

Pressure on Sports Medicine Clinicians to Prematurely Return Collegiate Athletes to Play After Concussion

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Context: Anecdotal and qualitative evidence has suggested that some clinicians face pressure from coaches and other personnel in the athletic environment to prematurely return athletes to participation after a concussion. This type of pressure potentially can result in compromised patient care.

Objective: To quantify the extent to which clinicians in the collegiate sports medicine environment experience pressure when caring for concussed athletes and whether this pressure varies by the supervisory structure of the institution's sports medicine department, the clinician's sex, and other factors.

Design: Cross-sectional study.

Setting: Web-based survey of National College Athletic Association member institutions.

Patients or Other Participants: A total of 789 athletic trainers and 111 team physicians from 530 institutions.

Main Outcome Measure(s): We asked participants whether they had experienced pressure from 3 stakeholder populations (other clinicians, coaches, athletes) to prematurely return athletes to participation after a concussion. Modifying variables that we assessed were the position (athletic trainer, physician) and sex of the clinicians, the supervisory structure of their

institutions' sports medicine departments, and the division of competition in which their institutions participate.

Results: We observed that 64.4% (n = 580) of responding clinicians reported having experienced pressure from athletes to prematurely clear them to return to participation after a concussion, and 53.7% (n = 483) reported having experienced this pressure from coaches. Only 6.6% (n = 59) reported having experienced pressure from other clinicians to prematurely clear an athlete to return to participation after a concussion. Clinicians reported greater pressure from coaches when their departments were under the supervisory purview of the athletic department rather than a medical institution. Female clinicians reported greater pressure from coaches than male clinicians did.

Conclusions: Most clinicians reported experiencing pressure to prematurely return athletes to participation after a concussion. Identifying factors that are associated with variability in pressure on clinicians during concussion recovery can inform potential future strategies to reduce these pressures.

Key Words: conflict of interest, organizational structure, sex, college

Key Points

- More than half of sports medicine clinicians had experienced pressure from coaches and athletes to return athletes to participation prematurely after a concussion.
- Clinicians experienced greater pressure from coaches at schools where the sports medicine department reported to the athletic department than at schools where the sports medicine department reported to an independent medical institution.
- Female clinicians experienced greater pressure from coaches than male clinicians experienced.
- More research is needed to determine how pressure affects clinical practice and whether pressure on clinicians affects return-to-participation decisions.

Addressing the health burden of mild traumatic brain injury from sport is increasingly considered a public health priority.¹ More than 450 000 college students participate in organized interscholastic sports each year.^{2,3} Among collegiate athletes in contact and collision sports, Daneshvar et al⁴ estimated that 43 concussions are sustained per 100 000 athlete-exposures to a game or practice, which is

nearly twice the rate of diagnosed concussions sustained by high school athletes competing in the same sports. This estimate likely understates the true incidence of concussions because many are undiagnosed.⁵⁻⁸ Recent evidence⁹⁻¹⁴ has suggested that repeated concussive and subconcussive brain trauma can lead to neurologic problems later in life, including changes in cognition and behavior.

Conflict of interest in the care of concussed athletes is a topic of growing ethical discourse.^{15–19} Writing for the *Chronicle of Higher Education* about US collegiate sport, Wolverton²⁰ painted a picture of colleges fraught with pressure on physicians and athletic trainers (ATs) from coaches and athletic administrators. A total of 101 clinicians who provide patient care for football teams in the National Collegiate Athletic Association (NCAA) Division I Football Bowl Subdivision participated in the non-peer-reviewed study, and more than half reported that they had “felt pressure from football coaches to return concussed players to action before they were medically ready.”²⁰ Some of this pressure was attributed to conflicts of interest inherent in the organizational structure and incentives of sports medicine departments. In some instances, ATs reported directly to head football coaches.²⁰ Even in substantially lower-stakes youth sports, Bramley et al²¹ reported that a sample of hockey coaches indicated they would be more likely to allow an athlete who had sustained a concussion to continue participating if the game was considered important, such as for a championship. Consequently, clinicians in collegiate sports medicine departments may find themselves in a challenging situation: having ethical responsibilities to provide appropriate medical care to their patients while facing perceived or real pressure from their employers to return athletes to participation.^{15–19,22} In a survey of sports medicine physicians in New Zealand, Anderson and Gerrard²³ observed that whereas all respondents expressed a sense of responsibility to their athlete patients, 72% also believed they had a responsibility to the team coach, and 55% believed they had a responsibility to team management.

