

To: National Federation of High School Members
From: Robert Wahl, Pennsylvania State Chairperson - email:altoonavault@aol.com
USA Track and Field Pole Vault Development/High Performance Committee
Date: Monday, May 25, 2009
Re: Pole Vaulting Helmet Update

Ladies and Gentlemen:

My name is Robert Wahl and I am the Pennsylvania State Chairperson for the national pole vault committee. I have prepared this memo in conjunction with other national committee members concerning the issue regarding the possible adoption of any pole vault helmets and the current lack of empirical scientific evidence.

Each January, the USA Track and Field Pole Vault Development/High Performance Committee holds its annual meeting at the National Pole Vault Summit in Reno, Nevada. One of the major topics discussed on January 1, 2009 was the latest development in regards to pole vaulting helmets. Included are:

1. Overview of the legal paper entitled *A Cost-Benefit Analysis of a Pole Vaulting Helmet Requirement: Why the NFHS and Other Rulemaking Bodies Should Not Adopt Such a Rule* by Professors Russ VerSteeg and Jim Beemiller (2004 Olympic gold medalist Tim Mack's coach) who both serve as legal counsel for the national committee and is set to be published this spring (2009) in The Michigan State University Journal of Entertainment & Sports Law.
2. A direct personal statement from Jan Johnson, the committee's National Safety Chairperson cautioning the mandatory adoption of a pole vaulting helmet.
3. A timeline history of the development of the ASTM International standards for the pole vault helmet with an article by Mark Hannay, Northeast Chairperson for the national committee.

The reason for this memo is that a pole vaulting helmet has now been developed to meet the ASTM International pole vault subcommittee specifications and standards. This helmet is manufactured by Gill Athletics. "ASTM studies the crash worthiness of helmet materials and design recommendations for the protective properties of helmets, but sports governing bodies, such as NFHS, are responsible for evaluating the long-term ramifications and implementation of such a safety helmet rules." (VerSteeg and Beemiller) This helmet comes in four sizes and retails currently at \$50. One note of caution is that this helmet is designed for a fall of less than three feet according to Jan Johnson.

Gill Athletics Pole Vaulting Helmet Website:
<http://www.pvhelmet.com/>

However, at the national meeting this year, the same concerns detailed below about a pole vault helmet possibly contributing to neck and/or spinal injuries due to hyperflexion (when the chin forced to chest) is still a major concern. Even though the helmet does meet the standards, by a vote of 23-4, the national committee voted against the idea of requiring a pole vault helmet until *scientifically empirical evidence* is conducted on the possible injury issue caused by the use of a pole vaulting helmet.

The legal paper by Professor Russ VerSteeg (New England Law Boston) and Professor Jim Beemiller (University of Tennessee) This paper details from the legal point-of-view the remaining issues of mandating a helmet that, even though ASTM certified, in which there are still medical concerns about using a helmet in a soft landing area (the pole vault landing system). Their essay “contends that, for reasons of *safety* and *legal liability*, the rules makers should not make helmets mandatory for pole vaulters.” Highlights of their argument are as follows:

1. Draws an analogy of the role in sports safety in athletic contests and motor vehicle safety concerning school busses. Research showed that the retrofitting of older school buses with safety belts “showed that the costs of injuries would actually *increase* if seatbelts were installed in older buses.”
2. According to tort law, before any implementation to safety measures in any field including sports rules, “rule makers must undertake a cost-benefit analysis in an effort to determine whether the costs associated with the implementation of any given safety rule can be justified by the decrease of injury costs.”
3. Looks at the “recent medical research conducted by physicians who, themselves, are actually pole vault coaches and intimately involved with pole vault safety.”
4. Concludes that “as was the case for retrofitting older school buses with seat belts, a helmet requirement for pole vaulters is dangerous. According to medical research, the cumulative costs of injuries will actually increase rather than decrease if such a rule were to be implemented.”
5. Also concludes that “given the current state of medical research, any rulemaking authority that does require pole vaulters to wear helmets could be subject to liability in the event a vaulter is injured (either immediate or long term) due to wearing a helmet.”

This currently published research article has been included as a separate document along with this memo and the “fact sheet” overview of the major points.

Statement from Jan Johnson: National Safety Chairperson,
Director of the Pole Vault Safety Certification Board (pvscb.com):

As you may know I have an extensive amount of data on all the known catastrophic PV injuries. Since the NFHS rule changes of 2003, our catastrophic injury record has been much improved, but it is not yet perfect. We seem to have ended the "out the back of the pit", and the "off the side of the pit" type accidents. These two types of accidents represented the mechanism for the vast majority of pole vault catastrophic injuries. This is of course due to the longer and wider landing surfaces now being used. However, we still have some problems in the plant box area. I am very doubtful that a helmet would have helped in most of the "in the box accidents" with which I am familiar. I have been expert legal witness in 8 "in the box accidents" resulting in catastrophic head, neck, or lower back injuries. Additionally, I have personally witnessed an additional two injuries of this type. In my opinion, a helmet might have helped in only one or two of these accidents. A helmet would have had no effect at all in two others (lower back area). Finally, the use of a helmet would have without question increased the leverage against the neck, but given some small amount of protection to the skull in the rest of the injuries.

How much protection can a helmet be expected to give? Less than ½" of hard foam and some plastic is not going to offer much protection in high falls into the box. Kevin Dare for instance fell from 15'+ feet. Wayne Hicks, my team-mate at Alabama, who's accident I personally witnessed, fell from at least 14'. However, the force impact studies seem to indicate that the current ASTM standard only offers sufficient protection from falls of less than approximately three feet!

In addition, in the "over-rotation type landing", (normally a safe landing) will offer a significantly greater moment of force to the neck area. This of course will be especially true on harder landing surfaces. All of us who are vaulters have landed in such a way I am sure would agree!

The costs of care and upkeep of helmets will be large and unending for the schools, who will immediately be obligated to purchase them if helmets are mandated, yet the results will be doubtful at best, and offer very little (if any) gain in safety.

For these reasons, I think the use of a helmet should not be mandated, but rather a personal decision.

Sincerely,
Jan Johnson
National Safety Chair
Director Pole Vault Safety Certification Board
Sky Jumpers Vertical Sports Club

Personally I have always stated that the major concern with most high school facilities is to make sure that all hard and unyielding surfaces be padded to the specifications of the NFHS standards which too many PA schools still fail to properly do. If a helmet is ever scientifically shown to not be a contributing factor to possible neck/spinal injuries, then I would be in favor of such an equipment change. Until then I recommend not to make any "knee jerk" actions.

