

CHAPTER 5

TRAUMATIC INJURY IN ATHLETICS: DIALOG WITH COLLEGIATE COACHES

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Abstract: The purpose of this chapter is twofold (1) to provide some general information on the psychology of injury, specifically emphasizing the issue of fear of injury in athletes; and (2) to explore the collegiate coaches' perspective regarding the causes and consequences of sport-related injuries including traumatic brain injuries. Several predisposing factors for development of fear of injury were identified, including gender, classification of injury in terms of its severity, and the number of previous injuries. These findings were shared with several collegiate coaches via personal interviews. Coaches' perspective and views on injury are described including the discussions of various notions regarding the causes and consequences of injury, including traumatic brain injuries in collegiate athletics. Clearly, as evidenced by coaches' responses, more education and knowledge about the causes, symptoms and long-term disabilities as a result of traumatic brain injury are needed to identify athletes at risk and to prevent brain injury in athletics.

Keywords: fear of injury; concussion; collegiate coaches; concussion.

1. INTRODUCTION

Injury is an unfortunate risk that is an unavoidable part of athletics. Most athletes that participate in high level sports experience some type of injury during their athletic careers. There is a concern among coaches and medical staff regarding the growing number of sport-related traumatic brain injuries. This is one of the most poorly understood injuries occurring in athletics more commonly known as a concussion (Walker, 1994). Presently, long term consequences are overlooked as the initial injury seems trivial and the athlete's sensory-motor abnormalities clear rapidly. Usually, athletes with uncomplicated and single mild brain injuries experience rapid resolution of symptoms with minimal prolonged sequelae (Macciocchi et al.,

1996). However, athletes with a history of mild traumatic brain injury (MTBI) do have a risk of developing a post-concussive syndrome (Cantu and Voy, 1995), an important factor to consider when clearing these athletes for sport participation. Post-concussive syndrome (PCS) is described as the emergence and variable persistence of a cluster of symptoms following an episode of concussion, including headache, dizziness, nausea and emotional lability (Wright, 1998). Other signs of PCS are disorientation in space, impaired balance and postural control, altered sensation, photophobia, lack of coordination and slowed motor responses (Goldberg, 1988).

The majority of athletes are able to return to play after rehabilitation based upon the injury physical symptoms/components resolution. Accordingly, established methods of rehabilitation typically focus on the physical components of injury and do not encompass other behavioral and psychological aspects that may exist as a by product of injury (Weiss, 2003). As a result, remnants of behavioral and psychological deficits that are not properly addressed prior to return to play may put an athlete at risk for re-injury.

Athletes' personality types, coping resources, gender differences, as well as effective counseling and social support are some of the issues that have been identified as the most salient factors that shape the psychological experience of injury. Correlations have been found between psychological factors and injury that could provide us with a better understanding of the injury type and severity of the injury in particular athletes (Yukelson, 1986; Heil, 1993). A number of previous studies have examined the athletes' emotional responses to injury (McDonald & Hardy, 1990; Smith et al., 1990), painting an intricate picture of an injured athlete's personal status. However, important aspects of fear of injury due to movement, discomfort, anticipation of pain, and associated avoidance reactions as predisposing factors to injury in athletics have not yet been adequately addressed. The injury fear due to movement is distinct from sport performance phobia (fear of failure to perform specific skills without the implication of injury, Silva, 1989) should be seriously considered by the coaching staff.

2. FACTORS CONTRIBUTING TO FEAR OF INJURY

Traditionally, the emotion of fear has been excluded from research related to general orthopedic and other injuries, including traumatic brain injuries, and has not been highly considered among injured athletes. One of the reasons is that athletes are generally perceived as "warrior type" individuals that do not harbor emotions such as fear. Athletes usually attempt to hide their fear because they feel coaches view fear as a weakness (Feigley, 1988). Both, the coaches viewing fear as a weakness and the athletes hiding their fear, are dangerous attitudes, considering that athletes

are faced with possible physical harm every time they step onto the field. Being faced with memories of pain and discomfort are likely to further developing some level of fear for subsequent injury. Fear may result in erratic emotional responses and various forms of avoidance reactions including absenteeism and lack of readiness to perform during practice/competitions. Given the complexity of the athlete's experience of injury, it seems erroneous for coaches to ignore fear as a possible component of re-injury.

