicine staff	
No. of student-athletes per athletic trainer across full sample by division (mean ± SD)	100.7 ± 78.66
I	62.7 ± 24.22 ^{b,c}
II	126.3 ± 55.01 ^d
III	160.9 ± 113.85 ^d
No. of student-athletes per physician across full sample by division (mean ± SD)	376.4 ± 412.65
I	303.7 ± 178.47 ^c
II	411.8 ± 510.41
III	578.9 ± 706.28 ^d
Clinical psychologist employed in sports medicine across full sample by division, % (n/N)	38.3 (136/355)
I	55.5 (106/191) ^{b,c}
II	23.2 (16/69) ^d
III	14.7 (14/95) ^d

^a Some participants did not respond.

^b Different from Division II ($P < .05$).

^c Different from Division III ($P < .05$).

^d Different from Division I ($P < .05$).

respondents indicated that their sports medicine department administered a written or verbal screening instrument for symptoms of disordered eating (44.5%), depression (32.3%), or anxiety (30.7%). Approximately half of the respondents reported that their institution's PPE asked student-athletes about their alcohol consumption (57.4%), prescription drug abuse (52.2%), or illegal drug use (46.8%). Pearson χ^2 tests of independence demonstrated variability by division in whether the PPE involved screening for symptoms of an eating disorder, depression, anxiety, or illegal drug use. Where differences existed among divisions for each disorder, more respondents at Division I institutions indicated they screened in the PPE for that disorder than did those at Division II or III institutions. Additional detail is provided in Table 2 on the mental health-related content of the PPE and sports medicine or athletic department screening initiatives conducted outside the PPE.

Around one-third of the sample (31.5%) did not screen for any of the 6 mental health concerns, and 19.5% screened for all 6, with a mean of just over 2. Analyses of variance indicated variability by division of competition in

the number of mental health problems for which student-athletes were screened ($P < .001$), driven by differences between Divisions I and II ($P < .001$) and between Divisions I and III ($P = .001$). On average, Division I institutions screened for 3 mental health disorders (mean ± SD = 2.99 ± 2.34), as compared with screening for an average of 2 disorders in Divisions II (mean = 1.92 ± 1.89) and III (mean = 1.96 ± 2.09).

Linear regression assessed the association between institutional characteristics and the screening index score. Bivariate analyses (models 1–5) reflected differences in screening index score by division of competition, ratio of student-athletes to ATs, employment of a clinical psychologist, and whether the institution had a written plan for identifying student-athlete mental health concerns. Division II and III institutions screened for fewer mental health disorders than did Division I institutions. Institutions with a higher number of student-athletes per AT screened for fewer mental health problems than did those with a lower athlete-to-AT ratio, as did institutions that employed a clinical psychologist. Differences in the ratio of sports medicine physicians to athletes were not significantly

Table 2. Student-Athlete Mental Health Identification Policies, Screening Practices, and Mental Health Staffing for Full Sample and by Competition Division (N = 365)

Variable	All, % (n/N)	Division, % (n/N)			P Value ^a
		I	II	III	
Written policy related to identification of mental health disorders	39.0 (130/333)	55.4 (98/177) ^{b,c}	21.2 (14/66) ^d	20.0 (18/90) ^d	<.001
Preparticipation examination history of diagnosis					
Eating disorder	84.7 (254/300)	88.9 (144/162)	77.0 (47/61)	81.8 (63/77)	.07
Depression	79.2 (236/298)	81.9 (131/160)	78.3 (47/60)	74.4 (58/78)	.40
Anxiety	75.8 (225/297)	79.3 (126/159)	71.7 (43/60)	71.8 (56/78)	.32
Preparticipation examination screening instrument/topic					
Eating disorder	44.5 (133/299)	52.5 (85/162) ^c	38.3 (23/60)	32.5 (25/77) ^d	.008
Depression	32.3 (97/300)	41.7 (68/163) ^{b,c}	21.7 (13/60) ^d	20.7 (16/77) ^c	.001
Anxiety	30.7 (92/300)	40.5 (66/163) ^{b,c}	20.0 (12/60) ^d	18.2 (14/77) ^d	<.001
Alcohol abuse	57.4 (170/296)	63.1 (101/160)	46.6 (27/58)	53.9 (42/78)	.07
Prescription drug abuse	52.2 (155/297)	57.1 (92/161)	41.4 (24/58)	50.0 (39/78)	.11
Illegal drug use	46.8 (139/297)	51.6 (83/161) ^b	32.8 (19/58) ^d	47.4 (37/78)	.048
Non-preparticipation examination screening					
Eating disorder	27.1 (79/291)	38.5 (60/156) ^{b,c}	15.3 (9/59) ^d	13.2 (10/76) ^d	<.001
Depression	16.2 (47/290)	23.7 (37/156) ^{b,c}	5.2 (3/58) ^d	9.2 (7/76) ^d	.001
Anxiety	14.3 (41/287)	23.2 (36/155) ^{b,c}	3.5 (2/57) ^d	4.0 (3/75) ^d	<.001
Alcohol abuse	21.9 (63/288)	29.2 (45/154) ^{b,c}	12.1 (7/58) ^d	14.5 (11/76) ^d	.005
Prescription drug abuse	23.8 (67/282)	31.5 (47/149) ^{b,c}	13.8 (8/58) ^d	16.0 (12/75) ^d	.005
Illegal drug use	30.9 (89/288)	39.6 (61/154) ^{b,c}	22.4 (13/58) ^d	19.7 (15/76) ^d	.003