The National Athletic Trainers’ Association recently released a consensus statement detailing best practices for sports medicine management in secondary schools and colleges, including the advantages and disadvantages of different models of supervisory relationships in sports medicine.²⁴ Supervisory models in which ATs or team physicians are employed by athletic departments are described as having the potential for conflict of interest in the medical care provided to athletes. Pecci and Laursen²⁵ and Laursen²⁶ have advocated for sports medicine departments to be nested within medical units, such as university health centers, rather than athletic departments. They suggested that this organizational structure would reduce real and perceived conflicts of interest in the care of athletes and would have additional benefits, such as easier access to other health care providers and more centralized oversight of medical care.^{25,26} Whereas these arguments are intuitive, no researchers have conducted an empirical evaluation of whether supervisory structure is systematically associated with different types of pressure on clinicians regarding the care of collegiate athletes who have sustained concussions.

Another potentially important variable that could modify the pressure that clinicians experience is their sex. Approximately half of all ATs are women, but women represent only about one-quarter of full-time staff ATs and only 1 in 8 head ATs in collegiate sports medicine departments.^{27–30} Some investigators³¹ have suggested that male and female ATs may have different experiences interacting with coaches and other ATs in the collegiate athletic environment. Mazerolle et al³¹ conducted qualitative interviews with 14 female NCAA Division I ATs and

described how they “often encountered gender discrimination when working with a team sport coached by a man.” They described a perception that coaches view female ATs as “more sympathetic and less pragmatic” than male ATs and that this judgment undermines the coaches’ confidence in the care they provide athletes. This differential perception is reinforced by 2 surveys^{32,33} in which male collegiate athletes reported being more comfortable receiving care from male ATs. Stereotypical judgments about women in the workplace tend to be strongest when women are an underrepresented minority, as is the case with female ATs in collegiate sports environments, and can inform the control strategies of individuals in positions of power.³⁴ Quantifying the extent to which pressure is experienced in the care of concussed athletes and whether it is modified by clinician characteristics such as sex are important steps in understanding whether institution-level intervention is needed.

Therefore, the purpose of our study was to obtain empirical evidence about whether clinicians who provide care to US collegiate sports teams experienced pressure to prematurely clear athletes for participation after a concussion. We hypothesized that clinicians in sports medicine departments reporting to the athletic department would experience greater pressure from coaches and athletes than clinicians in departments reporting to medical institutions and that female clinicians would experience greater pressure from coaches and athletes than male clinicians would experience.

METHODS

Procedures

In September 2013, clinicians from all 1066 NCAA member institutions competing in Division I, II, or III were contacted using an e-mail distribution service provided by the NCAA’s Sports Science Institute as part of a broader study of collegiate concussion-management practices.³⁵ The 2935 sports medicine personnel who received the initial e-mail included 2462 ATs and 429 physicians, all of whom were invited to participate in a Web-based survey, hosted on the Qualtrics survey platform (Qualtrics LLC, Provo, UT), about concussion management at their institutions. Two reminder e-mails were sent at approximately 3-week intervals after the initial contact.

Participants

All ATs and physicians caring for athletic teams in NCAA Division I, II, or III were eligible for inclusion in the study. The survey was completed by 900 clinicians (789 ATs and 111 physicians) from 530 unique schools, representing a school-level participation rate of 49.7% and an individual-level participation rate of 30.7%. All participants provided informed consent, and the study was approved by the institutional review boards at Harvard School of Public Health and Boston University School of Medicine.

Measures

The primary outcome was perceived pressure from 3 groups (athletes, coaches, other clinicians at their institutions) to prematurely return an athlete to participation after

Table 1. Descriptive Characteristics of a Sample of Clinicians Providing Patient Care to US Collegiate Athletes

Characteristic	Clinicians ^a		
	All	Male	Female
Position			
Total respondents, N	900	491	261
Athletic trainer, n (%)	789 (87.7)	417 (84.9)	247 (94.6)
Physician, n (%)	111 (12.3)	74 (15.1)	14 (5.4)
Teams for which patient care is provided			
Total respondents, N	739	496	263
Male contact or collision sport, n (%)	642 (86.9)	457 (92.1)	181 (68.8)
Any contact or collision sport, n (%)	718 (97.2)	475 (95.8)	238 (90.5)
Supervisory structure			
Total respondents, N	757	478	242
Athletic department, n (%)	648 (85.6)	399 (83.5)	216 (89.3)
Medical institution, n (%)	63 (8.3)	45 (9.4)	16 (6.6)
Other/unknown, n (%) ^b	46 (6.1)	34 (7.1)	1 (0.4)
National Collegiate Athletic Association division of competition			
Total respondents, N	739	496	263
I, n (%)	478 (64.7)	293 (59.1)	110 (41.8)
II, n (%)	163 (22.1)	82 (16.5)	58 (22.1)
III, n (%)	266 (36.0)	121 (24.4)	95 (36.1)
Experience, y (SD)			
Athletic trainer	17.94 (8.9)	20.17 (8.7)	14.12 (7.9)
Physician	18.72 (8.3)	19.93 (7.3)	12.07 (9.7)

^a Not all participants provided responses to all questions.