Suffering from injuries and experiencing fear may elicit a compilation of *bracing behaviors*. *Bracing behavior* is the act of preparing or positioning for impact or danger during athletic activity and movement (Keefe, 1990). An assemblage of bracing behavior produces a variety of deficient movement techniques (Keefe, 1984, 1990). It is important to note that *bracing* behavior may not always stem from the pain, discomfort, postural instability, or decreased degrees of freedom caused by the physical injury. Bracing behavior may also be caused by particular psychological states (Keefe, 1984), in general, and learned *avoidance reactions* (Fordyce et al., 1982) in particular. *Avoidance* refers to "the performance of a behavior which post-pones or averts the presentation of an aversive events" (Kazdin, 1980). It was proposed that fear of injury due to movement and associated anticipation of pain is one of the major factors of *bracing behaviors* as reflected in deficient movement patterns, ultimately causing secondary, or more severe injury (Moss, Slobounov, Sebastianelli, 2005). Therefore, it is important for coaches and medical personnel to understand predisposing factors causing the development of fear of injury due to movement in order to prevent real injury. If real injury occurred, it is important to evaluate the psychological status of athletes, as an important step for developing a holistic rehabilitation program and predicting athletes at risk for re-injury.

With respect to athletic injuries, fear may be experienced in different contexts. The fear not only originates from the exact event that caused the injury, but there is a fear of movement in general. Our personal observations of injured athletes both in the field and in the training room suggest that it is unlikely that re-injury will occur under the exact same circumstances, but rather some type of movement may cause a secondary injury. In our recent study (Moss et al., 2005) we locked into the concept of *Kinesiophobia*, referring specifically to *fear of movement*. This concept was originated by Kori et al. (1990) as "an excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury". In 1991, Miller developed the Tampa Scale of Kinesiophobia (TSK) comprising various questions regarding the fear of movement. We employed the TSK scale and observed injured athletes in the field and in the training room upon their return to sport participation. The details regarding the Tampa Scale of Kinesiophobia (TSK) and some results

with respect of fear of movement in injured athletes can be found elsewhere in this book (see Moss & Slobounov in this volume).

3. COLLEGIATE COACHES' POINT OF VIEW

There are numerous causes and a variety of physical, behavioral and psychological consequences of athletic injuries. Coaching errors are commonly cited as one of the major causes of athletic injuries. Specifically, inadequate assessment of an athlete's physical skills, misunderstanding of psychological coping resources, rushing with acquisition of new techniques, overtraining and overloading causing accumulated muscle and mental fatigue, and an early return to sport participation after injury are just a few examples of coaching errors that increase the risk of injury/re-injury in athletics. There is another set of common coaching mistakes identified by sport psychology practitioners, including:

- *Overreacting when the athlete makes an error or does not perform according to coaches' instructions and expectations;

- *Demanding too much time or commitment from athletes so that they are continually injured;

- *Relentlessly putting a high amount of pressure on the athletes, causing every practice to become a "life-or-death" situation, requiring that athletes are constantly at the boundary level of being over-trained;

- *Not respecting that student-athletes need to have balance in their life – time for school, work, family, friends and rest;

- *Overemphasizing body weight, especially in complex coordination sports with female athletes, leading to possible self-image problems or even serious eating disorders;

- *Mistreating the athletes for being lazy, not trying hard enough, or not placing high enough and dragging whole team down the slope;

- *Losing perspectives of the whole purpose of sports and being completely preoccupied with wining at any cost, putting athletes under tremendous pressure and stress;

Having this in mind we have interviewed several Penn State University coaches exploring their perspectives on causes and consequences of student-athletes injuries.