^a Pearson χ^2 test of independence for difference in proportions of yes and no responses for presence of specific screening component by division.

^b Different from Division II ($P < .05$).

^c Different from Division III ($P < .05$).

^d Different from Division I ($P < .05$).

associated with differences in screening. Departments with a written plan for identifying student-athlete mental health concerns performed more exhaustive screenings than those without a written plan. In multivariable linear regression analyses (model 6) simultaneously including all predictors, only whether the department had a written policy for identifying student-athlete mental health disorders and employed a clinical psychologist remained significantly associated with the screening index score. Full detail is provided in Table 3. The adjusted R^2 value for the inclusive multivariable model was only 0.248, suggesting that a majority of the institutional variability in screening was unexplained by the variables included in the present analyses.

Results of logistic regression analyses assessing the odds that an institution screened for specific conditions are presented in Table 4. Departments that did not have a written policy for identifying student-athlete mental health problems had lower odds of screening for eating disorders, depression, anxiety, prescription drug abuse, and illegal drug use. The only condition for which the absence of this policy was not associated with lower odds of screening was alcohol abuse. Institutions that employed a clinical psychologist in the sports medicine department had greater odds of screening for anxiety and prescription drug abuse than institutions without such an individual.

DISCUSSION

Early identification of individuals who are symptomatic with or at risk of mental health disorders can help to limit their health burden. Among athletes, early identification has the additional benefit of limiting the negative effect of the

disorder on athletic performance. Among collegiate student-athletes, their frequency of contact with sports medicine clinicians makes the sports medicine setting an important venue for mental health screening. The PPE presents an opportunity for institutionalized universal screening for these and other health concerns.³ My study demonstrated empirical evidence of among-institutions variability in the mental health-related content of PPEs. This variability extended to other student-athlete mental health screening initiatives outside of the PPE.

It is important to note that these differences were patterned by institutional characteristics. Across nearly all screening initiatives, with the exception of PPE screening for alcohol consumption or prescription drug abuse, a higher proportion of Division I institutions engaged in screening for each disorder or behavior than did Division II or III institutions. Multivariable linear regression suggests that these among-divisions differences may be, at least in part, attributable to differences in staffing. Division I institutions were more likely to employ a clinical psychologist in the athletic department and tended to have a lower ratio of student-athletes to ATs, both of which were independently associated with institutional screening practices. Additionally, Division I institutions were more likely to have a written plan for mental health screening, which was in turn the strongest predictor of institutional screening practices. It is not evident in this cross-sectional analysis whether the presence of the screening protocol itself caused more screening or its presence was a marker of greater institutional attention to mental health screening. Irrespective of causality, establishing and implementing such a plan requires expertise and time, which may be more abundant at Division I institutions as compared with Division II and

Table 3. Linear Regression Analyses: Association Between Institutional Characteristics and Number of Mental Health Concerns for Which Collegiate Student-Athletes Were Screened via Preparticipation Examination or Institutional Initiative (N = 365)^a