Pole Vault Helmet Timeline History:

The movement of developing a pole vault specific helmet came about due to the death of Penn State University pole vaulter Kevin Dare in February 2002. Dare was killed when he fell head first from an approximate height of fifteen feet when the pole vaulting pole he was using never reached past vertical resulting in Dare "stalling out" while attempting to complete a vault. Through efforts of the Dare family and PSU, the KDMAX pole vault helmet was developed and reached the market in November of 2004.

<See the below article by Mark Hannay for information through March 2005.>

At the November 2005 ASTM International meeting in Washington, DC, there was a debate about whether the pole vault subcommittee of ASTM should consider moving forward in looking to create a set of specifications and standards for a pole vaulting helmet, adopt the PSU helmet, or discuss the concerns that such a helmet may contribute to neck and/or spinal cord injuries.

During the meeting, most members expressed a concern that a pole vault helmet may contribute rather than protect the vaulter concerning such injuries. If a pole vault helmet were adopted, it would be the first helmet adopted for a soft surface landing (the pole vault landing system) versus other ASTM approved helmets for other sports (bicycling, skateboarding, snowboarding, etc).

At the meeting there was a representative of the National Federation of High Schools. When the NFHS Assistant Director Jerry Diehl was asked the question that if a pole vault helmet was ever constructed meeting the pole vault committee's recommendations, what would be the position of the NFHS. The representative stated that if a helmet was ever constructed meeting the specifications of the committee, then the NFHS would most likely implement adoption in the helmet within one to three years.

Because of this statement and the possibility of contributing injuries, the committee decided that until the concerns for such injuries are scientifically determined, that such any such helmets should be tabled for the time being.

In the summer of 2006, ASTM pole vault subcommittee developed a set of standards and specifications for the development of a pole vaulting helmet. The PSU/KDMax helmet did not meet the standards. The standards and specifications that were developed by the committee in 2006 could not be constructed with the current materials and technology. It was felt that this would give the national pole vault committee at least five years to come up with a methodology to test for neck/spinal injuries.

However, during the fall of 2008, Gill Athletics has developed a pole vault specific helmet that meets the ASTM International pole vault subcommittee standards and specifications. Details of the ASTM specifications can be found on the above included website. Note that there still has not been any scientific testing conducted due to costs and methodology on the possible concerns of neck/spinal cord injuries.

Helmet Issue Through March, 2005:

Helmet Facts & Opinions

(Coach's Comment #51, 3-18-05)

By: Mark Hannay

During the last three years, a considerable amount of debate has been dedicated to pole vault safety including the use of helmets in the event. Each year some high schools and colleges mandate their pole vaulters to use helmets during practice sessions and competition. In an attempt to help the schools more fully investigate the feasibility of helmets in the pole vault event, the following information is being presented. As a member of USAT&F's National Pole Vault Development Committee and the Pole Vault National Coaching Staff, I have provided the following specifics concerning helmets that may be difficult to obtain or have been overlooked. Much of the following information is the result of considerable scrutiny by the above committees or a direct result of committees chaired by members of the above committees. Finally, the following is accurate and verifiable at the time of this writing.

- **FACT-** As of March 18, 2005, no pole vault certified helmets exist including the newly released "pole vault specific" helmets.
- **EXPERT OPINION** - According to the National Pole Vault Development Committee's Legal Council: a mandating entity (e.g., state athletic associations, conference, school, etc.) faces possible liability exposure to injured athletes for damages caused by a mandated product (helmet) and/or by creation of an implication or false perception of safety of the product (helmet).
- **COMMITTEE OPINION** - If helmets are mandated by governing bodies or individuals personally choose to use a helmet, the helmets carrying the following ratings/classification are suggested, by the ASTM F08.53 Subcommittee*** for use in the event. The following is the entire list of helmet ratings that may provide some level of protection, but these helmets are not certified for pole vaulting:
 - ASTM F1492 (A helmet with an ASTM 1492 sticker in it meets the minimum performance standards established by the ASTM for skateboarding helmets. Many helmets advertised and sold as skateboarding helmets do not meet this standard.)

- NOCSAE Lacrosse Helmet without face guard or visor. (A helmet with the NOCSAE seal/logo on it meets the minimum performance standards established by NOCSAE (the National Operating Committee on Standards for Athletic Equipment) for lacrosse helmets).

- **FACT** - On November 8, 2002 the American Society for Testing and Materials F08.53 Subcommittee for Headgear and Helmets made the following statement: ***"While the committee is working to establish an appropriate headgear standard for use in pole vaulting, the committee recommends that governing bodies, consumers, and others desiring to use helmets immediately use helmets that meet one of the following standards: ASTM F1492 or NOCSAE lacrosse helmet without face guard or visor."
- **FACT** - Four states currently mandate that high school vaulters use helmets when participating in the pole vault event; Wisconsin, North Dakota, Minnesota, and Maine.
- **EXPERT OPINION** - The Pole Vault Development Committee's legal advisors suggest that mandating the use of non-certified equipment (helmets) is inadvisable and may not be enforceable.
- **FACT** - Often helmets are marketed as safety helmets, sport's helmets, or helmets specifically designed for pole vaulters. Each statement is implying that the helmet is acceptable for pole vaulting which is noted above as questionable. However, to be marginally acceptable for use in the pole vault and to be certified for use in the pole vault are very different confirmations.
- **FACT** - Statements like "pole vault specific helmet" imply that a helmet was designed for the pole vault event, but it does not confirm certification for pole vault use.
- **EXPERT OPINION** - Some evidence, research, and prominent individuals, including neurosurgeon Dr. Robert Cantu, the medical director of the National Center for Catastrophic Sports Injury Research in Chapel Hill, North Carolina, have suggested that helmets could actually cause an increased risk of neck injury with over-rotation landings within the pit. Current research by Dr. Spencer Chang MD, a fellowship trained orthopedic surgeon in sports medicine, suggest that helmets may pose an increased risk of neck injury to the vaulter when landing properly or improperly in the landing mat. It should be noted that a vaulter risks a neck injury if he/she has an "over rotation" landing in the landing mat. The use of a helmet during an "over rotation" landing increases this risk. Furthermore, the medical doctors who are members of the ASTM Pole Vault Headgear Task Group also share such concerns, but are not necessarily against the development of a pole vault helmet or the adoption of pole vault helmet standards.
- **FACT** - On January 18, 2005, straw votes were taken at the 2005 Men's Pole Vault Development meeting at the Reno, Nevada National Pole Vault Summit.
 - Should pole vaulting helmets be mandatory?
 - The committee voted as follows:
 - Yes - 1, No - 32, Abstentions - 4
 - Should more research be done in the area of pole vaulting helmets?
 - The committee voted as follows:
 - Yes - 37, No - 0, Abstentions - 0

Editors Note: Many helmets do not have or display rating labels/stickers/logos and may or may not be rated. The only way to be certain that a helmet meets the ASTM F1492 or NOCSAE Lacrosse Helmet standard is to check for an ASTM F1492 rating label/sticker/logo or NOCSAE Lacrosse Helmet label/sticker/logo on or in the helmet. The rating can often be found on the inside of the helmet. Helmets that do not carry such labeling should be avoided.

