

Analysis of states' progress towards and barriers to health and safety policy implementation for secondary school athletics

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Abstract:

Context: Implementation of health and safety best practices for the leading causes of sudden death and catastrophic injury has been shown to mitigate risk. However, to our knowledge, no authors have examined progress toward health and safety policy implementation at the state level. **Objective:** To investigate the progress made by state secondary school leaders in developing and implementing health and safety policies (ie, exertional heat stroke, sudden cardiac arrest, concussion, emergency action plans) and to explore perceived barriers to and strategies for implementation. **Design:** Mixed-methods study. **Setting:** State high school athletics associations and sports medicine advisory committees. **Patients or Other Participants:** Collaborative Solutions for Safety in Sport meeting attendees participated in this study. Thirty-five state leaders (current role experience = 8 ± 6 years) completed the survey. Ten of the 35 participated in follow-up interviews. **Data Collection and Analysis:** A survey assessing progress on health and safety policy implementation was administered. Respondents indicated whether their state had implemented a policy, made progress without implementation, or made no progress. We conducted follow-up telephone interviews so they could expand on the survey responses. The data were analyzed using descriptive statistics and the general inductive approach. **Results:** A total of 89% of respondents reported their states made progress on or implemented health and safety policies during the 2015–2016 academic year. Barriers to policy implementation included cost, a lack of understanding regarding policies versus recommendations, the content and value of policy change, and a false sense of security. Strategies for implementation included varying approaches to change, education of all constituents, and collaborative relationships among key stakeholders. **Conclusions:** Although a majority of respondents reported progress in implementing health and safety policies in their states, perceived barriers pointed to the need for the continued education of state leaders in charge of developing and implementing health and safety policies. Despite these barriers, collaboration among key stakeholders is crucial to successful implementation of best-practice policies in secondary school athletics.

Keywords: risk mitigation | emergency preparedness | emergency best practices | sudden death

Article:

Key Points

- After the Collaborative Solutions for Safety in Sport meeting, a majority of respondents (74%) reported implementing a health and safety policy.
- Personal and organizational barriers to change were described, including a lack of understanding regarding various aspects of health and safety policy implementation, as well as the costs associated with specific policy mandates.
- Successful strategies to promote policy implementation included varying approaches to change, education of all constituents, and synergistic relationships between high school athletic associations and sports medicine advisory committees.

Sport participation lends to improved academic achievement, health, and well-being and introduces lifelong learning opportunities for student-athletes.¹⁻³ With roughly 7.9 million US student-athletes currently participating in secondary school athletics,⁴ the overall health benefits of regular physical activity outweigh the long-term morbidity and mortality risks of inactivity. Despite the long-term health benefits of participating in sport and physical activity, the inherent risks of sport participation range from minor to potentially catastrophic. Thus, an enhanced awareness of these risks and a proactive mindset are critical for preventing catastrophic incidents. From 1982 through 2015, 735 fatalities and 626 catastrophic injuries occurred during participation in sanctioned secondary school athletics.⁵ Furthermore, in football alone, sudden cardiac arrest, exertional heat stroke, traumatic head injury, and exertional sickling accounted for nearly 90% of all deaths and catastrophic injuries.^{5,6}

Proper attention to and management of the leading causes of death and catastrophic injury in sport using evidence-based best practices are the best ways to optimize patient outcomes.⁷⁻¹³ Implementation of policies and procedures such as emergency action planning; access to, proper training in, and use of an automated external defibrillator (AED); heat acclimatization; environment-based activity modifications during extreme conditions; coaching education; proper equipment fitting and technique; and assessment of sickle cell trait status in athletes has been shown to mitigate the risks associated with death and catastrophic injury.¹⁴⁻¹⁷

Although prior literature¹⁴⁻¹⁷ suggested that implementing evidence-based best practices reduces the risk of death or catastrophic injury in sport at the collegiate and secondary school levels, such implementation of best practices in secondary schools remains a state-by-state process. Unlike the collegiate athletics setting, in which the National Collegiate Athletics Association has the authority to implement nationwide health and safety policies in all aspects, the National Federation of State High School Associations only has the authority to establish rules to minimize risks during competitions in the 17 sports that it governs.¹⁸ This tasks each state's high school athletics association (HSAA) with developing and implementing evidence-based health and safety policies in a climate of varied and inconsistent implementation of such policies across states.¹⁹

Previous researchers²⁰ identified a shared commitment between state HSAA and state sports medicine advisory committee (SMAC) members as allowing states to overcome barriers to the implementation of health and safety policies in secondary school athletics. However, they examined the associated factors in only 3 states and did not address the remaining 47 states or the District of Columbia. In addition, we know of no literature that assessed the progress made

by state HSAA leaders regarding the implementation of best practices as policy in their member schools. Thus, the purpose of our study was 2-fold: to (1) investigate the progress made by state HSAs across the United States in developing and implementing best-practice policies for the leading causes of sudden death and catastrophic injury in sport and (2) explore the perceived barriers to and the strategies used for successful policy implementation according to state HSAA and SMAC members.

METHODS

To achieve the study's purpose, we used a sequential mixed-methods study design. This study was conducted in 2 phases during the 2015–2016 academic year: phase I consisted of an online descriptive survey to identify states' progress in developing health and safety policies, and phase II consisted of in-depth interviews to gain a better understanding of the perceived barriers to and strategies for successful implementation of health and safety policies. This study was approved by the University of Connecticut Institutional Review Board.

Participants

The participants in both phase I and phase II of this study were representatives from various states' HSAs and SMACs who attended the Collaborative Solutions for Safety in Sport (CSSS) meeting held in March 2015 in New York City. These 2 entities are responsible for the development and implementation of health and safety policies at the state level for secondary school athletics, so it was important to hear their perspectives and experiences. The purpose of the CSSS meeting was to promote the implementation of best-practice health and safety emergency policies, including heat-related illness, cardiac arrest and concussion policies, and emergency action plans (EAPs), at the secondary school level. The meeting included education and discussion by leading experts on these best practices for optimizing health and safety in secondary school athletics and served as a forum for these leaders to discuss strategies for policy changes with peers. These health and safety best practices were the focus of the questioning and discussion in both phases of this study.