Variable	Model					
	1	2	3	4	5	6
	B ^b	B ^b	B ^b	B ^b	B ^b	B ^b
	β	β	β	β	β	β
Competition division						
I	Reference					Reference
II	-1.08 (0.32)					-0.36 (0.68)
III	-1.04 (0.29)					-0.75 (0.76)
Ratio of student-athletes to athletic trainers						-0.06
Ratio of student-athletes to physicians						-0.12
Clinical psychologist employed in sports medicine?						
Yes		-0.01 (0.00)	0.00 (0.00)	0.99 (0.24)	Reference	0.74 (0.37)
No				Reference		Reference
Written plan for identifying mental health issues?						
Yes					Reference	Reference
No					-1.61 (0.23)	-1.46 (0.38)
Adjusted R ²	0.050	0.041	0.000	0.044	0.124	0.248

^a Dependent variable is an index of whether student-athletes were screened for symptoms or risk of an eating disorder, depression, anxiety, excessive alcohol consumption, prescription drug abuse, or illegal drug use in either the preparticipation examination through a separate sports medicine department or athletic department screening initiative. Scores range from 0 (*no screening for any of the listed health issues*) to 6 (*screening for all 6 health issues*). Response of *no* to written plan for identifying mental health issues includes both *no* and *I don't know*.

^b B = standard error.

^c P < .001.

^d P < .05.

Table 4. Logistic Regression Analyses: Association Between Institutional Characteristics and Number of Odds of Screening for Specific Mental Health Concerns^a

Variable	Condition, Odds Ratio (Standard Error)					
	Eating Disorder	Depression	Anxiety	Alcohol Abuse	Prescription Drug Abuse	Illegal Drug Use
Competition division						
I	Reference	Reference	Reference	Reference	Reference	Reference
II	1.19 (1.59)	1.66 (1.37)	1.05 (0.93)	0.35 (0.27)	0.62 (0.46)	0.46 (0.34)
III	0.98 (0.91)	0.88 (0.87)	0.66 (0.69)	0.27 (0.23)	0.50 (0.42)	0.37 (0.31)
Ratio of student-athletes to athletic trainers	0.98 (0.01) ^b	0.98 (0.01)	0.99 (0.01)	1.01 (0.01)	1.00 (0.01)	1.00 (0.01)
Ratio of student-athletes to physicians	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Clinical psychologist employed in sports medicine?						
Yes	1.32 (0.60)	2.11 (0.90)	2.56 (1.16) ^b	1.77 (0.73)	2.42 (0.99) ^b	1.34 (0.55)
No	Reference	Reference	Reference	Reference	Reference	Reference
Written plan for identifying mental health issues?						
Yes	Reference	Reference	Reference	Reference	Reference	Reference
No	0.16 (0.07) ^c	0.31 (0.13) ^d	0.32 (0.14) ^d	0.49 (0.20)	0.37 (0.15) ^b	0.41 (0.17) ^b
Pseudo <i>R</i> ²	0.250	0.168	0.197	0.094	0.117	0.091

^a Dependent variable is screening in either the preparticipation examination through a separate sports medicine department or athletic department screening initiative for the condition: eating disorder, depression, anxiety, excessive alcohol consumption, prescription drug abuse, or illegal drug use. Response of *no* to written plan for identifying mental health issues includes responses of *no* and *I don't know*.

^b *P* < .05.

^c *P* < .001.

^d *P* < .01.

II institutions, given their greater likelihood of employing a clinical psychologist and of having more ATs relative to athletes.

Some of these institutional factors, such as having a written plan for identifying student-athlete mental health concerns, are more easily modifiable than others. My results provide relatively strong support for recommending that all collegiate sports medicine departments establish a written plan for identifying student-athletes with mental health concerns. However, staffing deficits may constrain screening effectiveness even if such a plan is in place. Interpreting the results of screening efforts, meeting with student-athletes identified as at risk or symptomatic, and facilitating referrals to mental health specialists are activities that take time. Overworked clinicians may justifiably focus on managing immediate student-athlete physical health concerns and not allocate their constrained time to screening activities that may seem secondary to their core responsibilities of safety and athletic performance. Resource-constrained sports medicine departments should explore the possibility of strengthening relationships with campus counseling services and working collaboratively to meet the mental health needs of student-athletes. Watson and Kissinger³⁷ indicated that a stronger relationship between sports medicine professionals and campus health services would strengthen care for student-athletes across a range of health conditions. Helping to establish a screening protocol and ensuring that student-athletes who are identified through this screening are referred to the appropriate resource may be one such opportunity for cross-campus collaboration.