Pole Vaulting Helmet Fact Sheet

1. In 2006, ASTM International Pole Vault Subcommittee developed a set of standards and specifications for a proposed pole vaulting helmet to be incorporated after the conclusion of scientific testing on possible neck stem and spinal cord injuries caused by a helmeted landing on a soft surface..
2. Fall 2008, Gill Athletics has developed a pole vaulting helmet that meets the ASTM criteria even though the scientific testing has not yet been conducted on soft surface landings.
3. Per usual practice, the National Federation of High Schools generally adopts equipment recommendations from ASTM International within one to three years time.
4. The USA Track and Field Pole Vault Development/High Performance Committee voted at its national meeting in January 2009 by a 23-4 voted to not yet recommend the use of a pole vaulting helmet due to the above concerns until scientific testing is completed and the empirical evidence is analyzed.
5. The major medical concern is about a pole vault helmet possibly *contributing* to neck and/or spinal injuries due to hyper-flexion, or when the chin forced to chest. This could either be an immediate injury or long-term.
6. A legal essay published Spring 2009 entitled *A Cost-Benefit Analysis of a Pole Vaulting Helmet Requirement: Why the NFHS and Other Rulemaking Bodies Should Not Adopt Such a Rule*. This essay has been written by two of the national committee's legal advisors, Professor Russ VerSteeg and Professor Jim Beemiller, on the legal ramifications for the adoption of such equipment without proper scientific testing of a well documented concern by elite/expert coaches in the field of pole vaulting who serve on the national committee. They conclude that "*given the current state of medical research, any rulemaking authority that does require pole vaulters to wear helmets could be subject to liability in the event a vaulter is injured (either immediate or long term) due to wearing a helmet.*"
7. Jan Johnson, National Safety Chairperson for the USA Track and Field Pole Vault Development/High Performance Committee states that "*the force impact studies seem to indicate that the current ASTM standard only offers sufficient protection from falls of less than approximately three feet*" and that "*the use of a helmet should not be a requirement, but rather a personal decision.*"
8. It is much more important that all high school facilities be closely inspected to make sure that they are indeed in compliance with NFHS rules mandating that all hard and unyielding surfaces be padded. This includes any type of rubberized track surfaces excluding the designated pole vault runway.
9. The Penn State developed KDMAX pole vaulting helmet does not meet the specifications and standards adopted by the ASTM International Pole Vault Subcommittee.

A COST-BENEFIT ANALYSIS OF A POLE VAULTING HELMET
REQUIREMENT: WHY THE NFHS AND OTHER RULEMAKING BODIES
SHOULD NOT ADOPT SUCH A RULE

Prof. Russ VerSteeg & Prof. James Bemiller*

INTRODUCTION

In the spring of 2002 three teenagers died as a result of head injuries sustained in pole vault accidents. Those deaths fanned the flames of debate regarding whether pole vaulters ought to be required to wear protective helmets.¹ At the November 11, 2004, meeting of the Pole Vault Helmet Task Group F08.53 of the American Society for Testing and Materials International (ASTM), the representative of the National Federation of State High School Associations (NFHS), Assistant Director Jerry Diehl, said something that prompted us to undertake the writing of this essay. When asked if he thought the NFHS would make pole vault helmets mandatory if the ASTM were to establish a helmet standard, he replied that it would just be a matter of time. The room fell silent. A number of the participants were numb and nearly in a state of shock. In discussing this matter in the three years that have passed since that meeting, others who were in attendance stated (in private conversations) that they were dumbfounded and nonplussed to think that, simply because the ASTM might adopt a standard establishing the minimum engineering and design requirements for a pole vault helmet, the NFHS would adopt the ASTM standard as a mandatory helmet rule without further consideration of the long term effects of such a decision. Many in the room that day, upon learning that the NFHS would make helmets mandatory, felt concern and downright fear to think the ASTM subcommittee held in its hands the fate of high school pole vaulters for the

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¹ See Russ VerSteeg, *Negligence in the Air: Safety, Legal Liability, and the Pole Vault*, 4 TEX. REV. ENT. & SPORTS L. 109, 109-112 (2003) [hereinafter, "VerSteeg, *Negligence in the Air*."] See also, Sheila Hagar & Vicki Hillhouse, Young Athlete Remembered for Faith, Friendship, Walla Walla Union Bulletin (2008) <http://www.union-bulletin.com> (Ryan Moberg of Walla Walla, Washington died on April 2, 2008, two days after a pole vault accident. Moberg's death was the first reported pole vault related fatality since the three tragic deaths of 2002).

foreseeable future. Shortly after Mr. Diehl's comment, the subcommittee took a vote and nearly decided (the vote was very close) to abandon the project completely. Indeed it is daunting to think that the ASTM subcommittee had the power to push the first domino that would irrevocably set in motion the establishment of a mandatory high school helmet rule.

ASTM studies the crash worthiness of helmet materials and design recommendations for the protective properties of helmets, but sport governing bodies, such as NFHS, are responsible for evaluating the long-term ramifications and implementation of such a helmet safety rule. By establishing such a safety rule, the governing body creates an "industry" standard which it requires all members to follow. Therefore, it was disconcerting to think the blanket implementation of helmet use at the high school level would rest solely upon the adoption of the ASTM minimum standard, without further discussion of the effects of the use of helmets by the athletes in the sport.

At the November 2005 F08.53 Task Force Meeting, Mr. Deihl, appearing to retreat somewhat from his statement made the previous year, said the NFHS would carefully consider both sides of the helmet issue prior to making a decision whether to enact a mandatory helmet rule. Since that meeting, the ASTM process has moved forward. In early 2006, the ASTM adopted Standard F2400-06 "Standard Specification for Helmets Used in Pole Vaulting."² Thus, with an ASTM standard adopted, rule makers such as the NFHS will now presumably revisit the question of whether they ought to require pole vaulters to wear helmets.