For phase I, 34% ($n = 35$ of 103) of the meeting attendees, representing 61% ($n = 31$ of 51) of the states, responded to the survey (2 states had both representatives complete the survey). A majority of participants (29%, $n = 10$) served as the assistant or associate director of their state's HSAA, followed by chair of the state's SMAC (26%, $n = 9$), another member of the state's SMAC (23%, $n = 8$), representative of an outside organization such as the state athletic trainers' (ATs) association (14%, $n = 5$), or executive director of the state's HSAA (9%, $n = 3$). Respondents had served an average of 8 ± 6 years (range = 1 to 30 years) in their current role. In addition to the basic demographics, participants were asked whether they had voting power regarding policy changes in their state HSAA. Twenty-three percent of respondents ($n = 8$) reported having voting power, whereas a majority (77%, $n = 27$) did not. This is an important measure, as it provides context for the level of influence the individual has on sport safety policy implementation at the state level.

After phase I was completed, survey respondents were contacted about continuing to phase II of the study. We communicated with all survey respondents and concluded that data saturation had

been achieved after 10 participants were interviewed and the interviews no longer revealed novel perspectives or experiences. Phase II participants were state HSAA executive directors (or equivalent; n = 4) or members of a state's SMAC (or equivalent; n = 6), each representing a different state. Phase II participants consisted of men (n = 7) and women (n = 3) who had held their current positions for an average of 6 ± 3 years (range = 2–14 years). Of the 10 interviewees, 20% (n = 2) reported having voting power in their HSAA. Demographic characteristics of the interview participants can be found in Table 1.

Table 1. Phase II Participant Demographics

Participant Pseudonym	Sex	Position Title	Role	Years in Role	Voting Power?
Brandon	Male	Assistant or associate director of HSAA	Administrator	8	No
Claire	Female	Member of SMAC	AT	8	No
Frank	Male	Board member of state AT association	AT	6	Yes
Joseph	Male	Executive director of HSAA	Administrator	2	No
Michael	Male	Chair of SMAC	AT	4	No
Nicole	Female	Chair of SMAC	Administrator	14	No
Patricia	Female	Member of SMAC	AT	4	Yes
Robert	Male	Chair of SMAC	AT	5	No
Steven	Male	Assistant or associate director of HSAA	Administrator	6.5	No
Terrence	Male	Assistant or associate director of HSAA	Administrator	4	No

Abbreviations: AT, athletic trainer; HSAA, high school athletics association; SMAC, sports medicine advisory committee.

Data-Collection Procedures

Phase I. Nine months after the 2015 CSSS meeting, an online survey (Qualtrics Inc, Provo, UT) was provided to the meeting attendees so that we could gain insight into the progress made regarding the implementation of health and safety policies for secondary school student-athletes. The respondents were prompted to indicate the level of progress based on the knowledge and resources obtained from the CSSS meeting in order to prevent responses regarding previously implemented policies. In the survey, participants were asked to specify whether their state had (1) implemented a policy in at least 1 of 4 major domains (heat, cardiac arrest, concussion, and EAP), (2) made progress toward but not implemented a policy at the time of the survey, or (3) made no progress in any of the 4 domains. These were the same key emergency health and safety best-practice topics covered during the 2015 CSSS meeting. *Progress* was operationally defined as “discussing or developing written language, but without dissemination of the information to member schools,” whereas *implemented a policy* was defined as “completion and execution of a formal policy recommendation or requirement.” Depending on the level of progress selected, respondents were then prompted to identify the domain(s) in which the state had either made progress or implemented a policy. Participants were allowed to select more than 1 option. For example, if the state successfully implemented a policy on heat-related illnesses and made progress toward but did not implement a policy on cardiac incidents, they could select both options. The purpose of these questions was 2-fold: (1) to assess the effect of the CSSS meeting on the attendees' promotion of health and safety best practices and (2) to assess the progress and proactivity demonstrated after the CSSS meeting. One reminder e-mail was sent to meeting attendees to increase the response rate. The survey respondents then served as our participant pool for interview recruitment.

The online survey was developed by 2 members of the research team who were involved in planning the CSSS meeting and who had extensive knowledge of health and safety policies for secondary school athletics. After the survey was created, it was shared with 2 leading researchers in the fields of exertional heat stroke and sudden cardiac arrest. We incorporated their feedback on the content and flow of the instrument, uploaded the instrument to the Qualtrics platform, and had 2 members of the research team complete the survey online to ensure there were no errors that could compromise the validity of the data. After performing these validation procedures, we administered the survey to the meeting attendees.

Phase II. On completing the phase I survey, the respondents were asked to participate in phase II of the research study, an open-ended, semistructured interview. Those who agreed were contacted via e-mail and sent a written consent form to participate in follow-up interviews so that we could gain further understanding of their experiences regarding the implementation of the best-practice health and safety policies described in phase I of the study. Interviews were conducted between May and August 2016 and lasted 30 to 45 minutes each. The semistructured interview guide (Appendix) allowed us a degree of flexibility during the interviews and the ability to ask follow-up questions when additional information was needed. The interview guide published by Pagnotta et al²⁰ served as a platform for developing the interview guide used in this study based on the content included and the similar topic under investigation. The interviews were audio recorded and later transcribed by a professional transcription company.