Screening efficiencies may also be sought through technology. The recent consensus statement²⁷ of the American College of Sports Medicine and the Fédération Internationale de Médecine du Sport recommended that a standardized electronic PPE be developed using human-centered design principles. Presently, in the US collegiate

sports setting, many PPEs include components that are completed with pen and paper and interpreted manually by a physician or AT. A reimagined PPE for this setting could involve athletes completing an inclusive battery of validated screening tools in a secure electronic format, with automatic scoring through the system and automatic notification of sports medicine clinicians—and potentially campus specialist mental health services—if an athlete provides certain responses or scores above certain thresholds.

It is important to note that I assessed only that screening for specific disorders occurred, not whether validated screening instruments were used or what follow-up protocols were enacted when a screen was positive. The NATA³⁰ has specified 8 questions that broadly assess psychosocial functioning for inclusion in PPEs for collegiate student-athletes (eg, “I don’t feel hopeful for the future”); however, the reliability and validity of these questions for use as a screening tool have not been assessed. Alternatively, others^{21,24} have suggested the utility of screening for symptoms or risk factors of specific mental health disorders with brief validated survey instruments that can be interpreted by nonspecialists. In a 2005 study,²² the nature of preparticipation screening at NCAA Division I institutions varied substantially, with only 32% requiring that all returning student-athletes complete an annual PPE. Focusing specifically on disordered eating, Mencias et al³⁸ found that few institutions were using validated screening instruments or including the recommended screening questions from the Female Athlete Triad Coalition. Additional research is needed to extend the work of Mencias et al³⁸ on screening for disordered eating to evaluate whether validated instruments are used to screen for a wider range of mental health disorders. Investigation is also needed to understand the extent to which institutions engage in follow-up care after a positive screen for a potential mental health disorder, in accordance with the

recommendations of the US Preventive Task Force.³⁴ Critically, research is further needed to understand whether screening through these methods in fact improves the mental health outcomes of student-athletes.

Limitations

A primary limitation of this study is the moderate response rate. Only 30% of clinicians who received the recruitment e-mail completed the survey. It is possible that those clinicians who chose to complete the survey did so because they wanted to express dissatisfaction with how their sports medicine department handles concerns related to student-athlete mental health. Alternatively, those who believe their institution does not appropriately manage conditions related to student-athlete mental health might have elected to not complete the survey for fear of a breach of confidentiality. Either way, the results may not be generalizable to all NCAA member institutions. Additionally, the results are not generalizable to high school sports medicine settings, where substantially fewer resources are likely devoted to student-athlete wellness and where the primary medical care for student-athletes is facilitated by the student-athlete's family and occurs in the community rather than in the school setting. Further work is necessary to determine how to most appropriately screen for mental health disorders outside of collegiate sports, including high school and private sports medicine settings.

The study's cross-sectional design is another limitation. Because of this design, I cannot make causal inferences about the associations assessed in the linear regression analyses. For example, the results suggest that having a written plan for identifying student-athlete mental health problems is associated with screening for more mental health problems. Institutions that engage more proactively with student-athlete mental health for some underlying unmeasured reason may be likely both to have a written plan and to engage in screening without these 2 variables being causally related.

The survey asked only about the presence of a clinical psychologist in the sports medicine setting. However, other licensed mental health professionals, such as psychiatrists, counseling psychologists, or licensed mental health counselors, may appropriately provide mental health care to student-athletes. Consequently, the percentage of schools that provide mental health care to student-athletes in the sports medicine setting is likely underestimated. Additional research is necessary to more comprehensively assess the range of individuals providing mental health care to student-athletes and whether these individuals are appropriately licensed to provide this care.