^b Responses in the *other/unknown* category included academic (eg, department of kinesiology) and institutional reporting structures (eg, dean of student life), as well as responses that may have been misclassified (eg, associate athletic director).

a concussion. Respondents were instructed to indicate the extent to which they agreed with statements about having experienced pressure from each group. For example, the wording of the question asking about pressure from coaches read: "I have felt pressure from coaches to return an athlete to play after a concussion before I think they are ready." Each statement was scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Items were developed for this study based on existing literature about pressure and conflicts of interest in sports medicine settings,^{15–19,22} with sports medicine clinicians reviewing the items for content and clarity.

Participants reported their sex, position in the sports medicine department (AT, physician), number of years of experience working on a sports medicine team, school name, NCAA division in which most teams at their school competed, and the sex and sport of the team or teams for which they provided patient care. Teams were classified as contact or collision based on the list provided in the *2013–14 NCAA Sports Medicine Handbook*.³⁶ We assessed the supervisory structure of their sports medicine departments by asking respondents whether the heads of their sports medicine departments reported to the athletic department, a medical institution (eg, student health services, university hospital), or another entity.

Statistical Analysis

The pressure items, scored on the 7-point Likert scale, did not deviate substantially from the normal distribution and, thus, were treated as continuous variables for analyses of differences in pressure between groups. For ease of interpretation, pressure is also reported as the percentage of respondents who *slightly agree*, *agree*, or *strongly agree* with the statement. However, all analyses were based on the means of the continuous measures in which no categories were collapsed. To examine differences in pressure experienced by clinicians from each of the 3 groups (clinicians, coaches, athletes), repeated-measures analysis of variance (ANOVA) was used with Greenhouse-Geisser correction as needed and post hoc tests using the Sidak correction. Independent-samples *t* tests and 1-way ANOVAs were used to assess between-groups differences. Linear regression was used to examine the difference in pressure by years of experience. Multivariate regression was used to determine the relative association of the measured clinician and institutional characteristics with the 3 outcome variables (pressure from other clinicians, coaches, and athletes). All statistical analyses were completed using R (version 2.15.3; <http://www.R-project.org/>) and SPSS statistical software (version 21.0; IBM Corporation, Armonk, NY).

RESULTS

Descriptive characteristics of the sample are provided in Table 1. Notably, nearly all of the responding ATs (97.1%, $n = 766$) and physicians (98.8%, $n = 110$) reported regularly providing care to at least 1 contact or collision sport. Years of experience differed by sex, with female ATs and physicians having fewer years of experience than male ATs ($t_{652} = 8.93$, $P < .001$) and physicians ($t_{82} = 3.45$, $P = .001$).

Across all responding clinicians, 64.4% ($n = 580$) slightly agreed, agreed, or strongly agreed (henceforth referred to as *agreed*; mean = 4.63) that they had experienced pressure from athletes to clear them to return to participation after a concussion, 53.7% ($n = 483$) agreed that they had experienced pressure from coaches (mean = 4.16), and 6.6% ($n = 59$) agreed that they had experienced pressure from clinicians (mean = 1.83). Pressure from some stakeholders differed by the respondent's position in the sports medicine department. Athletic trainers (55.3% [$n = 436$] agreed; mean = 4.24) were more likely than physicians (41.4% [$n = 50$] agreed; mean = 3.54) to report that they had experienced pressure from coaches ($P = .002$). However, physicians (18.4% [$n = 20$] agreed; mean = 2.37) were more likely than ATs (5.0% [$n = 39$] agreed; mean = 1.75) to report having experienced pressure from other clinicians ($P = .002$). Among both physicians and ATs, repeated-measures ANOVA indicated a difference in pressure from the different stakeholder groups ($P < .001$ and $P < .001$, respectively).

We also assessed differences in pressure by institutional characteristics. Clinicians reported greater pressure from coaches when their departments were under the supervisory purview of the athletic department (54.3% [$n = 489$] agreed; mean = 4.21) rather than a medical institution (40.2% [$n = 362$] agreed; mean = 3.54; $t_{669} = 2.65$, $P = .01$). When comparing the 2 supervisory structures, we observed

no differences in perceived pressures from athletes and other clinicians. Differences in pressure by competition division were found in each stakeholder group: athletes ($F_{2,719} = 3.07, P = .047$), coaches ($F_{2,722} = 5.70, P = .004$), and other clinicians ($F_{2,720} = 5.775, P = .003$). Pressure from athletes was lower in Division III than in Division I ($P = .048$), pressure from coaches was lower in Division III than in Divisions I ($P = .02$) and II ($P = .008$), and pressure from other clinicians was higher in Division I than in Division II ($P = .03$) and Division III ($P = .01$). Mean pressures by institutional characteristics are detailed separately for ATs and physicians in Table 2.