This essay contends that, for reasons of safety and legal liability, rule makers should not make helmets mandatory for pole vaulters. The authors of this paper are both attorneys whose careers have also closely interconnected with pole vaulting. Professor VerSteeg has been a law professor for 20 years. During that time, he has taught Tort Law, Sports Law, and has published four articles about the safety aspects of pole vaulting.³ He is also a high school pole vault coach who has coached one 16-foot vaulter and numerous Girls State Champions in Connecticut.⁴

² See ASTM's Document Summary, F24-00-06 (2006) <http://www.astm.org>.

³ VerSteeg, *Negligence in the Air*, *supra* note 1; *Pole Vault Injuries: Product Liability and Commercial Law Theories*, 5 TEX. REV. ENT. & SPORTS L. 237 (2004); VerSteeg, *A Legal Commentary on the National Federation of High School Associations Track and Field Rules Relating to the Pole Vault*, 14 MARQ. SPORTS L. J. 431 (2004); VerSteeg, *Arresting Vaulting Pole Technology*, 8 VAND. J. ENT. & TECH. L. 93 (2005).

⁴ Jordan Thull of East Lyme, Connecticut, won the 2006 New England Championship with a vault of 16'01". Jordan Thull's athletic profile is available at

Professor Bemiller is the coach of the 2004 Olympic Champion, Tim Mack. He is a professor of Exercise, Sport, and Leisure Studies at the University of Tennessee. He teaches undergraduate and graduate level courses in Sports Law and Sports Governance. Prior to joining the faculty at the University of Tennessee, he practiced law for 10 years, including civil defense litigation. Professor Bemiller has also coached vaulters at the University of Tennessee who have won 5 NCAA championships, 15 SEC championships, and currently hold the American Junior, and NCAA records.⁵ We are not saying that we are necessarily the experts on this topic. Perhaps we are the only lawyers or professors who have had the opportunity and time to devote to studying the issues related to pole vault safety. Our experiences have helped to shape certain perspectives about the pole vault helmet issue, and we want to take this opportunity to share our views.

In Part I, we explain the role of safety rules in athletic contests and draw an analogy to motor vehicle safety; school buses in particular. Part I explains that rule makers eventually abandoned the idea of mandating older school buses to be retrofitted with seat belts because research showed that the costs of injuries would actually *increase* if seatbelts were installed in older buses. Part II reviews legal principles developed in tort

<http://www.gonu.com/mtrack/thull.shtml>. (last visited Dec. 21, 2008). Amy Janceweicz of Norwich Free Academy won the 2003 Connecticut Class LL Championship with 9'06". She won again in 2004 with a meet record of 10-09. Jessica Sullivan, also of Norwich Free Academy, won the same title in 2005 with a vault of 10'00", and she repeated as champion in 2006, clearing 10'10" for a new meet record. In 2007, Sullivan won the LL and Open titles both indoors and outdoors, vaulting 11'06" in both. Jessica Sullivan's athletic profile is *available at* http://und.cstv.com/sports/c-track/mtt/sullivan_jessica00.html. (last visited Dec. 21, 2008). Another Norwich Free Academy vaulter, Kim Johnson, won both the LL and Open Indoor Championship in 2008, with a PR of 11'02". Results from the 2008 LL Girls Indoor Track Meet are *available at* <http://mysportsresults.com>. (last visited Dec. 21, 2008). And on January 9, 2009, Kaylan Pickford, a Norwich Free Academy junior, became just the fourth high school girl in Connecticut to vault 11'00" indoors.

⁵ Lawrence Johnson set the current American Junior record in 1993 as a freshman at Tennessee with a vault of 5.71m (18'8 3/4"). As a senior Lawrence vaulted 5.97m (19'7 1/2") to set the NCAA and American record. The NCAA mark still stands, while the American record has been surpassed. Lawrence Johnson's athletic profile is *available at* <http://usatf.org>. (last visited Dec. 21, 2008). Tim Mack won the 2004 Olympic Gold in Athens with an Olympic Record vault of 5.95m (19'6 1/2"). Later that summer Tim became one of a select group of vaulters to best the 6 meter barrier when he won the IAAF World Athletic Final in Monaco with a meet record vault of 6.01m (19'8 1/2"). Tim Mack's athletic profile is *available at* <http://www.usatf.com>. (last visited Dec. 21, 2008).

law, which insist that prior to implementing safety measures in either sports' rules or highway safety rules, rule makers must undertake a cost-benefit analysis in an effort to determine whether the costs associated with the implementation of any given safety rule can be justified by the decrease in injury costs. Again, drawing an analogy from highway safety, we note that automobile safety researchers concluded the costs associated with adding seat belts and air bags to new cars would be justified by a reduction in injury costs. Parts III and IV tie these pieces together by postulating how these principles apply to safety helmets in other sports, and then to the sport of pole vaulting. This section takes a serious look at recent medical research conducted by physicians who, themselves, are actually pole vault coaches and intimately involved with pole vault safety. This essay concludes that, as was the case with the idea of retrofitting older school buses with seat belts, a helmet requirement for pole vaulters is dangerous. According to medical research, the cumulative costs of injuries will actually increase rather than decrease if such a rule were to be implemented. Our conclusions also suggest, given the current state of medical research, any rulemaking authority that does require pole vaulters to wear helmets could be subject to liability in the event a vaulter is injured (either immediate or long term) due to wearing a helmet.

I. SOME CONCEPTS ASSOCIATED WITH SAFETY RULES IN SPORTS

There are several types of rules in sports. Some define the game. Some prevent unfair competition. Some are designed to promote safety. Obviously, a rule requiring a pole vaulter to wear a helmet is a safety rule. Prior to adopting a safety rule, it is important for a rule maker, or governing body, to bear in mind the pros and cons of adopting such a rule. Surely a safety rule should prevent more harm than it causes.

