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## Prevalence of concussion-related policies and practices among public school districts in the U.S., 2012 and 2016

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### Abstract

**Background:** Beginning in 2009, there was an increase in the number of states that had laws addressing three different components of youth sport-related concussion prevention and management: concussion education, removal from play, and medical clearance. Schools are an important setting to implement policies and practice related to concussions as many youth participate in organized sports through school venues.

**Objective:** To examine whether the prevalence of concussion-related policies adopted by school districts changed from 2012 to 2016, two time points that correspond to the administration of the SHPPS

**Methods:** This study used nationally representative data from the School Health Policies and Practices Study (SHPPS). Comprehensive district concussion-related policies were defined as those that address removal from play after injury, medical clearance before returning to play, and concussion-related educational materials and sessions for parents and student athletes.

**Results:** Among school districts nationwide, the prevalence of comprehensive policies significantly increased from 51.6% in 2012 to 66.7% in 2016. While these findings are promising, it is important to note that one-third of districts still lacked comprehensive policies in 2016, and only 71% of districts provided educational sessions in 2016.

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**Conclusions:** The findings in this study highlight improvements in school districts nationwide in adopting concussion related policies and practices. State laws addressing youth sport-related concussions are intended to promote player safety and improve the identification and management of concussions experienced among youth while playing sports. Policies like requiring educational sessions allow parents and student athletes to learn about concussions and understand the importance of reporting a concussion or concussion symptoms.

### Keywords

TBI; School Policies; Concussion

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### Introduction

During 2010 to 2016, on average 283 000 children aged <18 years sought care in emergency departments (EDs) each year for sports and recreation-related traumatic brain injuries (TBIs).<sup>1</sup> While concussion symptoms typically resolve within a few days for most athletes, a study comparing high school and college athletes found that one in ten athletes who sustained a concussion while playing organized team sports experienced symptoms of a concussion for more than seven days after their injury.<sup>2</sup> Concussion symptoms can negatively affect students' ability to attend school and fully participate in academic activities.<sup>3</sup> Many youth play organized sports through school venues, making the school an important setting to implement policies and promote practices related to the management and prevention of concussion.

Beginning in 2009, there was an increase in the number of states that began to promulgate laws addressing three different components of youth sport-related concussion prevention and management: 1) requiring education about concussions among parents and student athletes; 2) requiring immediate removal from play for any athlete suspected of sustaining a concussion; and 3) allowing an athlete to return to play only after they have been evaluated and cleared by a licensed health care professional.<sup>4</sup> According to LawAtlas,<sup>5</sup> by 2014, two thirds of states had all three components, termed here as "comprehensive" concussion laws, and every state had some kind of youth sports concussion law in place even if not a comprehensive set of laws. The specificity and requirements outlined in state laws addressing youth sport-related concussions vary,<sup>6</sup> and as a possible consequence, policies and practices implemented by districts and schools also vary. For example, a study of 71 schools found that 59.2% required the distribution of concussion-related education materials to athletes and their parents.<sup>7</sup> Of those schools, 49.3% required the parent's signature of receipt and only 39.4% required the student's signature,<sup>7</sup> an indicator that parents and students received the information.

The purpose of this study is to understand whether the percentage of school districts with concussion-related policies changed from 2012 to 2016. These time points correspond to the administration of the School Health Policies and Practices Study (SHPPS), a cross-sectional study conducted periodically by the Centers for Disease Control and Prevention (CDC) to examine school health policies and practices at the state, district, school, and classroom levels. Although academic support after concussion for student-athletes is increasingly a

component of organizational policies,<sup>8</sup> as of 2017 there were only nine states with legislation requiring return to learn components.<sup>9, 10</sup> Therefore, this study will not include return to learn in its policy analysis and will focus solely on policies regarding return to play and associated activities.