Data Analysis and Credibility

We analyzed the quantitative survey data using descriptive statistics and presented them as mean \pm standard deviation and response percentage for each state's level of progress in implementing the various health and safety policies. Qualitative data were analyzed using the general inductive approach.²¹ After the audio files were transcribed, 3 researchers independently analyzed the data. Data analyses consisted of reading through each transcript multiple times to gain a firm understanding of the participants' perspectives and experiences. The researchers independently assigned codes that specifically related to the research questions and then combined like codes to form categories, which became the overarching or emerging themes in the data.

Ensuring data credibility and trustworthiness is crucial in qualitative research. Four credibility strategies²² were used to ensure the trustworthiness of our findings. The first strategy was pilot testing: the researchers conducted interviews with 2 individuals matching our inclusion criteria. At the end of the interviews, we gave the participants an opportunity to provide feedback and clarify any points of confusion that occurred during the interview. No major changes were required, so their data were included in the analysis. The second strategy was multianalyst, or researcher, triangulation,²² whereby 3 researchers independently coded the interview transcripts and then discussed the key findings and themes. Any disparities or disagreements were debated until a consensus was reached. Another strategy that ensured trustworthiness was member checks²²: we asked each participant to review his or her interview transcript for accuracy and clarify if needed. After data analysis, we conducted interpretive member checks by sending the key findings, including the emergent themes, to each participant to ensure accurate representation of his or her experiences. Last, a peer reviewer²² with extensive knowledge of this topic and experience with qualitative research appraised the study methods and final themes.

RESULTS

Phase I: Online Survey

The respondents' perceptions of their state's willingness to pursue health and safety policy changes on a global scale are depicted in Figure 1. Seventy-four percent (n = 26) of respondents reported successful implementation of a health and safety policy, 14% (n = 5) reported progress in at least 1 of the 4 domains, and 11% (n = 4) reported no progress in the implementation of best practices. Further details from those who reported successful implementation of a policy are explained in the next paragraph and Figure 2.

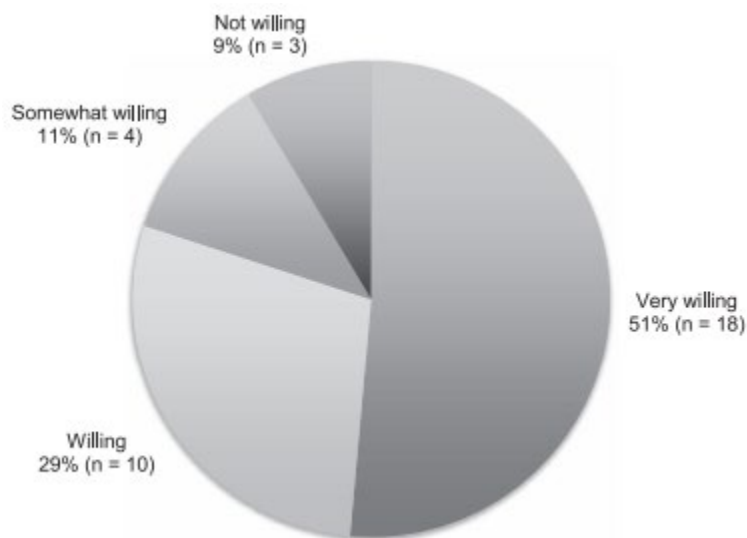


Figure 1. Perceptions of states' willingness to implement policy change.

The participants' responses regarding their states successfully implementing or making progress in implementing the specific best-practice recommendations related to heat (Table 2), sudden cardiac arrest and AED (Table 3), concussion (Table 4), and EAPs (Table 5) are provided. Of the respondents who reported that their states had successfully implemented at least 1 best-practice policy (n = 26), 23% (6 of 26) reported policies implemented in 1 area, 27% (7 of 26) in 2 areas, 19% (5 of 25) in 3 areas, and 31% (8 of 25) in all 4 areas. Similarly, of the states making progress toward implementing a policy change (n = 5), 40% (2 of 5) made progress in 1 area, 20% (1 of 5) in 2 areas, and 40% (2 of 5) in all 4 areas.

Phase II: In-Depth Interview

Analysis of the qualitative data yielded 2 emergent themes: perceived barriers to policy change and strategies for successful policy implementation. The emerging barriers to change as well as the strategies states have used to successfully develop and implement various health and safety policies are summarized in Figure 3.

Table 2. Implementation of Heat Policy Components

Component No.	Component Description	No. (%) ^a	
		Implemented (n = 17)	Made Progress (n = 2)
Heat acclimatization			
1	Days 1–5 are the first formal practices; no more than 1 practice occurs per day.	14 (82)	1 (50)
2	Total practice time does not exceed more than 3 h/d.	14 (82)	1 (50)
3	Days 1–5: 1-h maximum walk-through is permitted; 3-h (minimum) break between practice and walk-through or vice versa.	11 (65)	1 (50)
4	Days 1–2 of first formal practices: helmet is only protective equipment permitted (if applicable).	14 (82)	2 (100)
5	Days 3–5: Only helmet and shoulder pads are permitted.	14 (82)	1 (50)
6	Day 6: All protective equipment may be worn and full contact may begin.	13 (76)	1 (50)
7	Days 6–14: Double-practice days must be followed by a single-practice day. When a double-practice day is followed by a rest day, another double practice is permitted.	11 (65)	
8	On a double-practice day, neither practice can exceed 3 h, and no more than 5 h total of practice in 1 d are allowed. Two practices should be separated by 3 continuous hours in a cool environment.	10 (59)	1 (50)
9	Athletic trainer is on site before, during, and after all practices (including the preseason period).	3 (18)	1 (50)
10	Other: My policy differs slightly from above.	4 (41)	^b
Wet-bulb globe temperature			
		n = 1	n = 2
1	All schools have a heat-modification policy for any sanctioned activity.	1 (100)	1 (50)
2	Heat policy is based on wet-bulb globe temperature, not heat index.	1 (100)	1 (50)
3	Wet-bulb globe temperature guidelines are based on epidemiologic data specific to that state or region.	1 (100)	1 (50)
4	Heat policy has at least 4-step progression of modifications.	1 (100)	1 (50)
5	Includes modification of equipment (if applicable to sport).	1 (100)	1 (50)
6	Specific modification of work-to-rest ratios.	1 (100)	1 (50)
7	Specific modification of total practice time.	1 (100)	1 (50)
8	Specific modification of water breaks.	1 (100)	1 (50)
9	Policy mentions the use of shaded areas for rest breaks.	1 (100)	0 (0)
10	Other: My policy differs slightly from above.	0 (0)	^b

^a No. is the number of respondents who reported that their state implemented or made progress on the specific component; the corresponding percentages are percentages of the total number of states implementing or making progress on that policy. For example, for item 1 under heat acclimatization, of the 17 respondents whose state implemented a heat-acclimatization policy, 14 (82%) reported that their state implemented this specific component.