The question of whether there should be a pole vault helmet requirement is analogous to the issue of whether other "laws" should be enacted requiring certain prophylactic safety measures. For example, one analogy that comes to mind is the question of whether old school buses should be required to have safety belts installed. For many years, groups of concerned parents lobbied their legislators to enact laws to have older school buses retrofitted with seat belts. The parents were concerned that, in the event of an accident, children would suffer severe injuries due to not being secured in their seats. But research engineers tested and calculated the effects of implementing laws mandating that school buses be retrofitted with seat belts. The engineers found, if children were belted in, that a number of serious and dangerous consequences were likely to

follow. Crash tests conducted in Canada showed that wearing seat belts was likely to *increase* the likelihood of children's heads hitting the seat in front of them, "resulting in severe or fatal head and neck injuries."⁶ The same study indicated that "shoulder belts *increase the chance of abdominal injuries*" and that "children would slip down, risking injuries to organs covered by the lap belts."⁷ "A 1999 study by the US National Transportation Safety Board (NTSB) suggested that adding seat belts to school buses *will cause additional head injuries and probably additional deaths* in some crashes."⁸ Commenting on an American study from the 1970's, a 1994 New South Whales paper, prepared for the Bus Safety Advisory Committee, stated:

It was concluded that the use of lap belts alone in conjunction with the low-backed and inadequately padded seats that were typical of those installed in North America at that time (and are still typical of route service buses in New South Whales) could *increase* injury because the lap belted passenger pivots about the belt and slams the head, face and, if tall enough, chest into the seat back ahead.⁹

That same New South Whales study also raised the concern that retrofitting school buses with safety belts would also be a problem because of the lack of stability in the floors of the older buses "due to the need to strengthen the underfloor structure."¹⁰ Presumably, if the underfloor were not reinforced, the weight of school children shifting during an accident could actually cause the seat belts themselves to become unbolted from the floor, causing more severe injuries than if the children were not wearing a seat belt in the first place.¹¹ So, in light of the engineering research and

⁶ Canada Safety Council, "Seat-Belts in School Buses?" <http://www.safety-council.org/info/traffic/schbusbelt.htm> (last visited Dec. 21, 2008); *See also* "Seat Belts on School Buses: A Review of Issues and Research" The University of North Carolina Highway Research Center (Feb. 29, 1996), http://www.hsrc.unc.edu/pubinfo/child_busses.htm.

⁷ *Id.* (emphasis added).

⁸ *Id.* (emphasis added).

⁹ Dr. Michael Henderson and Michael Paine, "School Bus Seat Belts: Their Fitment, Effectiveness and Cost" (Dec. 1994) <http://users.tpg.com.au/users/mpaine/busbelt.html>. (emphasis added).

¹⁰ *Id.*

¹¹ *Id.* at 10. (This study concluded: "the mandatory fitting of lap-only or lap/sash seat belts in large route service buses used for the transport of children in the School Student Transport Scheme is not recommended.").

testing, parents and legislators concluded that, since such a rule (a rule that at face value looked good in theory) actually was likely to *increase* the likelihood of causing injuries and in fact would have wound up costing much more (i.e., purchasing and installing belts *plus* the costs associated with the more severe injuries that would have been caused in accidents), it would be unwise to implement such a rule. Therefore they abandoned the idea.¹²

A similar cost-benefit analysis (i.e., in which the balancing of treatment of a dangerous condition must be weighed against its potential long term effects) occurred when the 7-time Tour de France Champion, Lance Armstrong, was diagnosed with testicular cancer in 1996. To combat the severity of his illness, Armstrong originally sought consultation from experts in Houston, Texas. The doctors in Houston outlined a treatment protocol which involved caustic doses of chemotherapy and radiation. The treatment would cure the cancer, but would ravage his lungs in such a way that he would never be able to race a bike again. He would have to learn to walk again. The chemotherapy would also leave him infertile, and in immense pain. Because of the late stage of his cancer diagnosis, the doctors in Houston believed that this protocol was his best option. Armstrong was taken aback, and sought a second opinion from experts at the Indiana Medical Center in Indianapolis who had pioneered the treatment of testicular cancer. Their plan included tailoring his treatment with the goal of helping him to return to riding. Without compromising his chances for recovery, they altered his treatment protocol of chemotherapy to preserve his lungs, and his brain tumors were removed surgically, rather than using radiation, to preserve his balance. Armstrong and his doctors' careful study and analysis led to a solution that treated the problem without suffering residual long term negative effects on his otherwise healthy systems. Choosing the more radical treatment would have caused debilitating long-term side effects and the end of his athletic career.¹³ Although this example deals with a medical decision making process rather than a legal process, it is another example of an initial opinion which looked good in theory, but under careful

¹² The clear trend today is to design *new* school buses in a way that will make seat belts safe. But there has been very little change regarding efforts to retro-fit older buses, due to the high costs and increased risks of injuries. See School Transportation News, "The History of Seat Belt Development" <http://www.stnonline.com> (last visited Dec. 21, 2008).

¹³ ARMSTRONG, L. & JENKINS, S. LANCE ARMSTRONG. IT'S NOT ABOUT THE BIKE. MY JOURNEY BACK TO LIFE. New York, NY: Berkley (2001).

consideration of the cost of prevention, led to a more refined solution.

II. THE HAND FORMULA AND HOW IT APPLIES TO SAFETY RULES

Lawyers have adopted an economic mode of analysis to evaluate safety precautions and the advisability of safety rules. A famous judge, Learned Hand, put it this way: Before adopting a safety rule, we should determine whether the costs of adopting the rule outweigh the benefits of adopting it and vice versa.¹⁴ In short, Judge Hand said that we should compare two costs. First, we should try to determine the likelihood of the injury (i.e., probability or the "risk" that a given type of injury might occur) that we are trying to prevent and also try to assess the magnitude of that potential injury. According to Judge Hand, the likelihood of the injury multiplied by the magnitude of the injury equals the "cost" of that injury. That is one "cost." Second, on the other side of the equation, we should determine the costs associated with preventing that potential harm. In short, if the costs of trying to prevent the harm are greater than the costs of the harm itself, then it would *not* make sense to adopt a rule requiring the preventative measures. On the other hand, if the costs of trying to prevent the harm are less than the costs of the injury, then it *would* make sense to adopt a rule requiring safety measures. The preventative measures are said to be cost-effective.

Using Judge Hand's rule ("Hand Formula"), we typically analyze any given proposed safety rule as follows. First, in order to evaluate the "costs" associated with an injury (the injury that we are trying to prevent) we must assess the likelihood (probability) of the harm. How does one go about doing that? Well, this is where empirical research from the insurance industry or other statistical studies can help. For example, in the automobile industry, empirical research can give us a good idea of the probability of certain types of car crashes. What percentage of car crashes involve certain types of injuries? And what percentage of drivers are involved in those types of accidents? Secondly, we must try to assess the "magnitude of the harm." With automobile crashes, for example, the "magnitude" of injury involves at least two factors: 1) the severity of the injury (i.e., grave bodily harm or death); and 2) the costs associated with that injury (e.g., the insurance costs, medical costs, pain and suffering, loss of consortium, etc., associated with grave bodily harm or death). According to the Hand Formula (the way lawyers evaluate the advisability of safety rules), this is how we arrive at the "costs" of the injury: we

¹⁴ See United States v. Carroll Towing Co., 159 F.2d 169 (2d Cir. 1947).

multiply the probability of the injury occurring by the magnitude of the injury. So, using our empirical research we must arrive at some number to express probability (i.e., a number between .000 and 1.000).