## Methods

A detailed description of the 2012 and 2016 study methods have been published elsewhere.<sup>11, 12</sup> Briefly, both SHPPS 2012 and SHPPS 2016 used a stratified random sampling design to select nationally representative samples of public school districts to examine district-level school health policies and practices. In 2012, the sampling frame was classified into four strata based on urbanicity and socioeconomic status. In 2016, the sampling frame was stratified into 12 levels based on the National Center for Education Statistics locale codes. SHPPS 2012 was conducted from July 2011 to August 2012. SHPPS 2016 was conducted from October 2015 to August 2016. During both 2012 and 2016, some questionnaires were divided into modules; that is, related items on the questionnaires were grouped together. For example, all items related to districts' interscholastic sports program were grouped into a module. This strategy allowed district contacts to identify a person with expertise related to those items contained within a module. This strategy also reduced the burden for respondents and improved reporting accuracy because it allowed for different respondents for each module. Most (85% in 2012 and 90% in 2016) of the completed district-level questionnaires or modules were completed using the Web-based questionnaires, and the remaining were completed using paper questionnaires.

The outcomes of interest were derived from four questions that addressed concussion-related policies and practices for interscholastic sports programs. The variable "return to play" was measured with the question, "Has your district adopted a policy requiring clearance by a healthcare provider before allowing student athletes to further participate in practice or competition after a suspected concussion?" The variable "removal from play" was measured with the question, "Has your district adopted a policy requiring that student athletes suspected of having a concussion be removed immediately from practice or competition?" The variable "educational materials" was measured with the question, "During the past 12 months, has your district provided educational materials to student athletes or their parents on preventing, recognizing, and responding to concussion?" The variable "educational sessions" was measured with the question, "During the past 12 months, has your district provided educational sessions to student athletes or their parents on preventing, recognizing, and responding to concussions?" Response options for all questions were "Yes" and "No." For purposes of this analysis, districts with comprehensive policies were defined as those that responded "yes" to each of the four questions.

The sample size and response rate for the module containing questions about districts' interscholastic sports program were 591 districts and 56.4%, respectively in 2012 and 541 districts and 56.5%, respectively in 2016. Data were weighted to produce national estimates and analyses were conducted using SUDAAN statistical software to account for the stratified sampling design and weighting. Changes in concussion-related policies and practices were determined using t-tests for proportions.

## Results

In 2012, most districts had return to play (87.2%) and removal from play (85.4%) policies, and the prevalence of both were significantly higher in 2016 (91.4% and 90.9%, respectively) (Table 1). A policy addressing educational materials was present in 73.4% of districts in 2012, but significantly increased to 87.4% in 2016. Likewise, a policy addressing educational sessions was present in 58.7% of districts in 2012, but significantly increased to 71.3% in 2016. In 2012, 51.6% of districts had comprehensive policies and in 2016 that percentage significantly increased to 66.7% of districts. All differences were statistically significant at  $p < .05$ .

## Discussion

State laws addressing youth sport-related concussions are intended to promote player safety and improve the identification and management of concussions experienced among youth while playing sports.<sup>13, 14</sup> Although the passage of state youth sports concussion laws may have played a role in raising awareness of the risk of concussion, the impact on athletes who report concussions or concussion symptoms may not have been as profound.<sup>15</sup> Still, research suggests that nationwide, concussions reported by athletic trainers and identified by healthcare utilization reports increased after legislation was enacted,<sup>16, 17</sup> and one study conducted among a nationally representative sample of US high schools showed that 2.6 years after state legislation was enacted, recurrent concussions among student athletes significantly declined.<sup>16</sup> The passage of legislation may also explain the increases in comprehensive concussion policies reported by schools in this study; however, differences in the interpretation and implementation of these laws at the local level may impact the overall success of reducing long-term health outcomes associated with concussions.<sup>15</sup> It is also important to note that during this period, public focus on youth sport-related concussion increased, including a report by the National Academies of Science, *Sports-Related Concussions in Youth: Improving the Science, Changing the Culture*, in 2014, and changes to school district policies could have been influenced by greater awareness from sources other than the laws.<sup>18</sup> For example, media has been associated with comprehensive school policies in other contexts, such as increasing the adoption of comprehensive *Tobacco Free Schools* policies.<sup>19</sup> A limited evaluation of a 2007 eight month media campaign in North Carolina found that 17% of North Carolina residents had seen the *Tobacco Free Schools* television ads and nine new school districts adopted *Tobacco Free Schools* policies.