^b Option was not displayed on survey.

Table 3. Implementation of Cardiac/Automated External Defibrillator (AED) Policy Components

Component No.	Component Description	No. (%) ^a	
		Implemented (n = 15)	Made Progress (n = 3)
1	School AED programs should be implemented under the supervision of a physician (medical director) and select school staff personnel provided with proper training and certification.	3 (20)	0 (0)
2	AEDs should be placed in easily accessible, public locations with adequate signage.	9 (60)	2 (27)
3	All athletic trainers, coaches, administrators, school nurses, and physical education teachers should have access to an AED on school property and at all school-sanctioned athletic events and activities.	8 (53)	3 (100)
4	Schools sponsoring athletic events should have an AED on site or access to one within 3 min at each athletic venue for practices, games, and other athletic events.	9 (60)	2 (67)
5	All coaches and other select staff are provided with training and certification in CPR and AED use.	10 (67)	2 (67)
6	The location(s) of AED(s) are well marked, publicized, and known among all staff.	10 (67)	2 (67)
7	An AED should be retrieved and applied to any collapsed and unresponsive athlete while emergency medical services (911) is called and CPR started.	9 (60)	2 (67)
8	AEDs are inspected frequently (ie, according to manufacturer recommendations) to ensure proper working order, the batteries are charged, and wires and pads are in good condition.	7 (47)	1 (33)
9	Other: My policy differs slightly from above. Please describe in the text below.	4 (27)	^b

Abbreviation: CPR, cardiopulmonary resuscitation.

^a No. is the number of respondents who reported that their state implemented or made progress on the specific component; the corresponding percentages are percentages of the total number of states implementing or making progress on sudden cardiac arrest and AED policy. For example, for component 1, of the 15 respondents whose state implemented a sudden cardiac arrest and AED policy, 3 (20%) had their state implement this specific component.

^b Option was not displayed on survey.

Table 4. Implementation of Concussion Policy Components

Component No.	Component Description	No. (%) ^a	
		Implemented (n = 22)	Made Progress (n = 4)
1	Schools should develop an emergency action plan for handling potentially life-threatening injuries and a referral plan for concussions.	17 (77)	3 (75)
2	Schools should use certified helmets and equipment.	15 (68)	2 (50)
3	The preparticipation examination includes concussion-specific questions.	13 (59)	2 (50)
4	Preseason education is provided for personnel, coaches, and athletes on the basics of concussion.	18 (82)	2 (50)
5	High school athletes suspected of sustaining a concussion are not permitted to return to a practice, game, or activity involving exertional activity on the same day.	18 (82)	2 (50)
6	Athletes suspected of a concussion are not permitted to return to participation until written clearance is obtained from a licensed physician or athletic trainer.	19 (86)	2 (50)
7	No student-athlete should return to sport or activity unless he or she has returned to school.	13 (59)	2 (50)
8	A graduated return-to-participation protocol (at least 5 steps, no more than 2 in 1 d) is followed after a concussion.	14 (64)	2 (50)
9	Comprehensive medical-management plans for acute care of a potential head or cervical spine injury are in place.	7 (32)	1 (25)
10	Other: My policy differs slightly from above.	7 (32)	^b

^a No. is the number of respondents who reported that their state implemented or made progress on the specific component; the corresponding percentages are percentages of the total number of states implementing or making progress on concussion policy. For example, for component 1, of the 22 respondents whose state implemented a concussion policy, 17 (77%) reported that their state implemented this specific component.

^b Option was not displayed on survey.

Table 5. Implementation of Emergency Action Plan (EAP) Policy Components

Component No.	Component Description	No. (%) ^a	
		Implemented (n = 12)	Made Progress (n = 2)
1	Every school and organization that sponsors athletics has developed an EAP for managing serious and potentially life-threatening injuries.	10 (83)	2 (100)
2	The EAP is developed and coordinated with local emergency medical services, school public safety officials, on-site medical personnel or school medical staff, and school administrators.	9 (75)	0 (0)
3	A written EAP document is distributed to all staff members.	9 (75)	1 (50)
4	An EAP specific to each venue is completed and includes maps and directions to that specific venue.	9 (75)	1 (50)
5	On-site emergency equipment that may be needed in an emergency situation is listed.	5 (42)	1 (50)
6	The EAP identifies personnel and their responsibilities to carry out the plan of action with a designated chain of command.	10 (83)	1 (50)
7	The EAP lists contact information for emergency medical services and other key personnel.	10 (83)	1 (50)
8	The facility address, location, and contact information are identified.	10 (83)	1 (50)
9	Recommendations for documentation that should be supplied after an injury or a catastrophic incident are specified.	5 (42)	1 (50)
10	The EAP is reviewed and rehearsed annually by all parties involved.	8 (67)	1 (50)
11	Health care professionals providing medical coverage during games, practices, or other events are included in the practice and rehearsal of the EAP.	7 (58)	1 (50)
12	Other: My policy differs slightly from above.	2 (17)	^b

^a No. is the number of respondents who reported that their state implemented or made progress on the specific component; the corresponding percentages are percentages of the total number of states implementing or making progress on EAP policy. For example, for component 1, of the 12 respondents whose state implemented an EAP policy, 10 (83%) reported that their state implemented this specific component.