Next, differences in perceived pressure were compared between male and female clinicians. Female clinicians agreed more strongly than male clinicians that they had experienced pressure from coaches to prematurely return athletes to activity (61.1% [$n = 159$] agreed; mean = 4.46 versus 49.3% [$n = 242$] agreed; mean = 3.97; $t_{70} = -3.030, P = .003$). No differences by respondent sex were observed for pressure from athletes or other clinicians. When restricting the sample to those clinicians who provide patient care for male contact or collision teams, multivariate regression indicated that female sex was associated with more pressure ($\beta = .42, P = .03$) and years of experience was associated with less pressure ($\beta = .03, P = .009$) from coaches. Similarly, when the sample was restricted to clinicians providing patient care only to female contact and collision teams, years of experience was associated with less pressure from coaches ($\beta = .03, P = .004$), and respondent sex was associated with greater pressure from coaches ($\beta = .38, P = .042$). Mean pressures by clinician characteristics are detailed separately for ATs and physicians in Table 2. Linear regression indicated that more experienced physicians felt less pressure from other members of the sports medicine staff ($\beta = -.06, P = .007$) but not from coaches ($\beta = -.03, P = .35$) or athletes ($\beta = .01, P = .79$). More experienced ATs felt less pressure from coaches ($\beta = -.03, P = .001$) and athletes ($\beta = .024, P = .007$) but not from other members of the sports medicine staff ($\beta = .00, P = .88$).

Full results of the multivariate regression models are reported in Table 3. Pressure from coaches was lower among clinicians working at Division III than at Division I institutions ($\beta = -.72, P < .001$) and was higher among women respondents than men ($\beta = .41, P = .02$), among those who had fewer years of experience ($\beta = -.03, P = .006$), and among ATs than physicians ($\beta = .57, P = .03$). Pressure on clinicians from athletes was associated only with the respondents' years of experience, with more experienced clinicians feeling less pressure ($\beta = -.02, P = .03$).

DISCUSSION

Our study represents the first quantitative examination of the pressures clinicians experience when caring for concussed athletes in the collegiate sports medicine environment. Empirically determining the extent to which pressure is experienced and what factors modify this pressure is critical for understanding possible targets for intervention. More than half of the clinicians in our study have experienced pressure from coaches and athletes to return athletes to participation prematurely after a concu-

sion. Whereas the frequency and absolute intensity of this pressure is unknown, it nonetheless is a troubling finding. Additional research is needed to determine how pressure affects clinical practice and specifically whether pressure on clinicians affects return-to-participation decisions. Apart from the effect that this pressure may have on clinical care, Kania et al³⁷ reported that pressure from coaches on ATs to medically clear athletes predicts occupational burnout.

Clinicians at schools where the sports medicine department reports to the athletic department experienced greater pressure from coaches than respondents at schools where the sports medicine department reports to a medical institution. This observation is consistent with previous reports^{20,26} and may reflect perceived or real competitive pressures being placed on the clinicians by the athletic department. However, supervisory structure was not associated with pressure in the multivariate regression analyses. This result is possibly attributable to the small number of respondents from institutions with the medical supervisory structure ($n = 63$). Other school characteristics, such as division of competition, may be more strongly predictive of the pressure experienced by clinicians. Respondents at Division III institutions tended to report less pressure from coaches and other clinicians but not from athletes than respondents from Division I and II institutions. This difference between coaches and clinicians possibly reflects a relatively greater prominence of internal motivating factors for return to participation among athletes than among coaches. These factors could include cognitions such as athletic identity, desire to be part of a team, or desire to conform to perceived athlete norms,³⁸ and they might be distributed similarly across athletes, regardless of the administrative structure of their athletic environment or level of competition. This finding is consistent with qualitative descriptions of the high degree of pressure on many clinicians from coaches at highly competitive Division I football programs.²⁰ Clinicians at Division I institutions whose sports medicine departments are under the supervision of the athletic departments may experience greater pressure than clinicians at Division III institutions under the same supervisory structure; however, this cannot be elucidated reliably from our data. More research with a larger sample of schools under the medical institution supervisory structure is needed to evaluate the relationship among division of competition, supervisory structure, and pressures experienced by clinicians to return athletes to participation prematurely.