Coach Fran Ganter, Football

Currently: Assistant Athletic Director. Former Responsibility: Offensive Coordinator, Running Backs Year at Penn State: 28th Collegiate coaching experience: 28 years - all at Penn State Bowl games as a player: 3 - 1967 Gator; 1969, 1970 Orange Bowl games as a Penn State coach: 25 - 1972, 1975 Cotton; 1972, 1975, 1979, 1983 Sugar; 1974, 1986 Orange; 1976

Gator; 1977, 1980, 1982, 1987, 1992, 1997 Fiesta; 1979 Liberty; 1983 Aloha; 1988, 1994, 1998 Citrus; 1989 Holiday; 1990, 1992 Blockbuster; 1995 Rose; 1996 Outback. Second in longevity among members of the Penn State football coaching staff, Fran Ganter is in his fourth decade as a member of the Nittany Lion program. In his 28th year as a member of Joe Paterno's brain trust, Ganter has been instrumental in the Nittany Lions' success since his days as a player in the late 1960's. His four years as a player give him 32 consecutive years of association with the Penn State program. The Lions' offensive coordinator and running backs coach, Ganter is the architect of an offense which has ranked no lower than third in rushing and first or second in the Big Ten in total offense and scoring three times in Penn State's five years of conference play. The Lions have proven to be one of the nation's most balanced and prolific offenses under Ganter, averaging at least 30 points per game each of the last seven seasons. In 1997, Penn State averaged 208.6 yards per game rushing and 213.9 yards passing, ranking in the nation's top 25 in rushing, total offense (422.5 ypg.) and scoring (32.7 ppg.). In 1994, Ganter directed what is regarded as one of the top offenses in college football history. Blessed by an abundance of talent, including five National Football League first-round draft picks, Ganter melded their strengths and skills to develop an attack which led the nation in total offense (520.2 yards per game) and scoring (47.8 points per game). The Lions' scoring average was fourth-highest in NCAA history and the squad set 14 team school season marks.

Coach Randy Jepson, Men gymnastic team:

Head coach Randy Jepson punctuated an already outstanding coaching career by piloting the 2004 Nittany Lions to an NCAA-record 11th national title. His second national coach of the year award highlighted personal achievements, but it is what his team accomplished that the 2004 season will be remembered for. In addition to the team championship, Penn State sophomore Luis Vargas brought home the Lions' first NCAA all-around title since 1973. Senior Kevin Tan also ended his career on a high note, capturing his third-straight Big Ten title and his second-consecutive NCAA title on the still rings. Now, 13 years into his tenure as a head coach at Penn State, Randy Jepson prepares to move forward and sustain the momentum the Lions carried throughout the NCAA championships into years to come. The 2000 National Coach of the Year and 2003 Big Ten Coach of the Year, Jepson has played a significant role in perpetuating the proud winning tradition of the Nittany Lion program, not only as head coach, but as an athlete and assistant coach as well. After guiding his teams to two national championships and men's gymnastics first Big Ten title, Jepson serves as a symbol of the University's proud heritage of the sport. A member of the coaching staff since 1983, Jepson was appointed head coach on July 6, 1992,

succeeding long-time head coach Karl Schier. During the 20 years Jepson has coached at his alma mater, Penn State student-athletes have earned All-America honors 66 times. He has also coached 14 individual national champions during his tenure, while Mark Sohn was the first man to win four-consecutive pommel horse national championships.