^b Option was not displayed on survey.

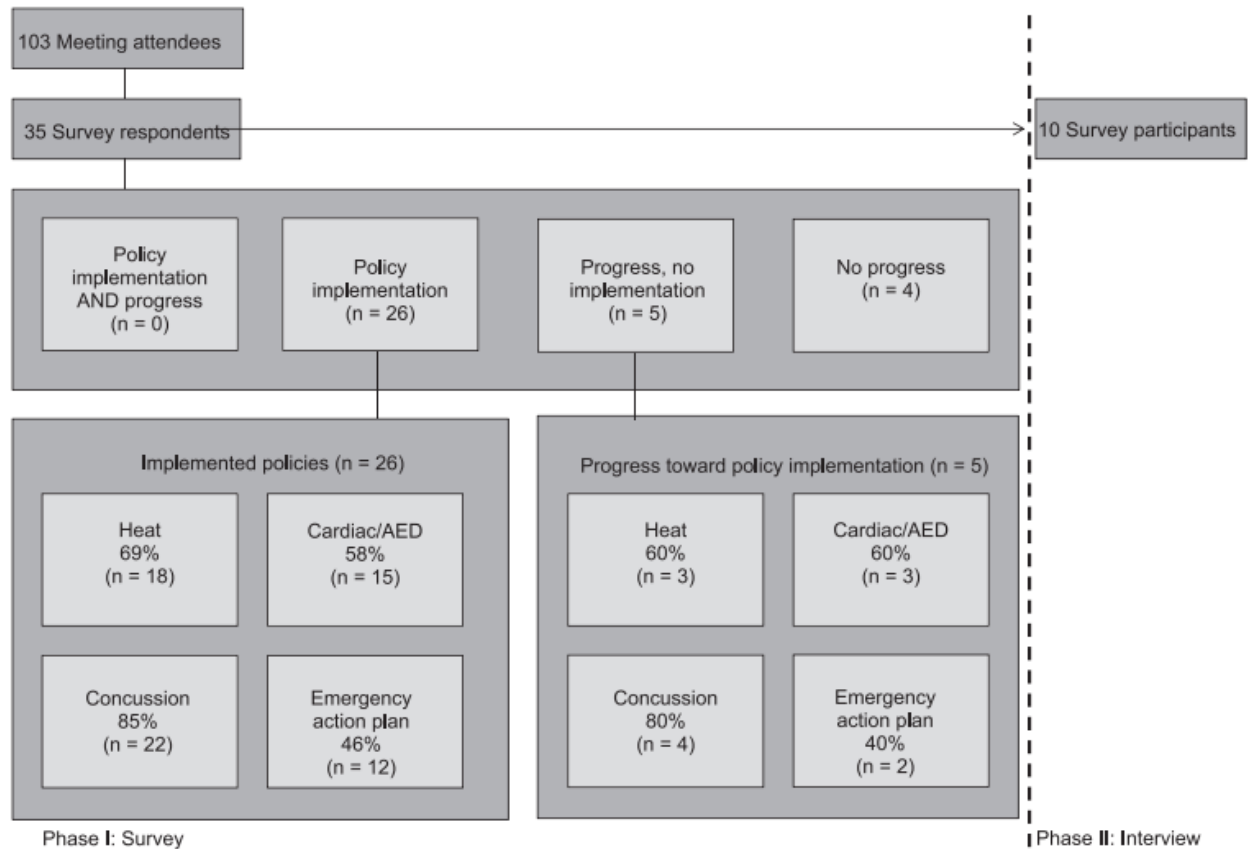


Figure 2. Summary of reported progress on and implementation of various health and safety policies. Abbreviation: AED, automated external defibrillator.

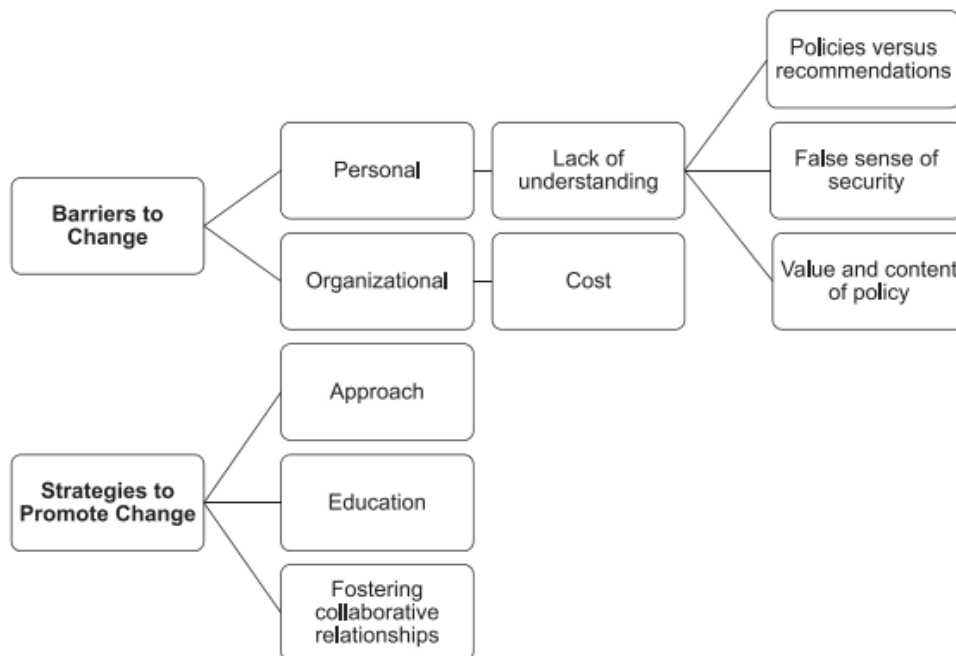


Figure 3. Barriers to and strategies for health and safety policy implementation for secondary school athletics.