Compared with male clinicians, female clinicians reported experiencing greater pressure from coaches. This observation may suggest that coaches perceive female clinicians to be less qualified or perhaps more easily intimidated into taking certain actions. Workplace bullying and other hostile work behaviors often function as a form of managerial control,³⁹ with some evidence suggesting that this form of control is directed more often at women than at men.⁴⁰ These differences in responses may reflect systematically different sensitivities to pressure rather than a difference in pressure between parties. However, both sexes were similar in their reports of pressure from other members of the sports medicine staff and athletes; they differed in their reports of pressure from coaches, suggesting that important sex differences exist in the coach-clinician interaction. Independent of sex, less

Table 2. Mean Pressure Experienced From Different Groups by Respondent Characteristics, and Differences in Pressure Experienced Within Each Set of Categories of Respondent Characteristics

Characteristic ^a	Athletic Trainer			Physician		
	Mean (95% Confidence Interval) ^b	F Value	P Value ^c	Mean (95% Confidence Interval) ^b	F Value	P Value ^c
Outcome: pressure from clinicians						
All respondents	1.75 (1.66, 1.84)			2.37 (2.01, 2.73)		
Division of competition						
I	1.87 (1.72, 2.01)			2.53 (2.08, 2.98)		
II	1.65 (1.44, 1.85)	2.72	.07	1.73 (0.93, 2.53)	1.29	.28
III	1.64 (1.50, 1.79)			2.00 (1.11, 2.89)		
Respondent sex						
Male	1.70 (1.59, 1.81)			2.18 (1.80, 2.56)		
Female	1.81 (1.65, 1.99)	1.23	.26	3.54 (2.31, 4.76)	7.21	.009
Supervisory structure						
Athletic department	1.76 (1.60, 1.91)			2.34 (1.90, 2.78)		
Medical institution	1.60 (1.41, 2.37)	0.42	.52	2.05 (1.44, 2.66)	0.52	.47
Provide care for contact or collision sports?						
Yes	1.74 (1.65, 1.83)			Not applicable ^d		
No	2.06 (1.36, 2.76)	1.19	.28	Not applicable ^d		
Outcome: pressure from coaches						
All respondents	4.24 (4.09, 4.39)			3.54 (3.12, 3.96)		
Division of competition						
I	4.37 (4.14, 4.59) ^e			3.74 (3.25, 4.23)		
II	4.54 (4.20, 4.89) ^e	6.35	.002	3.18 (1.81, 4.55)	1.64	.20
III	3.83 (3.56, 4.10) ^f			2.60 (1.20, 4.00)		
Respondent sex						
Male	4.06 (3.87, 4.26)			3.51 (3.03, 4.00)		
Female	4.49 (4.23, 4.75)	6.69	.01	3.92 (2.81, 5.04)	0.45	.50
Supervisory structure						
Athletic department	4.28 (4.12, 4.44)			3.59 (3.07, 4.11)		
Medical institution	3.68 (3.00, 4.36)	3.16	.08	3.32 (2.47, 4.17)	0.29	.59
Provide care for contact or collision sports?						
Yes	4.22 (4.06, 4.38)			Not applicable ^d		
No	4.71 (3.77, 5.64)	0.99	.32	Not applicable ^d		
Outcome: pressure from athletes						
All respondents	4.60 (4.45, 4.75)			4.84 (4.48, 5.20)		
Division of competition						
I	4.54 (4.33, 4.76)			4.82 (4.40, 5.23)		
II	4.96 (4.65, 5.28)	2.93	.05	5.09 (3.84, 6.35)	0.16	.86
III	4.46 (4.19, 4.73)			4.70 (3.44, 5.96)		
Respondent sex						
Male	4.53 (4.34, 4.72)			4.85 (4.43, 5.27)		
Female	4.68 (4.44, 4.92)	1.12	.34	4.69 (3.86, 5.52)	0.09	.77
Supervisory structure						
Athletic department	4.63 (4.47, 4.79)			4.88 (4.42, 5.34)		
Medical institution	4.22 (3.52, 4.92)	1.64	.21	4.59 (3.82, 5.35)	0.41	.52
Provide care for contact or collision sports?						
Yes	4.60 (4.45, 4.75)			Not applicable ^d		
No	4.41 (3.49, 5.33)	0.16	.69	Not applicable ^d		

^a Range for all pressure outcomes was 1 to 7, with higher values indicating greater perceived pressure.

^b Mean pressure experienced by respective stakeholder population by each categorical respondent characteristic.

^c P value for within-characteristic comparisons of mean pressure experienced by respective stakeholder populations. We used 1-way analyses of variance to assess between-groups differences.