Coach Steve Sheppard, Women gymnastic team:

Seven NCAA Championships appearances and eight NCAA Regional Championships. Twelve All-America titles, 24 regional individual titles and 68 all-conference academic selections. The 1999 Big Ten Co-Coach-of-the-Year. One of his athletes sits atop every Penn State event record list. All this, and Steve Sheppard is just entering his 13th season as the head coach of Nittany Lion gymnastics. Beyond impressive scores and records, Sheppard's true aim lies in molding the all-around college student. To that end, he and longtime assistant Jessica Bastardi, along with first-year assistant coach Aladine Naamou, have created a family atmosphere within the gymnastics program that has helped athletes thrive. "We have a philosophy where we want our athletes to succeed in all aspects of their college experience," Sheppard explained. "We want them to succeed academically, athletically, and socially. We want them to come away feeling good about their time at Penn State."

Coach Joe Battista, Ice hockey team:

Coach Battista recently completed his eighteenth season as coach with a combined winning percentage of .806 and no losing seasons and a 424-100-22 record. A Pittsburgh native, Coach Battista attended Penn State as an undergraduate and was a standout defenseman for the Icers. During his career (1978 to 1982), he was a two-time MACHC First Team All-Star, was the team captain and MVP during his senior year, and he finished the season with 50 points, an extraordinarily high total for a defenseman. After completing an internship with the Pittsburgh Penguins, Coach Battista was hired as Director of Amateur Hockey Development and assistant to the marketing director. He also coached the Junior Penguins, a 17-19 year old travel team, to three Mid-American Championships and two 3rd place finishes at the USA Hockey National Championships. For the past 20 years, he has served USA Hockey as a Coaching Certification Instructor, ultimately earning to the USA Hockey Master Coach Award.

In 1987, Coach Battista took over Penn State Hockey. His teams have won six ACHA National Championships ('90, '98, '00, '01, '02, '03), 14 NLIT Championships, three Chicago Classic Championships, two ICHL Championships ('89 and '92), and two ACHL titles ('93 and '94). Coach Battista's teams have played in eight consecutive ACHA National Title

games. Coach Battista was inducted into the Penn State Hockey Hall of Fame in February of 2005 in recognition of his 27 years of involvement with Penn State Hockey as a player, HMA officer, and Head Coach. He was inducted into the Penn Hills Sports Hall of Fame in 1996, the Pennsylvania Sports Hall of Fame in 2004, and was named the ACHA Division 1 Coach of the Year in the 1999-2000 and 2001-2002 seasons. He was also selected by Blue-White Illustrated as Penn State's 2001-2002 Coach of the Year. He was selected by USA Hockey to be the head coach for Team USA at the World University Games held January 16-26, 2003 in Tarvisio, Italy.

Coach Russ Rose, Women Volleyball team:

Heading one of the most successful programs in the country, Russ Rose passes along the confidence and character he has gained during his tenure in Happy Valley. It is a confidence not gleaned from the shine of numerous trophies and accolades bestowed upon the coach and the program, though no one would question if it was. In 26 seasons at Penn State, Rose has collected wins at a staggering pace. Never having posted less than 22 wins in a season, he earned his 800th career victory at Penn State on Sept. 3, 2004, with a win over Rutgers (only the sixth Division I coach to reach the milestone), has collected eight Big Ten titles in 14 years and has firmly entrenched the Nittany Lions among the elite programs in the nation. In 2003, Rose celebrated 25 years of coaching at Penn State. He was honored with a bench outside of the post office sponsored by the Penn State Booster Club and surprised with a gathering of more than 40 former players and members of the program, who offered their thoughts and insights on Rose and his career. "It was my sophomore year when he said 'When you leave this gym, when you finish your career, every day you leave here, you should feel like you gave 110 percent,'" said former player Christy Cochran (1995-98). "And that's exactly it. If you put your career in his hands, you'll be great."