Finally, only 25% of the variability in screening index scores was explained by the institutional characteristics measured in this study, suggesting that additional investigation is needed to understand what other institutional characteristics predict differences in screening practices. One possible factor to explore is institutional oversight of the sports medicine department—whether the sports medicine department is supervised by the institution's student health services or by the athletic department. Efficiencies in screening and postscreening referral may be present if the sports medicine department is closely linked with other campus health services. It is also possible that,

under such a structure, more attention is given to mental health disorders, given their increasing prominence as areas of concern for the general student body.

CONCLUSIONS

The substantial variability in mental health screening practices among NCAA member institutions suggests that opportunity exists to make these practices more widespread. Recently (after the data presented herein were collected), the NCAA collaborated with a number of leading sport and medical organizations to release an interassociation consensus statement on mental health best practices.³³ These guidelines address many of the concerns raised in this paper, including recommending written plans for the identification and referral of student-athletes experiencing mental health challenges, universal screening for mental health disorders, and increased cross-campus collaboration to meet staffing needs. Research is now needed to understand whether these best-practice guidelines are being implemented. Research is also needed to validate existing short-form screening instruments for use with collegiate athletes so that recommendations for screening approaches can be made confidently in this population.

REFERENCES

1. World Health Organization (WHO). Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, June 19–22, 1946; signed on July 22, 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on April 7, 1948. Geneva, Switzerland: WHO.
2. Wiese-Bjornstal DM. Psychology and socioculture affect injury risk, response, and recovery in high-intensity athletes: a consensus statement. *Scand J Med Sci Sports*. 2010;20(suppl 2):103–111.
3. Yang J, Cheng G, Zhang Y, Covassin T, Heiden EO, Peek-Asa C. Influence of symptoms of depression and anxiety on injury hazard among collegiate American football players. *Res Sports Med*. 2014; 22(2):147–160.
4. Mountjoy M, Sundgot-Borgen J, Burke L, et al. The IOC consensus statement: beyond the Female Athlete Triad—Relative Energy Deficiency in Sport (RED-S). *Br J Sports Med*. 2014;48(7):491–497.
5. Seto CK. The preparticipation physical examination: an update. *Clin Sports Med*. 2011;30(3):491–501.
6. Galambos SA, Terry PC, Moyle GM, Locke SA, Lane AM. Psychological predictors of injury among elite athletes. *Br J Sports Med*. 2005;39(6):351–354.
7. Martens MP, Dams-O'Connor K, Beck NC. A systematic review of college student-athlete drinking: prevalence rates, sport-related factors, and interventions. *J Subst Abuse Treat*. 2006;31(3):305–316.
8. Sundgot-Borgen J, Torstveit MK. Aspects of disordered eating continuum in elite high-intensity sports. *Scand J Med Sci Sports*. 2010;20(suppl 2):112–121.
9. Tracey J. The emotional response to the injury and rehabilitation process. *J Appl Sport Psychol*. 2003;15(4):279–293.
10. Tripp DA, Stanish W, Ebel-Lam A, Brewer BW, Birchard J. Fear of reinjury, negative affect, and catastrophizing predicting return to sport in recreational athletes with anterior cruciate ligament injuries at 1 year postsurgery. *Rehabil Psychol*. 2007;52(1):74–81.
11. Substance Abuse and Mental Health Services Administration. *Results from the 2010 National Survey on Drug Use and Health: Mental Health Findings*. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2012. NSDUH Series H-42, HHS Publication No. (SMA) 11-4667.