^d No mean differences were reported for physicians because all but 1 reported providing patient care to contact or collision teams.

^e Compared with Division III.

^f Compared with Divisions I and II.

Table 3. Results of Multivariate Regression of Association Between Clinician Characteristics and Pressure Experienced From Different Stakeholders

Characteristic ^a	β Value (95% Confidence Interval)	P Value
Outcome: pressure from clinicians ^b		
Division of competition		
I	Referent	
II	-.29 (-0.55, -0.03)	.03
III	-.31 (-0.54, -0.08)	.009
Respondent sex		
Male	Referent	
Female	.22 (0.00, 0.43)	.052
Supervisory structure		
Athletic department	Referent	
Medical institution	.04 (-0.31, 0.39)	.83
Provide care for contact or collision sports?		
No	Referent	
Yes	-.16 (-0.77, 0.45)	.60
Position		
Physician	Referent	
Athletic trainer	-.45 (-0.78, -0.12)	.007
Years of experience	.00 (-0.02, 0.01)	.57
Outcome: pressure from coaches ^c		
Division of competition		
I	Referent	
II	.18 (-0.23, 0.58)	.40
III	-.72 (-1.08, 0.35)	<.001
Respondent sex		
Male	Referent	
Female	.41 (0.06, 0.74)	.02
Supervisory structure		
Athletic department	Referent	
Medical institution	-.42 (-0.96, 0.13)	.14
Provide care for contact or collision sports?		
No	Referent	
Yes	.41 (-0.06, 0.87)	.75
Position		
Physician	Referent	
Athletic trainer	.57 (0.06, 1.07)	.03
Years of experience	-.03 (-0.04, -0.01)	.006
Outcome: pressure from athletes ^d		
Division of competition		
I	Referent	
II	.34 (-0.05, 0.74)	.09
III	-.14 (-0.49, 0.21)	.44
Respondent sex		
Male	Referent	
Female	.07 (-0.26, 0.40)	.69
Supervisory structure		
Athletic department	Referent	
Medical institution	-.24 (-0.77, 0.30)	.39

Table 3. Continued

Characteristic ^a	β Value (95% Confidence Interval)	P Value
Provide care for contact or collision sports?		
No	Referent	
Yes	.30 (-0.60, 1.20)	.51
Position		
Physician	Referent	
Athletic trainer	-.36 (-0.85, 0.14)	.16
Years of experience	-.02 (-0.04, 0.00)	.03

^a The range for all pressure outcomes was 1 to 7, with higher values indicating greater perceived pressure.

^b $R^2 = 0.034$.

^c $R^2 = 0.069$.

^d $R^2 = 0.022$.

experienced clinicians reported greater pressure from coaches and athletes but not from other clinicians. Thus, this type of attempted managerial control is a concern in the coach-clinician dynamic but not within sports medicine departments themselves, and it may be directed at individuals perceived to be more controllable. Female clinicians or clinicians with limited years of experience in their positions may be viewed, correctly or incorrectly, as more easily influenced.

These observations suggest the importance of NCAA policy or institution-level intervention to address the pressure that many clinicians experience to prematurely return athletes to participation after a concussion. This may include reorganization of the supervisory structure within institutions to reduce real or perceived conflicts of interest in the care of athletes by having sports medicine personnel report to a medical institution rather than an athletic department. It may also include implementing interventions to improve communication among coaches, athletes, and clinicians during the concussion-recovery and return-to-participation process. In a study of the experiences of female ATs in collegiate settings, Mazerolle et al³¹ reported that establishing clear expectations at the beginning of the season helped facilitate more trusting interactions with coaches. Instructing all ATs to use this type of communication strategy may help reduce the pressures experienced in providing patient care to concussed athletes. Athletic departments may also consider communicating more clearly with coaches, clinicians, and athletes about their institutional concussion-management plans. The NCAA requires all institutions to have concussion-management plans; however, not all stakeholders in the concussion-management process are aware of these plans.³⁵ Increasing awareness of the objective set of steps through which all athletes must pass during the concussion-recovery process may help decrease the perception of clinician subjectivity and may reduce pressure on clinicians by athletes and coaches.