Coach Emmanuel Kaidanov, Fencing team:

Emmanuel G. Kaidanov is a fencing master and head coach of the men's and women's fencing teams at Penn State. Kaidanov immigrated to the United States in 1979 from the Soviet Union, where he had competed as a world-class fencer and served as a coach. He was a candidate for the U.S.S.R. National team in saber from 1958 to 1964. Kaidanov has been a fencing coach for over 40 years and is in his 24th year at Penn State. He has developed both the men's and women's teams into perennial NCAA Championship contenders with the men sporting a 306-21 record in dual meets (94 percent) and the women boasting a 296-23-1 mark (93 percent). He won his 600th career dual meet during the 2004-05 season. Kaidanov led

Penn State to its ninth overall NCAA combined team title in 2002, placing the Lions firmly at the top of the NCAA fencing world. In the decade of the '90's, his teams won back-to-back NCAA combined titles in 1990 and 1991 and finished second in 1992, 1993 and 1994. Penn State won a record six straight titles from 1995 to 2000.

Q1. Injury is a common risk and unfortunately an unavoidable part of athletics. Most collegiate athletes, regardless of sport, experience some type of injury during their athletic careers ranging from mild to severe. Despite technological advances and improved sport equipment, advanced coaching expertise and knowledge about particular sport, understanding nutritional and psychological factors contributing athletes' progress and well-being, the number of injuries continue to rise. Could you please elaborate with your opinion on why injury is still an unavoidable part of athletics today? What elements do you feel are most essential in coaching collegiate athletes to prevent risk of injury?

Coach Ganter: *I think the injuries are inevitable because in contact sports things have to happen. There has to be some give and something is going to give when you dealing with a contact sport. Obviously, the knowledge of the game is an important contributor to injury. It is important to make sure that athletes are in proper position. The strength training is the most essential element in coaching college athletes in order to prevent risk of injury. I think conditioning and strength training probably outweigh the other two, because you could be out of position or you could be in an awkward position and still your strength training should carry you through any serious injury, at least as far as prevention goes. So, I think strength training, including its proper gain and control, is the key element in terms of prevention of injury in football.*

Coach Jepson: *I would like to address the questions regarding the injury as unavoidable part of athletics in gymnastics, and what can be we do in order to prevent traumatic injuries in our sport. It is my strong believe that physical preparation of gymnasts is a most essential key factor of injury and injury prevention. Functional abilities, general strength and conditioning, flexibility and specific skills are most importantly the lack of these athletic properties are predisposing factors for injury. Especially in my sport, you have to have general strength, specific flexibility in order to be injury free. So, you as a coach going to set up the situation when injury is in control. The second thing that I look at this issue from injury prevention perspective, is the selection of elements that a given gymnast can learn, consistently perform and be comfortable with in his competitive routine. Athletes and coaches should have realistic expectations of demands and personal capacities to meet these demands. You need prepare athletes both physically*

and emotionally, so that expectations should be reasonably adequate and acceptable both from coaches and athletes' perspectives. Do not expect good performance from athletes who well prepared physically, but not ready emotionally for upcoming events. Even the amount of work load would be differentially accepted and perceived by athletes with different level of "emotional" readiness. I would say, you can avoid injury if train properly. As far as risk concern, no questions that gymnastic is risky sport by nature, however, proper training of gymnasts is a key factor of injury-free environment in gymnastics.

Coach Sheppard: Every time the body is in motion, its need to overcome an inertia that is difficult to control. Especially in my sport of gymnastics, as soon as the gymnast left the base of support, it is really difficult to change the movement trajectory. So, an inappropriate take-off, slight errors in movement initiation may lead to an unavoidable risk of injury. In addition, you must stop the movement fast, the hard landing, deceleration and all other mechanical properties of required skills are difficult to control, which is another major reason of injury, including traumatic brain injury. In other words, objective demands of sport of gymnastics, high risk associated with skill performance, necessity to maintain focus on what is supposed to be done, all these are predisposing factors for injury in modern gymnastics. You subjected your body to abnormal forces all the time that lead to overused injuries as well as traumatic injuries. You land incorrectly, you land hard on one leg, or you fall, and this will be always present in gymnastics. Therefore, I agree that risk of injury is an unavoidable and inherent part of athletics in general, and in gymnastics, in particular. There is no way totally to eliminate it. However, if you train smart and correctly, you can definitely reduce the number of injuries, especially overuse injury, by appropriate planning and controlling the training process. The planning of training programs, the assessment of physical skill and psychological status of an athlete are important, but the most important issue, at least in our sport of gymnastics, is body composition. Overall, physical fitness and conditioning and the lack of these properties must be the most important priority of gymnastic coaches. If you take care of it, you can dramatically reduce the number of injuries. Second, a systematic approach, periodization, and knowing how to push athletes to achieve their potentials are also crucial. Overall, we can in some way control the injury, but in terms of avoid the injury, this is a big question for me.