Despite evidence of increased healthcare utilization for concussion and reductions in repeat concussions,<sup>15-17</sup> studies show that athletes do not always report concussions to coaches.<sup>20</sup> Coaches influence on concussion reporting is a key factor in athletes' intentions to report concussive symptoms.<sup>21</sup> Researchers have also asserted that coach education is a key component of legislation.<sup>4</sup> Despite this, one study of 71 schools found that only one-third of schools required that coaches receive concussion-related education,<sup>7</sup> indicating a potential area of exploration for future studies of school district policy.

The findings in this study highlight improvements in school districts nationwide in adopting concussion related policies and practices; however, the study has several limitations. First,

SHPPS relies on respondents' knowledge and perception of district policies rather than a review of the policies themselves. This concern is addressed to an extent, however, by a validity study conducted during a previous SHPPS cycle that indicated an overall high level of data quality.<sup>22</sup> Second, SHPPS does not provide information on how district-level policies are implemented or interpreted by district or school staff. In a qualitative evaluation of the school sports concussion regulations enacted in Massachusetts, several factors emerged that may have impacted implementation of the specific requirements. These factors included availability of full-time staffing, funding constraints, student athletes and parents not being forthcoming about concussions, expectations and awareness of outside influences, and communication and acceptance of suggestions for improving implementation.<sup>23, 24</sup> Challenges with implementation may contribute to diminishing uptake of policies and laws over time. More research is needed to identify factors associated with successful implementation of concussion related policies and practices to inform sustainable implementation of student athlete concussion policies at both district and state levels.

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**Implications for Policy & Practice:**

- Removal from play and return to play practices consistent with best practices developed with the consensus of experts in the field for the management of youth sports concussion are important for protecting athletes from additional injury<sup>25</sup>. Athletes who have had concussion education, often a component of comprehensive concussion policies, are more likely to report concussion symptoms. Despite this, one-third of districts do not have a comprehensive policy in place as of 2016.<sup>26, 27</sup>
- Awareness of concussion policies has been shown to increase reporting of concussion symptoms. Therefore, districts without comprehensive policies may consider developing them as a strategy to increase reporting.
- Policies play a key role in reporting and treatment; however, they do not fully address the problem of underreporting.<sup>15-17</sup> There are still gaps related to concussion reporting among athletes, despite evidence of increased treatment seeking and reductions in repeat concussions.<sup>20</sup> Educational programs play an important role in facilitating culture change, but further research is needed on additional strategies to promote concussion reporting.

**Table 1:**

Percentage of public school districts with concussion-related policies and practices, and with a comprehensive policy - School Health Policies and Practices Study, 2012 and 2016<sup>a</sup>

	2012	2016	P-value
District Level Policies	Responded Yes	Responded Yes	
	% (95% CI)	% (95% CI)	
Return to Play <sup>b</sup>	87.2 (83.7–90.0)	91.4 (88.4–93.7)	0.032
Removal from play <sup>c</sup>	85.4 (81.8–88.4)	90.9 (87.8–93.2)	0.008
Educational materials <sup>d</sup>	73.4 (69.2–77.3)	87.4 (84.0–90.2)	0.000
Educational sessions <sup>e</sup>	58.7 (54.1–63.1)	71.3 (67.0–75.3)	0.000
Comprehensive Policy <sup>f</sup>	51.6 (47.0–56.2)	66.7 (62.2–70.9)	0.000

<sup>a</sup> weighted percentages are presented.

<sup>b</sup> The variable “return to play” was measured with the question, “Has your district adopted a policy requiring clearance by a healthcare provider before allowing student athletes to further participate in practice or competition after a suspected concussion?”

<sup>c</sup> The variable “removal from play” was measured with the question, “Has your district adopted a policy requiring that student athletes suspected of having a concussion be removed immediately from practice or competition?”

<sup>d</sup> The variable “educational materials” was measured with the question, “During the past 12 months, has your district provided educational materials to student athletes or their parents on preventing, recognizing, and responding to concussion?”

<sup>e</sup> The variable “educational sessions” was measured with the question, “During the past 12 months, has your district provided educational sessions to student athletes or their parents on preventing, recognizing, and responding to concussions?”

<sup>f</sup> Comprehensive policy is defined as having a policy on return to play, removal from play, education sessions, and education materials.