12. Weigand S, Cohen J, Merenstein D. Susceptibility for depression in current and retired student athletes. *Sports Health*. 2013;5(3):263–266.
13. Yang J, Peek-Asa C, Corlette JD, Cheng G, Foster DT, Albright J. Prevalence of and risk factors associated with symptoms of depression in competitive collegiate student athletes. *Clin J Sport Med*. 2007;17(6):481–487.
14. Greenleaf C, Petrie TA, Carter J, Reel JJ. Female collegiate athletes: prevalence of eating disorders and disordered eating behaviors. *J Am Coll Health*. 2009;57(5):489–495.
15. Vardar E, Vardar SA, Kurt C. Anxiety of young female athletes with disordered eating behaviors. *Eat Behav*. 2007;8(2):143–147.
16. Miller BE, Miller MN, Verhegge R, Linville HH, Pumariega AJ. Alcohol misuse among college athletes: self-medication for psychiatric symptoms? *J Drug Educ*. 2002;32(1):41–52.
17. Rand CM, Shone LP, Albertin C, Auinger P, Klein JD, Szilagyi PG. National health care visit patterns of adolescents: implications for delivery of new adolescent vaccines. *Arch Pediatr Adolesc Med*. 2007;161(3):252–259.
18. Neal TL, Diamond AB, Goldman S, et al. Inter-association recommendations for developing a plan to recognize and refer student-athletes with psychological concerns at the collegiate level: an executive summary of a consensus statement. *J Athl Train*. 2013;48(5):716–720.
19. Esfandiari A, Broshek DK, Freeman JR. Psychiatric and neuropsychological issues in sports medicine. *Clin Sports Med*. 2011;30(3):611–627.
20. Etzel EF, Watson JC, Visek AJ, Maniar SD. Understanding and promoting college student-athlete health: essential issues for student affairs professionals. *NASPA J*. 2006;43(3):518–546.
21. Eisenberg D, Nicklett EJ, Roeder K, Kirz NE. Eating disorder symptoms among college students: prevalence, persistence, correlates, and treatment-seeking. *J Am Coll Health*. 2011;59(8):700–707.
22. Watson JC. College student-athletes' attitudes toward help-seeking behavior and expectations of counseling services. *J Coll Student Dev*. 2005;46(4):442–449.
23. Thompson RA, Sherman RT. "Good" athlete traits and characteristics of anorexia nervosa: are they similar? *Eat Disord*. 1999;7(3):181–190.
24. Levitt JM, Saka N, Hunter Romanelli L, Hoagwood K. Early identification of mental health problems in schools: the status of instrumentation. *J School Psychol*. 2007;45(2):163–191.
25. Weist MD, Rubin M, Moore E, Adelsheim S, Wrobel G. Mental health screening in schools. *J Sch Health*. 2007;77(2):53–58.
26. Joy EA, Paisley TS, Price R Jr, Rassner L, Thiese SM. Optimizing the collegiate preparticipation physical evaluation. *Clin J Sport Med*. 2004;14(3):183–187.
27. Roberts WO, Lollgen H, Matheson GO, et al. Advancing the preparticipation physical evaluation: an ACSM and FIMS joint consensus statement. *Clin J Sport Med*. 2014;24(6):442–447.
28. Seto CK. The preparticipation physical examination: an update. *Clin Sports Med*. 2011;30(3):491–501.
29. Wingfield K, Matheson GO, Meeuwisse WH. Preparticipation evaluation: an evidence-based review. *Clin J Sport Med*. 2004;14(3):109–122.
30. Conley KM, Bolin DJ, Carek PJ, Konin JG, Neal TL, Violette D. National Athletic Trainers' Association position statement: preparticipation physical examinations and disqualifying conditions. *J Athl Train*. 2014;49(1):102–120.
31. McDuff DR, Morse ED, White RK. Professional and collegiate team assistance programs: services and utilization patterns. *Clin Sports Med*. 2005;24(4):943–958.
32. Zychowicz ME. Pre-participation physical evaluations for athletes. *Nurse Pract*. 2012;37(11):41–45.
33. NCAA Sport Science Institute. Inter-association consensus document: best practices for understanding and supporting student-athlete mental wellness. National Collegiate Athletic Association Web site. <http://www.ncaa.org/sites/default/files/Mental%20Health%20Best%20Practices%20WEB%20SINGLE.pdf>. Published 2016. Accessed February 16, 2016.
34. US Preventive Services Task Force. Screening for depression in adults: US Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2009;151(11):784–92.
35. Gallagher R. National Survey of Counseling Center Directors Web site. http://www.collegecounseling.org/pdf/nscdd_final_v1.pdf. Published 2009. Accessed October 13, 2014.
36. Matheson VA, O'Connor DJ, Herberger JH. The bottom line: accounting for revenues and expenditures in intercollegiate athletics. *Int J Sport Finance*. 2012;7(1).
37. Watson JC, Kissinger DB. Athletic participation and wellness: implications for counseling college student-athletes. *J Coll Counsel*. 2007;10(2):153–162.
38. Mencias T, Noon M, Hoch AZ. Female athlete triad screening in National Collegiate Athletic Association Division I athletes: is the preparticipation evaluation form effective? *Clin J Sport Med*. 2012;22(2):122–125.

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