Coach Battista: Size and strength, $F=MA$. They are simply pushing the limits. Equipment is lighter but not necessarily more protective. I also feel seasons are too long and both mentally and physically it is taking its toll on these kids. Coaches need to work closer than ever with strength coaches, nutritionists, sport psychologists and trainers. Hydration issues, recovery

issues, relaxation techniques, flexibility training, curbing over training, time management, stress related issues. There are so many more stressors today.

Coach Rose: *I have 2 thoughts on the reason injuries occur, and the first are that players come in to college unprepared for the physical demands of practice, and the frequency and intensity of preparing at the next level. The second is that some injuries occur because the sport is demanding. For example, hand injuries occur from blocking (vs. bigger, stronger, more experienced hitters), and ankle or foot injuries may occur from the repetitions, which increase the chance of trauma. A goal would be for the players to come in to college healthy and prepared for the demands both physically and mentally.*

Coach Kaidanov: *As coaches, we should face the reality that injury indeed is real problem in athletics. The demands of the sport are so high that it is beyond the abilities of athletes to meet these demands. We have to train harder and harder to be competitive and the athletes' effort is so high that this at one time or another may lead to traumatic injury. I should stress that both physical effort, related with volume and intensity of the training program as demand of the sport so high, as well as psychological perceived effort are contributing factors to injury. In other words, physical demands of the sport are much higher than athletes' capacities and capabilities to meet these demands. Therefore, I should say that unfortunately, traumatic injuries in sport are still an unavoidable part of athletics today. Having said that, I should stress that there coaching strategies to reduce the risk of injury, including appropriate all around the season strength training, flexibility and endurance training. Athletes should not only to physically ready at the beginning of the competitive season, but, most importantly should maintain this level of physical conditioning throughout the entire season. And this is the direct responsibility of coaches and definitely a crucial factor for prevention of injury. In other words, the stronger the athlete physically, the less the probability of injury we should expect.*

Q2. According to a survey of 482 athletic trainers, almost 50% responded that they believed that every single injured athlete suffered psychological trauma (Larson et al., 1996). They also indicated that 24 % of trainers reported that they have referred an athlete for counseling for situations related to their injury. Recent studies demonstrated that the probability of psychological problems dramatically increases in athletes suffering from 3 or more even minor injuries. Do you agree that every single injury may cause psychological trauma and therefore athletes should seek psychological counseling shortly after injury?

Coach Ganter: *My overall answer to this question is NO. This is coming from my personal experience and just based on what I have seen when kids were coming back from serious injury. I think that the majority of cases in football players are able to find ways out from injury on their own. For the most part, I have been surprised of how reckless athletes are when they come back. I remember one of our players throwing his knee brace over the fence which he had to wear till the end of the season after injuring his ACL. He wore it for about 10 minutes of the practice took it off and threw it over the fence and would never put it on again. So, I look at a guy who was coming back 11 months after an ACL surgery and notice that there is no psychological problem there. No fear, no intimidation at all. Another great example, we had a player who was recovering from a knee injury. On the first day when he was allowed to participate, he went out on the field and he yelled acRose the field at Joe (coach Paterno) and he did these zigzags for about 50 yards, he just zigzagged down field, planted on his knee and then he turned around and shrugged his shoulders like “see” and that was the first day he was allowed to practice. I think there are far more guys that amaze me of their lack of concern as to whether they are going to get hurt again or not. I think it is interesting that the trainers feel the other way. It surprises me.*