Second, we must arrive at some number to express the "magnitude of harm" (e.g., the costs associated with the grave bodily injury or death caused by certain types of automobile accidents, presumably expressed as a dollar amount). The next step in the Hand Formula analysis is to determine, as nearly as possible, the costs of preventing the harm. For example, in order to try to prevent grave bodily harm and death in automobile accidents, the auto industry has spent millions of dollars doing research and development for safety belts and air bags, and continues to study the effects of their use. In addition, the auto industry has spent millions of dollars manufacturing and installing safety belts and air bags in all motor vehicles. Prior to making safety belts and air bags mandatory in newly manufactured vehicles, legislators had to satisfy themselves that the costs associated with preventing grave bodily harm and death in certain types of crashes (the R & D, manufacturing and installation costs) were less than the costs of the harm (i.e., "cost of the harm" defined as the probability multiplied by the costs incurred by the harm [insurance, medical, legal, etc.]). In short, legislators had to decide that it was going to cost less to prevent the injuries than the aggregate costs of the injuries themselves.

III. FACING BRUTAL REALITY IN THE CONTEXT OF PROTECTIVE HELMETS IN SPORTS

It may seem dispassionate to think about grave bodily harm and death in terms of probabilities, insurance costs, medical costs, and legal fees. But for good or ill our society has developed a legal system, a medical system, and an insurance system that take these types of factors into account. Those of us involved in making sports rules would be remiss if we were to ignore this analysis. Sport governing bodies ultimately will be judged by the legal system under these theories when their decisions are scrutinized. Therefore, before creating an industry standard of practice, governing agencies should conduct a transparent and thorough investigation into the costs, benefits, and future consequences that rule changes might entail.

Presumably, when baseball rule makers, football rule makers, and hockey rule makers adopted rules making helmets mandatory in those sports, they determined that the costs associated with preventing head

injuries (i.e., purchasing helmets for every participant) were less than the costs associated with the frequency and types of head injuries that they sought to prevent (e.g., the probabilities of being struck by a baseball or being struck by a flying puck when multiplied by the costs of severe head and face injuries).¹⁵ This process was exemplified by the American Football Coaches Association when it initiated the First Annual Survey of Football Fatalities in 1931 to address the increase in catastrophic injuries and death which plagued the sport at that time. These continuing research projects now encompass all major sports for men and women through the National Center for Catastrophic Sport Injury Research at the University of North Carolina at Chapel Hill. The governing bodies of football have implemented safety rules, such as banning wedge formations and imposing blocking restrictions, which were less expensive than the costs associated with a burgeoning catastrophic injury rate which threatened the integrity of the game.¹⁶

IV. APPLICATION TO THE ISSUE OF WHETHER HELMETS SHOULD BE MANDATORY FOR POLE VAULTERS

Those of us who are involved with the sport of pole vaulting must now come to terms with these issues as they relate to our sport. A small number of states (e.g., Wisconsin, North Dakota, South Dakota, Minnesota, and Maine) have already adopted rules making helmets mandatory, and an NFHS representative has said that the NFHS may make helmets mandatory. As pole vault coaches, and more importantly, lawyers and professors who specialize in sports law and risk management, we think that it is imperative that the NFHS pause to assess this situation seriously and critically before deciding to require all high school vaulters to wear helmets. Have we as interested members of the pole vault community really done our homework and risk assessment? Have we carefully thought through the Hand Formula analysis? Or are we jumping to conclusions with knee-jerk reactions to a handful of fatal accidents? The authors of this paper fear that it would be a serious mistake for the NFHS, NCAA, IAAF, or anyone for that matter to adopt a mandatory helmet rule before carefully analyzing the long-term effects of such a regulation.

¹⁵ For a brief discussion of the effects of mandatory helmet rules in other sports, see VerSteeg, *Negligence in the Air*, *supra* note 1 at 167-70.

¹⁶ National Center for Catastrophic Sport Injury Research, The University of North Carolina-Chapel Hill, Twenty Second Annual Report: Fall of 1982-Spring 2004, available at <http://www.unc.edu/depts/nccsi/AllSport.htm> (last visited July 26, 2006).

Pole vaulting is a demanding sport with a long and unique history. The modern pole vault was a part of the sport of gymnastics around 1775 and was later moved to the athletics or track and field program, probably because of its similarity to the long jump and high jump, and due to the increased space needed as approach runs and heights increased.¹⁷ Because of the "closed" nature of the event, taking place in a fixed environment, the vault is totally different from sports which require or encourage helmet use. Biking, skateboarding, snowboarding, equestrian, football, and the like all take place in an "open" environment in which participants must react to a changing landscape of hard surfaces and other players. In pole vaulting we have control over the environment. Rather than requiring helmets, the goal of organizers should be to remove the causes of injury through rule modifications that enhance the safety of the environment, and enhance competent coaching, thereby reducing dangerous impacts. Should gymnastics or springboard/platform diving require participants to wear helmets while performing in air maneuvers to protect participants from the rare mishap? Presumably, gymnasts and divers would resist helmets because of their cumbersome nature and interference with kinesthetic awareness and performance. It is likely that a helmet would add stresses and strains, for example, to a gymnast's and/or diver's neck, potentially causing injuries. A mandatory helmet rule for sports such as gymnastics, diving, and pole vaulting would appear to treat the result rather than the cause. Arguably, these safety concerns can be addressed by adequate athletic facility design, improved coaching, and the realization that in certain instances accidents simply will occur as an inherent risk of the sport.

The following are some thoughts regarding our assessment of applying the Hand Formula to the helmet issue. First, like the automobile industry, we too want to prevent grave bodily harm and death. As was noted, in 2002, within two months of one another, three teenagers died from head injuries that resulted from pole vault accidents.¹⁸ Several studies have documented the "catastrophic accidents" that have been reported in the pole vault community during the past 20 years.¹⁹ Several doctors and researchers have begun gathering data and writing about the

¹⁷ See History of the Pole Vault, <http://www.petrspacek.com/history/history.htm> (last visited Dec. 21, 2008); See also The Open Encyclopedia Project, Pole Vault, <http://open-site.org> (last visited June 27, 2006); Jan Johnson, Russ VerSteeg, and Ray Kring, Illustrated History of the Pole Vault (2007).