We engaged in a process of *enumeration*, which involved counting the number of participants represented in each theme or subtheme. Three participants described barriers that did not align with the dominant themes, and as a result, they were removed during the enumeration process. Therefore, the denominator was 7 participants instead of 10. For a theme to be categorized as *dominant*, it had to be represented by at least 50% of participants. The emerging themes of the study, with operational definitions and supporting quotes from participants, are shown in the Supplemental Table (available online at <http://dx.doi.org/10.4085/1062-6050-28-18.S1>). Participants were assigned pseudonyms to protect their identities.

Perceived Barriers to Policy Change

Personal Barriers. Participants described both personal and organizational barriers that prohibited the state from moving forward in implementing sport safety policies. *Personal barriers to change* were defined as barriers to successful policy change experienced on the individual level, either by the interviewee or another individual with whom the interviewee worked closely. A personal barrier that emerged from the data was a lack of understanding regarding the various aspects of implementing health and safety policies. This theme was divided into 3 subthemes: policies versus recommendations, a false sense of security, and value or content of specific policies.

Policies Versus Recommendations. During the interview process, 5 of the 7 participants demonstrated a lack of understanding regarding the difference between mandating policy at the state level and making a recommendation to the HSAA member schools. Again, this was expressed by the interviewee about himself or herself or about a close coworker. Apparent confusion occurred at the state level that making a recommendation about appropriate health and safety best practices for optimizing health and safety for member schools was adequate, if not equivalent to, mandating a policy. Quotes from participants demonstrating the difference between mandating a policy and disseminating guidelines can be found in the Supplemental Table.

False Sense of Security. More than half of the participants (5 of 7) referenced or demonstrated a *false sense of security*, which is the feeling that nothing catastrophic has happened in the state so far and therefore policy change is not needed. This false sense of security is also evidence of a *reactive change mentality*, whereby change is initiated as a result of an outside force. A false sense of security has proven difficult to overcome, especially when stemming from the HSAA, because these members have the authority to determine which recommendations or guidelines become policies at the state level. An individual or organization with a false sense of security does not recognize that secondary school student-athletes need enhanced sport safety policies. When the need is not recognized, the value is not seen, which our participants demonstrated as another barrier under the theme of lack of understanding. The Supplemental Table contains additional quotes from participants that highlight a false sense of security.

Value and Content of Policy. Misconceptions were evident regarding the breadth and complexity of implementing specific best-practice health and safety policies. Both the content of sport safety policies and the implementation of these policies as preventive measures were

misunderstood. To implement best practices, stakeholders must understand the components of a specific health and safety policy are crucial; failing to understand this prevents states from optimizing the health and safety of their student-athletes. When the value of a specific policy was not recognized, it was perceived as more challenging for a state to implement a comprehensive approach to optimizing student-athlete health and safety. Further support for this subtheme is available in the Supplemental Table.

Organizational Barriers. In addition to personal barriers, our participants addressed *organizational barriers to policy change*, which were defined as barriers that occurred on an organizational level and were outside the control of the interviewee. A predominant organizational barrier identified by our participants was the cost associated with mandating specific sport safety policies. All but 1 of the participants addressed the barrier of cost, specifically the cost that HSAA-mandated policies place on member schools. During the interview process, respondents often cited *unfunded mandates*, which occur when the state associations are hesitant to mandate a policy and require a change in their member schools without being able to appropriate funds to assist the schools with that change. Although most often experienced by HSAA administrators, concern related to the costs of various policy changes was also discussed from the member schools' standpoint. Concern raised by individuals at the school level is a barrier for the administrators who are responsible for implementing the policy at the state level. Additional support for cost as a barrier can be found in the Supplemental Table, including concerns related to monitoring environmental conditions using wet-bulb globe temperature devices.

Strategies for Successful Policy Implementation

To assist state associations with successful sport safety policy implementation, we wanted to understand not only the barriers faced but also the strategies that states have found to be successful. Our analysis revealed 3 strategies to promote change: approach, education, and fostering collaborative relationships (Figure 3).

Approach. Emphasis was placed on the approach or method used for bringing about change in the state, especially if a previous approach had been unsuccessful. In some instances, participants talked about the importance of using various methods for bringing about change and being flexible with the approach. Specific approaches discussed by our participants included the SMAC serving as a resource for the HSAA instead of demanding change and providing evidence to support the request for the change. Other approaches included introducing recommendations to member schools before mandating a policy change so the personnel responsible for incorporating the change at the school level have sufficient time to adjust to the new standard, as well as emphasizing education of both athletic administrators and the state's member schools. The Supplemental Table supplies support for varying approaches to implement health and safety policies.

Education. The role of education in mobilizing efforts and promoting policy change was discussed by all but 1 of our participants. Education can take a variety of forms, but they emphasized providing reasons why changes are either being requested or made. The importance of communicating the value of the change to the individuals responsible for implementing the

new policy at the school level was also highlighted. Change is not an easy process for some to accept, but our participants acknowledged the importance of using education as a means of easing these transitions. Additional quotes from participants demonstrating education as a strategy for policy implementation are located in the Supplemental Table.

Fostering Collaborative Relationships. The role of the state's SMAC, or the state's ATs' association and sports medicine physician groups if it does not have an SMAC, is to advise the HSAA on appropriate health and safety policies that should be in place to maximize the health and safety of student-athletes. Consequently, participants focused on the importance of fostering and maintaining positive, collaborative relationships between these entities. In the context of this study, *fostering collaborative relationships* was defined as key stakeholder groups who are in positions to make change by having the same mission and working collaboratively.