Our study had several important limitations. The response rate of 30.9% of individuals and 49.7% of institutions limited our ability to generalize these results to all sports medicine clinicians and all institutions. Respondents were possibly systematically different from nonrespondents; for example, respondents might have been

more interested in concussions or more worried about inappropriate concussion management at their institutions. The responses of our participants may have been affected by social desirability bias or a fear, despite assurances from investigators to the contrary, that their institutions might be identified. Sex differences may also have existed in the willingness to report experiences of pressure from coaches and other stakeholders. Although we took steps to ensure that the content and clarity of the questions reflected the constructs of interest, experienced pressure is inherently subjective, so the reliability and validity of this measure are uncertain. In addition, the pressure questions did not specify a time period. Consequently, some of the reported pressure may have occurred during a time when less awareness about concussions and fewer policies related to concussion management existed than currently exist at US colleges. Offsetting this possibility is the observation that clinicians with more years of experience reported less pressure. This difference in pressure experienced may have reflected less sensitivity to pressure rather than any objective difference in the pressure delivered. Future authors are encouraged to more clearly specify a reference period and to investigate the ways in which pressure is communicated and experienced.

CONCLUSIONS

Institution-level change to reduce pressure on clinicians caring for concussed athletes is one important strategy for ensuring that all athletes are following a medically indicated concussion-recovery protocol. Our observations provide important empirical evidence about modifiers of this experienced pressure and suggest ways it may be reduced.

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REFERENCES

- Wiebe DJ, Comstock RD, Nance ML. Concussion research: a public health priority. *Inj Prev*. 2011;17(1):69–70.
- Irick E. 2011–12 NCAA sports sponsorship and participation rates report. National Collegiate Athletic Association Web site. <http://www.ncaapublications.com/p-4293-2011-12-ncaa-sports-sponsorship-and-participation-rates-report.aspx>. Accessed January 9, 2015.
- Howard B. High school sports participation continues upward climb. National Federation of State High School Associations Web site. <http://www.nfhs.org/content.aspx?id=5752>. Accessed January 9, 2015.
- Daneshvar DH, Nowinski CJ, McKee AC, Cantu RC. The epidemiology of sport-related concussion. *Clin Sports Med*. 2011;30(1):1–17.
- Llewellyn T, Burdette GT, Joyner AB, Buckley TA. Concussion reporting rates at the conclusion of an intercollegiate athletic career. *Clin J Sport Med*. 2014;24(1):76–79.
- Kroshus E, Daneshvar DH, Baugh CM, Nowinski CJ, Cantu RC. NCAA concussion education in ice hockey: an ineffective mandate. *Br J Sports Med*. 2014;48(2):135–140.
- Register-Mihalik JK, Guskiewicz KM, McLeod TC, Linnan LA, Mueller FO, Marshall SW. Knowledge, attitude, and concussion-reporting behaviors among high school athletes: a preliminary study. *J Athl Train*. 2013;48(5):645–653.
- Torres DM, Galetta KM, Phillips HW, et al. Sports-related concussion: anonymous survey of a collegiate cohort. *Neurol Clin Pract*. 2013;3(4):279–287.
- McKee AC, Stern TD, Nowinski CJ, et al. The spectrum of disease in chronic traumatic encephalopathy. *Brain*. 2013;136(1):43–64.
- McKee AC, Cantu RC, Nowinski CJ, et al. Chronic traumatic encephalopathy in athletes: progressive tauopathy after repetitive head injury. *J Neuropathol Exp Neurol*. 2009;68(7):709–735.
- McKee AC, Gavett BE, Stern RA, et al. TDP-43 proteinopathy and motor neuron disease in chronic traumatic encephalopathy. *J Neuropathol Exp Neurol*. 2010;69(9):918–929.
- Daneshvar DH, Riley DO, Nowinski CJ, McKee AC, Stern RA, Cantu RC. Long-term consequences: effects on normal development profile after concussion. *Phys Med Rehabil Clin N Am*. 2011;22(4):683–700.
- Zemek RL, Farion KJ, Sampson M, McGahern C. Prognosticators of persistent symptoms following pediatric concussion: a systematic review. *JAMA Pediatr*. 2013;167(3):259–265.
- Seichepine DR, Stamm JM, Daneshvar DH, et al. Profile of self-reported problems with executive functioning in college and professional football players. *J Neurotrauma*. 2013;30(14):1299–1304.
- McNamee M, Partridge B. Concussion in sports medicine ethics: policy, epistemic and ethical problems. *Am J Bioeth*. 2013;13(10):15–17.
- Sailors PR, Teetzel S, Weaving C. Prescription for “sports medicine and ethics.” *Am J Bioeth*. 2013;13(10):22–24.
- King NM, Robeson R. Athletes are guinea pigs. *Am J Bioeth*. 2013;13(10):13–14.
- Testoni D, Hornik CP, Smith PB, Benjamin DK, McKinney RE. Sports medicine and ethics. *Am J Bioeth*. 2013;13(10):4–12.
- Partridge B. Dazed and confused: sports medicine, conflicts of interest, and concussion management. *J Bioeth Inq*. 2014;11(1):65–74.
- Wolverton B. Coach makes the call: athletic trainers who butt heads with coaches over concussion treatment take career hits. The Chronicle of Higher Education Web site. <http://chronicle.com/article/Trainers-Butt-Heads-With/141333/>. Accessed January 9, 2015.
- Bramley H, Kroft C, Polk D, Newberry T, Silvis M. Do youth hockey coaches allow players with a known concussion to participate in a game? *Clin Pediatr*. 2012;51(3):283–287.
- Waddington I. Ethical problems in the medical management of sports injuries. In: Loland S, Skirstad B, Waddington I, eds. *Pain and Injury in Sport: Social and Ethical Analysis*. New York, NY: Routledge; 2006:182–199.
- Anderson LC, Gerrard DF. Ethical issues concerning New Zealand sports doctors. *J Med Ethics*. 2005;31(2):88–92.
- Courson R, Goldenberg M, Adams KG, et al. Inter-association consensus statement on best practices for sports medicine management for secondary schools and colleges. *J Athl Train*. 2014;49(1):128–137.
- Pecci M, Laursen M. A shift in college sports medicine services under the umbrella of student health. *College Health Action*. 2010;49(4):1, 29. http://www.acha.org/Promotional_Opportunities/docs/ACTION_v49n4.pdf. Accessed January 21, 2015.
- Laursen RM. A patient-centered model for delivery of athletic training services. *Athl Ther Today*. 2010;15(3):1–3.