¹⁸ VerSteeg, *Negligence in the Air*, *supra* note 1.

¹⁹ See Barry Boden, et al., *Catastrophic Injuries in Pole Vaulters*, 29 AM. J. SPORTS MED. 50 (2001).

probabilities of these catastrophic injuries occurring.²⁰

It seems to us that we have sufficient statistical data to begin to arrive at one side of the Hand Formula's equation. We can determine the "cost" of grave bodily injury or death of an individual.²¹ Given our statistical data, we also can forecast the probability of these types of head injuries (i.e., the types of injuries that a helmet is designed to prevent or minimize). We must be careful and recognize that the probability appears to have been reduced during the past five years as a direct result of the new rules mandating an increased pit size, and perimeter padding of all hard surfaces surrounding the landing pit, and minimum standard placement.²² Data indicates that the mishap of a vaulter landing with his or her body partially on the landing pit and his or her head whipping off the pit and striking the surrounding hard surface, usually some sort of pavement material, or completely missing the landing pit and landing on a hard surface accounted for 69% of the catastrophic injuries reported. These types of injuries appear to have been virtually eliminated, or at the very least, dramatically reduced as a result of the new safety regulations currently in place (e.g., pit size, perimeter padding, standard depth, etc.). The circumstance of a vaulter becoming disoriented or releasing the pole without enough momentum and landing in the planting box accounted for 25% of the catastrophic injuries reported in the Boden et al. study.²³ Current rule changes and recommendations relating to pit placement, box collars, padding for hard surfaces around the perimeter of the pit, minimum standard settings, painted safety landing areas on the top pad of the pit, and pole rating and maximum grip regulations are designed to reduce these occurrences. We also submit that the probability has been further reduced due to the increased awareness and emphasis on risk

²⁰ See Spencer Chang, et. al., *Pole Vault Injuries* (unpublished research paper, on file with author); See also Spencer Chang, et. al. *The Effect of New Safety Regulations on Injury Prevention in the Pole Vault* (unpublished research paper, on file with author) [hereinafter "Injury Prevention"].

²¹ Again, assigning a monetary value to human life may seem dispassionate, however, we assure you that we are extremely compassionate persons (in 1997 Professor VerSteeg's sister was a murder victim...handgun...and so he is personally familiar with the emotional trauma associated with the violent and unexpected death of a family member). But the cold hard facts of life necessitate that we arrive at the legal rules by which we order our society in a logical fashion, taking costs and benefits into account in many circumstances that otherwise may seem either unsympathetic at best, or inhumane at worst.

²² See NCAA Rule 2-6-1 available at <http://www.ncaa.org> (last visited Dec. 21, 2008).

²³ See Boden, *supra* note 18 at 50.

management education and safety for both coaches and athletes. So in blunt terms, our task is to calculate the probability that a pole vaulter will suffer grave injury or death as a result of trauma to the head (i.e., we must multiply the probability - again a number between .000 and 1.00 - of such an accident by the dollar value - "cost" - of that accident).

The second step in applying the Hand Formula will be to determine the costs of prevention. There are two important matters that we must take into account. First, there are the obvious direct costs associated with the out of pocket costs of purchasing equipment.²⁴ How much will it cost schools and/or individuals to purchase a helmet for vaulters? Presumably some sharing of helmets is feasible, but at least we could begin by multiplying the number of vaulters by the retail price of a helmet. We must also consider whether these costs incurred will be effective in preventing the injuries we are concerned with, namely falls into the planting box or onto hard surfaces. Experts suggest that no feasible helmet will protect a vaulter in the event of a 16-foot fall that results in a direct blow to the back of the head against an unpadded plant box. Such an impact would exceed the capabilities of current motorcycle helmets. The energy to be managed by an 18-foot vault would be three times the capability of a bicycle helmet. To protect against such an impact would require a helmet of such weight and thickness as to make its use impractical.²⁵ Therefore, the cost of mandatory helmet regulation should include the caveat that the helmet is not a panacea, and may provide a false sense of protection from catastrophic injury.

But there is a much more important and serious cost that must be added to this side of the equation, namely, the costs associated with injuries *caused* by helmets. Dr. Wilson SooHoo and Dr. Spencer Chang, (who are both pole vault coaches themselves) and others have begun doing research on the potential injuries that wearing a helmet might *cause* to a pole vaulter. In particular, their research shows that an appreciable percentage (at least 10%) of pole vault landings occur in such a way that either upon impact or immediately after impact (i.e., rolling backwards in the pit immediately after landing) a vaulter's neck experiences a sudden hyperflexion of the cervical vertebrae.²⁶ Their research also shows that

²⁴ Of course even this seemingly straight forward cost involves certain additional hidden costs as well. For example, the research and development, insurance, and manufacturing costs involved with producing a pole vault helmet.

²⁵ Bicycle Helmet Safety Institute, "Helmets for Many Activities" <http://www.helmets.org/other.htm> (last visited Jan. 26, 2006).

²⁶ *Injury Prevention*, *supra* note 19 at 2.

the added thickness of a helmet at the nape of the neck will exacerbate the hyperflexion upon landing, increasing the likelihood of cervical spinal injury.²⁷

In some instances, this hyperflexion may directly cause a severe cervical spinal injury immediately upon impact. In particular, Dr. Chang has argued some landings, that in the past have merely caused strains to a vaulter's neck, probably would have caused spinal fractures if the vaulter had been wearing a helmet.²⁸

In addition to the likelihood of immediate injury, this hyperflexion caused by a helmet is also likely to cause significant long-term or chronic neck injuries. If one were to extrapolate, and try to calculate the number of repeated occurrences of these types of landings over several years of vaulting, it is clear a significant number of these hyperflexion landings will occur over the course of several years. So let us assume hundreds of thousands of hyperflexion landings will occur in any given year. Now let us also take the doctors' word and assume a helmet will increase the severity of hyperflexion. Lastly, consider the nature of the potential injury these factors could produce if the NFHS, for example, were to make helmets mandatory. Hundreds of thousands of hyperflexion landings will occur over the course of several years. Helmets will exacerbate this hyperflexion effect. This, in our opinion, is a formula for disaster. This combination of hyperflexion landings - coupled with the fact that helmets will intensify the severity of the effects of those landings on the cervical vertebrae - will certainly cause chronic neck injuries in the long term. Thus, there is an argument to be made that chronic neck injuries (i.e., injuries to the cervical vertebrae) will probably be among the long-term effects of wearing a helmet while pole vaulting. Of course at the present time we have no empirical data to show what long term effects wearing a helmet will have on a statistical sample of the pole vault population. What we do have is a group of doctors and researchers who, based upon their professional analysis and judgment, forecast that this is a likely result.²⁹ If they are correct, and if an appreciable percentage of vaulters (assuming a mandatory helmet rule) would eventually suffer chronic injuries to the cervical vertebrae, we can only imagine that the aggregate, cumulative medical, insurance, and legal costs would be substantial.