The effects of a negative working relationship among the key stakeholder groups, although less prominent, were detrimental and supported the idea that healthy collaborative relationships enhance a state's ability to implement policy change. Representing the state's SMAC, Claire discussed the resistance she and her colleagues received from the HSAA: “They always think we're asking for more money when [we're] just telling them there are policies that should be changed...they just think we have ulterior motives.” Competing views between the administrators and health care professionals had prevented Claire's state from making changes. Similarly, Frank explained his frustrations with the working relationship between the entities, specifically pertaining to the executive director of the HSAA:

The executive director has just not been friendly with athletic trainers for whatever reason...if it's his [executive director's] idea or something that's brought forward to him by others, not athletic trainers, then he's willing to run with it...there's some things he just doesn't want to hear or listen to.

Tension between the executive director and the ATs responsible for advising the HSAA was an apparent barrier to progressing toward health and safety policy implementation. These 2 examples provide support that the dynamic between the HSAA and SMAC is a determinant of success or failure in enhancing the safety of student-athletes in secondary schools. The Supplemental Table offers further support for collaborative relationships as a strategy to successfully implement health and safety policies in high school sports.

DISCUSSION

Our aims were to assess states' levels of progress regarding the implementation of health and safety policies and to gain a better understanding of the barriers faced and strategies used in such implementations. We found that most respondents made progress in promoting health and safety for secondary school athletes, with 89% (31 of 35) reporting either implementing at least 1 policy or making progress toward best-practice recommendations after the CSSS meeting. Although a greater number of participants indicated that at least 1 policy had been implemented compared with those who reported making progress, advances in the 4 domains were relatively similar among progress levels. A majority of respondents, independent of whether or not their state implemented a policy, described strides in the domain of concussion, followed by heat-

related policies, sudden cardiac arrest, and EAPs. Interestingly, progress or policy implementation related to EAPs was least common, despite their critical role in maximizing appropriate and efficient responses to emergency situations. The extent of progress in each domain may reflect the priorities of the states based on location, climate, or other factors, as well as the presence of any external media or legislative influence.

Participants emphasized the importance of various approaches to change, education, and collaborative relationships as key strategies to successful policy implementation, yet some encountered barriers including a personal or perceived lack of understanding as well as the cost associated with policy change. A general lack of understanding about the components related to policy change expressed by our participants, or individuals they worked closely with, was a key barrier for state leaders to overcome. One aspect of this lack of understanding related to the difference between mandating a policy and disseminating recommendations to member schools. When an HSAA makes a best-practice recommendation to member schools, the administrators at the school level have the authority to decide whether the school will follow it. The only way to regulate best practices for emergency health and safety across all schools is for the HSAA to mandate a specific policy.

The cost associated with mandating policy at the state level was a dominant barrier to successful implementation. Cost has been frequently cited as a barrier to optimizing health and safety for student-athletes.²³⁻²⁶ In a national study,^{23,24} researchers who assessed athletic training coverage in public and private high schools across the United States found the primary reason for not employing an AT was the cost associated with the position. Similarly, Schneider et al²⁶ surveyed local administrators (principals) and sports medicine professionals from public schools in West Virginia and concluded that lack of funding was a major barrier to providing health care to their student-athletes. Furthermore, the respondents in that study²⁶ thought supplying more funding, more certified medical staff, and continuing education would make it easier to provide health care to the student-athletes at their schools. Our findings are consistent with this previous literature²³⁻²⁶ on cost as a barrier to optimizing student-athlete health and safety when attempting to hire a medical professional. Certain policy changes do warrant the purchasing of equipment, including but not limited to wet-bulb globe temperature units, rectal thermometers, immersion tubs, AEDs, and concussion-monitoring software. However, other policy changes, including heat acclimatization, concussion reporting, EAPs, and coaches' education, can be implemented with little to no cost to the member schools. For states experiencing cost as a barrier, these policies can serve as a foundation for enhancing the health and safety of their student-athletes. Although cost can hinder some aspects of health and safety policy implementation (eg, best-practice policy is to have an AED on site within 1 to 3 minutes of every venue), strategic plans to move toward the implementation of best practices should be developed. Raising funds; collaborating with not-for-profit hospitals, local businesses, companies, or emergency services; strategically placing AEDs; and incentivizing each school to improve its level of safety are all examples of ways to move forward, promote change, and attain policy goals.

Few investigators have addressed barriers to successful policy change. Pagnotta et al²⁰ examined how and why 3 states were able to successfully implement heat-acclimatization policies. They found that actual and perceived resistance to change was the biggest barrier to overcome.²⁰ Although it was not a dominant result in our study, participants cited resistance to change as a

barrier they were personally experiencing. Despite these barriers, shared leadership among all involved parties and open communication were 2 strategic methods that assisted Arkansas, Georgia, and New Jersey with heat-acclimatization implementation.²⁰ These 2 strategies, although not identical to our findings, can be aspects of a positive, collaborative relationship, which was discussed by our participants as a major facilitator of change. Additionally, our participants who did not directly reference collaborative relationships often described tension between the HSAA and SMAC as a barrier to change. This provides further support for the open communication and shared leadership that were noted by Pagnotta et al²⁰ as facilitators of change. The CSSS meeting purposefully brought together the 2 stakeholder groups from each state responsible for developing and implementing health and safety policies. Not only did the meeting provide attendees with education on various policies to mitigate risk in sport, but it also provided a forum for open discussion and an opportunity for each state's constituents to work together toward a common goal.