27. Irick E. 2009–2010 race and gender demographics: member institutions report. National Collegiate Athletic Association Web site. <http://ncaapublications.com/p-4220-2009-2010-race-and-gender-demographics-member-institutions-report.aspx>. Accessed January 9, 2015.
28. Membership statistics. National Athletic Trainers' Association Web site. <http://members.nata.org/members1/documents/membstats/index.cfm>. Accessed January 9, 2015.
29. Acosta RV, Carpenter LJ. Women in intercollegiate sport: a longitudinal, national study thirty-five year update. 1977–2012. Acosta/Carpenter Web site. <http://acostacarpenter.org/AcostaCarpenter2012.pdf>. Accessed January 9, 2015.
30. Kahanov L, Loeb sack AR, Masucci MA, Roberts J. Perspectives on parenthood and working of female athletic trainers in the secondary school and collegiate settings. *J Athl Train*. 2010;45(5):459–466.
31. Mazerolle SM, Borland JF, Burton LJ. The professional socialization of collegiate female athletic trainers: navigating experiences of gender bias. *J Athl Train*. 2012;47(6):694–703.
32. O'Connor C, Grappendorf H, Burton L, Harmon SM, Henderson AC, Peel J. National Collegiate Athletic Association Division I football players' perceptions of women in the athletic training room using a role congruity framework. *J Athl Train*. 2010;45(4):386–391.
33. Drummond JL, Hostetter K, Laguna P, Gillentinte A, Del Rossi G. Self-reported comfort of collegiate athletes with injury and condition care by same-sex and opposite-sex athletic trainers. *J Athl Train*. 2007;42(1):106–112.
34. Cleveland JN, Vescio TK, Barnes-Farrell JL. Gender discrimination in organizations. In: Dipboye RL, Colella A, eds. *Discrimination at Work: The Psychological and Organizational Bases*. Mahwah, NJ: Lawrence Erlbaum Associates; 2005.
35. Baugh CM, Kroshus E, Daneshvar DH, Filali NA, Hiscox MJ, Glantz LH. Concussion management in United States college sports: compliance with National Collegiate Athletic Association concussion policy and areas for improvement. *Am J Sports Med*. 2015;43(1):47–56.
36. Guideline 2I: sports-related concussion. In: NCAA Committee on Competitive Safeguards and Medical Aspects of Sports, ed. *2013–14 NCAA Sports Medicine Handbook*. 24th ed. Indianapolis, IN: National Collegiate Athletic Association; 2013:56–66.
37. Kania ML, Meyer BB, Ebersole KT. Personal and environmental characteristics predicting burnout among certified athletic trainers at National Collegiate Athletic Association institutions. *J Athl Train*. 2009;44(1):58–66.
38. Kroshus, E, Kubzansky LD, Goldman RE, Austin SB. Norms, athletic identity, and concussion symptom under-reporting among male collegiate ice hockey players: a prospective cohort study. *Ann Behav Med*. 2015;49(1):95–103.
39. Beale D, Hoel H. Workplace bullying and the employment relationship: exploring questions of prevention, control and context. *Work Employ Soc*. 2011;25(1):5–18.
40. Hoel H, Cooper CL, Faragher B. The experience of bullying in Great Britain: the impact of organizational status. *Eur J Work Organ Psychol*. 2001;10(4):443–465.

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