Therefore, the risk of both immediate and long-term injuries

²⁷ *Id.* at 5, 17-20.

²⁸ *Id.* at 17-19.

²⁹ *Id.* at 17-20.

caused by wearing a helmet while pole vaulting seems to be too great a cost to make helmets mandatory.

V. CONCLUSION

Therefore, we find ourselves faced with exactly the type of problem that not long ago faced lawmakers who were considering legislation to require the installation of seat belts in old school buses. Relying on medical research, just as the legislators relied on engineering research, we must determine whether we believe that such a rule will make the sport safer or more dangerous as was done when legislators had to determine whether they thought adding seatbelts would make schoolchildren more or less safe. Our analysis boils down to this.

(1) Costs associated with the injury we are trying to prevent equal the probability of severe head trauma or death caused by hitting one's head on a hard surface (e.g., the plant box) multiplied by the medical, insurance, and legal costs of such injuries.

(2) Costs associated with trying to prevent severe head trauma or death equals out of pocket costs to purchase helmets (which will not protect the vaulter from a fall from any significant height) plus medical, insurance, and legal costs resulting from some percentage of vaulters suffering (a) sudden, direct cervical spinal fractures due to hyperflexion; and (b) chronic, long-term cervical vertebrae injuries.

Simply stated, before the NFHS or any rulemaking body decides to adopt a mandatory helmet rule, they must first determine whether they think (1) is more or less than (2). Our opinion is that taking into consideration the recent implementation of other safety rules that are now in place, the costs of prevention by mandating helmets far outweighs the costs of harm, and therefore a mandatory helmet rule would be a terrible (if not disastrous) idea from a legal standpoint. It appears that the probability of the type of injury that helmets are designed to prevent is extremely low. Our statistics suggest a very small percentage of vaults result in severe head trauma or death. Only two such injuries have been reported during the past five years (i.e., since the new pit-size rules and rules requiring perimeter padding went into effect).³⁰ Admittedly, the severity of this type of injury is exceptional. But even if we were to put a

³⁰ In April of 2005 a Pennsylvania high school freshman, Ryan Adler, was seriously injured when he stalled out and hit his head in the vicinity of the box. For a collection of articles and discussion relating to this incident, see <http://www.polevaultpower.com>; See also *supra* note 1 for a discussion on the April 2008 death of Ryan Moberg.

very high dollar figure on accidental death, say five million dollars, when multiplied by an extremely low probability, this side of the Hand Formula equation winds up being a fairly low figure. On the other hand, the costs of prevention are steep.

For example, begin with a conservative figure for the number of helmets that someone would have to purchase, say 10,000-20,000.³¹ Then multiply that by the cost of the helmet (even with discounts and shipping costs one would be lucky to get it for less than \$85).³² Now add the costs that would result from some percentage of vaulters experiencing a sudden trauma (i.e., broken neck) due to a severe hyperflexion *plus* the costs associated with some percentage (say even 3%) of vaulters suffering chronic neck injuries that may not even manifest until 10 years from now. These costs seem to be exceptionally high (insurance, doctors, X-ray, medication, physical therapy, and legal). In our estimation, although it may seem dispassionate, the costs associated with buying thousands of helmets coupled with the costs of treating hundreds of broken necks and hundreds and even thousands of vaulters suffering from long term chronic neck injuries will far outweigh the costs associated with the isolated occurrence of severe head trauma or death caused by cranial injury (i.e., without a helmet).

We think that vaulters, their parents, and coaches should be advised of the risks involved with wearing or not wearing a helmet while pole vaulting. Given those risks, the decision of whether to wear a helmet should be left up to each individual or that individual's parents and or coach. But it would be a mistake for any rulemaking body, such as NFHS or state association, to make wearing a helmet mandatory.

One final note. If the NFHS or a state association were to make wearing helmets mandatory and if either immediate injury or chronic injury were caused by wearing a helmet, could the NFHS or state association who made such a rule be held liable? Yes, we think so. Should that be a factor that the NFHS or state association takes into account when considering adopting such a rule. Yes, we think so. A mandatory helmet rule which sets an industry standard of practice and is revealed to cause catastrophic or chronic injury when used correctly would be an obvious breach of the duty of care to the participants by the governing body. We arrive at these conclusions by simply analyzing

³¹ The NCCSIJ estimated there were 25,000 high school participants in the pole vault in their 2005 report.

³² See e.g., <http://www.polevaulthelmet.com> (last visited Dec. 21, 2008).

potential liability in common tort law terms. Liability typically is predicated on whether someone, in this case the NFHS, acts or fails to act in a reasonable manner. As we explained, courts have used the Hand Formula to determine reasonableness in this type of context. Simply stated, it would be unreasonable for a rulemaking body to adopt a rule whose cumulative costs of prevention outweigh the costs of the injury sought to be prevented. Consequently, a vaulter who suffers any type of neck injury³³ while wearing a helmet (*i.e.*, a helmet that was required by some rulemaking entity) would certainly have a viable cause of action against that rule maker, given the current state of economic realities. Furthermore, the prospect of a class action law suit by a group of injured vaulters against a rulemaking body, such as the NFHS, state athletic association, or NCAA, seems particularly likely.

The possibility that latent, chronic cervical spine injuries will manifest in the future reminds one of the way that class action plaintiffs have succeeded against asbestos manufacturers and tobacco companies. On the other hand, given these same economic realities, it seems quite clear that a vaulter who suffers a traumatic cranial injury would not be successful against such a rule maker on the theory that the rule maker should have required the wearing of helmets.³⁴ Hence, it is clearly in the best legal interests of the NFHS and other rulemaking bodies not to adopt a rule that would require vaulters to wear helmets. Moreover, it is in the best interests of the vaulters.

³³ Either a sudden or chronic injury.

³⁴ Of course there are many other factual inquiries that an injured vaulter would pursue (*e.g.*, whether the pit size met the minimum size requirements, whether there was sufficient perimeter padding, etc.). For additional legal theories, see VerSteeg, *Negligence in the Air*, *supra* note 1.