Coach Jepson: *I disagree that every single injury induced psychological trauma. In depends of the type of injury. For example, in gymnastics we have a lot of minor injuries, inducing bruises, scratches, etc., that are not seriously traumatic, but induce discomfort, unlike serious traumatic injuries requiring both medical and psychological attention. But if we are talking about discomfort or muscle soreness, I do not think that we should recommend that the athlete see a sport psychologist. If an athlete really has had traumatic injury, it is really hard to get him on the horse again, psychological services would definitely help. My approach is I would recommend injured athletes for psychological evaluation and possible treatment if this injury could be classified as moderate to severe; otherwise, I guess the athletes would be able to fully recover as the symptoms of physical trauma are resolved.*

Coach Sheppard: *I thing the psychological trauma is a continuum of injury from mild to severe. In terms of mild injury, it is upsetting to be hurt, it is an emotional response to injury. But I think that most athletes are mature enough to be able to deal with injury, fully recover without extra psychological attention, and be psychologically free at the end of physical rehabilitation programs. So, injury is a part of the sport and you have to deal with that. On the other hand, a serious injury, such as season ending injury could be very psychologically demanding. This situation is often associated with a severe psychological impact requiring the involvement of*

psychological personal to deal with this issue. I would say, this depends on the severity of injury; athletes may or may not be referred for psychological evaluation, counseling and even treatment. So, referring athletes with mild injury to a psychologist may create even more problems, since athletes may develop the symptoms of becoming preoccupied with injury.

Coach Battista: *Not all will react that way but the question should be approached with every injury. Athletes afraid of losing their spot on the depth chart due to injury, the extra time needed to rehab, the loneliness if it is an extended rehab all play a role. I would caution against the “self-fulfilling prophecy mentality” of some athletes looking for an excuse to get out of practice and/or games which may mask bigger issues. My generation was taught to “suck it up” at any cost and sacrifice for the team. The pendulum may have swung too far in the other direction where we are being overly cautious.*

Coach Rose: *It is my opinion that career-ending injuries need to be evaluated with the assistance of counselors. It is my experience with my players that they understand the expectations of their participation and are accountable for their physical and mental health. On occasions, we need to use outside help, it was because of the concerns associated with eating disorders. I seek tough players and again they know what they are signing on for, and we weed out the players who are dependent on psychological stroking.*

Coach Kaidanov: *Not exactly, it depends of classification of injury. I should say that severe injury should definitely be treated differently from psychological perspectives, than mild or moderate injury. In fact, overemphasis or preoccupation with injury and overestimation of impact of injury may cause even more negative mental consequences. Athletes, at least in fencing sport, are really mentally tough people and could handle emotional impact of injury. They of course would be frustrated by the fact that they can't practice or compete in their loved sport, but they are strong enough to overcome these temporary emotional problems. Overall, different people, different approach should be used in terms of psychological recovery for athletes suffering from injuries. I would say we should do our best to prevent multiple injuries or at least to predict athletes at risk for multiple injuries rather than to consider what we should do psychologically with athletes suffering from multiple injuries.*

Q3. Injured athletes usually return to sport participation based upon clinical symptoms resolution and upon recommendation of the medical staff. However, there is a notion among medical practitioners that clinical symptoms resolution may NOT be the injury resolution. Incomplete

rehabilitation following injury may lead to development of so-called *bracing* (self-protecting) *behavior*. This is a dangerous situation that may lead to more severe injuries. Through your coaching experience could you describe the signs and symptoms of bracing behavior among your athletes? What would be your coaching strategies to prevent, and if observed, to eliminate these symptoms of bracing behavior?