The process of change can be complex and influenced both positively and negatively by a variety of factors. Many theories exist regarding how and why people change. Lewin developed change theory to organize the process into 3 steps and focused on the importance of balancing forces that are working in opposing directions.²⁷ The first stage, *unfreezing*, requires an organization to become self-aware and realize how the status quo may hinder the organization.²⁷ The second stage, known as the *change stage*, involves the decision to implement new health and safety policies and keep up with current best practices. *Refreezing* then establishes the change as a new habit and new norm.²⁷ Applying this theory to our study, to begin the first stage and work toward health and safety policy implementation, the barriers or restraining forces (cost and lack of understanding) must be limited or the strategies or driving forces (approach, education, and collaborative relationships) must be enhanced (or both). This balance of driving and restraining forces is one that state leaders in HSAs and SMACs should be aware of when navigating barriers to health and safety policy implementation.

Another theory, known as institutional theory, explains that organizations implement change to remain competitive with other organizations.^{28,29} According to DiMaggio and Powell,²⁹ feelings of uncertainty promote imitation, which occurs when organizations model themselves on similar organizations. For example, if a specific state HSAA is unfamiliar with policy change, the state's leaders can look to a neighboring state, adopt that state's policy, and put it in the context of their own state. According to this theory, other motivations for change are growth of the profession accompanied by new standards and pressure from professional or stakeholder organizations.²⁰ Based on research, stakeholder organizations can dictate which best-practice health and safety policies should be in place to prevent sudden death in sport. Pressure from these stakeholder organizations serves as a driving force for change on state HSAs responsible for implementing health and safety policies. Authors of a recent study¹⁹ objectively assessed the implementation of health and safety policies in secondary school athletics and ranked all 50 US states and the District of Columbia on the number of policies mandated by each HSAA to prevent sudden death in sport. This publication itself created a sense of competition among the HSAs, as each state's policies were compared with the others, and inherent pressure was exerted to develop and implement various health and safety policies to compete with the states at the top of the list. This could serve as an impetus for change, yet we identified crucial barriers from the state leadership perspective that must first be overcome for these policy changes to take place. The 2

aforementioned theories may provide insight into how and why health and safety policy changes are implemented at the state association level, but further research is warranted to directly assess this relationship.

Implications

Our results highlight a critical layer of health and safety policy implementation. To support states through this process and develop strategies, stakeholders must acknowledge and understand the barriers and challenges preventing policy implementation. Cost was a frequently noted barrier, yet the implementation of certain health and safety policies (eg, heat acclimatization and EAPs) is associated with limited or no cost for the HSAA or individual member schools. The examples cited earlier require that a written plan be in place and be followed and rehearsed by all parties. This calls for continued education of the state leadership in charge of mandating health and safety policy changes and the individuals responsible for adopting the mandated policies, such as athletic directors and coaches. State leaders often equate policy change with cost expenditures instead of with student-athlete health and safety, which is the true value and focus of mandating the various health and safety policies.

The most prominent finding from this study that directly applies to state leadership is the importance of collaborative relationships between HSAA administration and the health care professionals who bring knowledge and expertise to the table. These constituents must work together to optimize the health and safety of student-athletes at the secondary school level. Interestingly, inconsistencies were noted between leaders within the same states. In phase I of this study, 2 meeting attendees from each of 4 states completed the online survey, and in 3 of those states, they had different interpretations of the changes and progress made in their own state. For example, an HSAA representative indicated his state had implemented policies pertaining to all 4 areas (heat illnesses, sudden cardiac arrest, concussions, EAPs), whereas the SMAC representative reported the state had made progress in all 4 areas but had not yet implemented these policies. This clearly illustrates a divide between the 2 entities responsible for developing and implementing health and safety policies. The HSAA and SMAC must act as a unit, taking a team approach to enhancing the health and safety of the student-athletes in their state. One cannot successfully fulfill its mission without the other. The SMAC members bring the knowledge and expertise related to health and safety policies, whereas the HSAA members have the voting power to implement a health and safety policy for all member schools to follow. A symbiotic relationship will result in more efficient policy implementation, which will in turn enhance safety measures for secondary school student-athletes.

Limitations and Future Research

This study was not without limitations. We had a relatively low response rate (34%) to phase I, and as a result, the quantitative findings reflect the progress made by only 31 states. Furthermore, we interviewed only 10 state leaders, so our qualitative findings cannot be generalized to all 50 states and the District of Columbia. The convenience sample was purposeful and included only those who attended the 2015 CSSS meeting. However, the survey and interview responses may be inherently biased, as those who participated likely had an interest in the topic or an experience, either positive or negative, to draw upon. Although the respondents were prompted

to report only on the progress or implementation of policies *after* the CSSS meeting, we were unable to control for responses based on policies implemented before the meeting. Lastly, we did not interview a representative from both the HSAA and the SMAC within a single state. Therefore, the perceptions are one sided, and we were unable to triangulate our participants' perspectives and experiences within their own state.

Future researchers should continue to investigate the barriers to health and safety policy implementation, as well as the strategies states have found successful in overcoming these barriers. Phase II of this study allowed us to gain an understanding of the experiences of participants in 10 states; however, it is equally important to interview state leaders from the remaining states to triangulate our findings and potentially discover new barriers that need to be addressed. The roles of the HSAA and SMAC are distinct, yet the organizations depend on each other, and it is important to understand the perspectives of these key stakeholder groups within each state. The importance of collaboration is evident from this research, and gaining an enhanced understanding of the experiences of both constituent groups would provide insight into this relationship dynamic.

CONCLUSIONS

States are making progress on health and safety policy implementation, specifically in 4 major domains: heat acclimatization, sudden cardiac arrest, concussions, and EAPs. However, a lack of understanding about policy implementation versus recommendations, the required content and value of specific policy changes, a false sense of security, and the cost associated with mandating health and safety policies have been major barriers for states to overcome. Despite these barriers, various approaches to policy change, providing education on why a specific change is needed, and fostering positive, collaborative relationships were keys to success for state leadership. State leaders in HSAA and SMACs should consider implementing at least 1 of these 3 strategies as a way to promote policy change and enhance the overall health and safety of student-athletes in secondary schools, especially in the face of resistance or stagnancy.

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