Coach Ganter: *You do see some instances when players are self-protective. You can tell that they are not ready to go all out and I can think of many times walking over to a doctor, to a trainer to tell them that this player is not ready to come back. Even though we felt he was ready to get back on the field or may be even the kid coaxed by the trainer or the doctor to get on the field, and then after you watched him for a little bit, you realize that he is not ready. I think that is pretty easy to see. If a kid is not a hundred percent ready, then I have always pulled them out. I do not think any coach, a smart coach, would want a kid out there that does not belong to be there, especially if he is important to your team. The other thing that I think falls into this scenario, I have never been a guy who felt, it was hard for me to believe, that a guy was babying himself. Maybe it was because of the athletes we get here. I always felt if he said he was hurt, if he acted as being hurt, he was hurt for sure. I am sure there are a couple guys that needed to be pushed that we needed to tell them that they are not hurt, get back out there and that stuff. I have always leaned toward the players side of it, and if the kid says he is hurt, and he cannot go 100 %, I always need to respect his knowing his own body. I have always honored that and told him to get out and go see the trainer. It is hard for me to believe that a kid at this level would not want to be out there, so when they say they are hurt I usually believe they are hurt.*

Coach Jepson: *We see this type of behavior in gymnastics a lot. This most often happen when there are still residual physical symptoms that occupy the gymnast attention. So this comes to the question when an injury resolves completely and athlete is ready to fully participate. The presence of this bracing behavior is an indication, as least for us gymnastic coaches that we have to be careful to prevent re-injury. Bracing and protecting, though understandable from an athlete's point of view, really damaging in terms of movement dynamics and leads to abnormal technique development that ultimately creates chronic long-term problems. In gymnastics it is a very conservative process, you are ready you go, if not don't go. In terms of coaching strategies to identify this abnormal pattern, to me is the matter of trust. It is really difficult to work with new coming freshman gymnast, they do not have realistic expectations, and do not have enough confidence in us, as coaches. It takes time to develop that relationship demonstrating that our major concern is the athletes' safety and well-being but not what they can or*

cannot do in the gym. I am sure that all my athletes know that I stand for their best interest, and protection, including protection from injury. They know that I will allow them to perform again when they ready. This trust is a fundamental element in my injury-free philosophy of coaching. And my longevity as a coach demonstrated that I will not allow them to get back until they fully recovered. I should say that my relationship with the medical staff is also important. This is a team effort and mutual understanding and decision should be made, to eliminate confusion from the athletes' site in terms of severity and consequences of injury. Again, it is very important that everybody is in the same page regarding the status of the injury.

Coach Sheppard: *I thought about this issue before, and I agree that physical symptoms resolution does not necessarily mean that an athlete is ready to compete and fully recovered from injury. What we do in gymnastics, is we plan re-training the injured athlete. For example, athletes after leg injury have a tendency to land on the non-injured leg, putting more pressure on non-injured leg during landing, which in fact creates of danger of overuse syndrome leading to further injury. Moreover, this situation may develop "bad habits" which can predispose to further injury. So, we do progressive skills of landing gradually increasing the height of the blocks, or changing the surface of support from soft to hard, etc. So, they know that the injured leg can "take it", so we build the confidence that no injury would happen if done properly. This is just one coaching strategy to deal with the negative effect of "bracing behavior".*

Coach Battista: *A perfect example would be a former standout athlete in hockey, 4-time first team all-American Josh Mandel, broke his foot blocking a shot and was casted in early December. It was the second year in a row for the same foot at the same time of the year. Although cleared to practice and play in early January at 100%, he saked gingerly on his foot for the first two days of practice and was ineffective. We had to decide whether to take him on a trip to Arizona or to take someone else. We met with Josh, asked him to do a few non-contact drills and to not think about the foot and just go all out. He slowly gained confidence and by the end of practice was essentially back to his normal level of play. The psychological barrier had to be overcome. Basically we want the athlete to be honest and give us feedback. If we can do testing to reassure them that they are indeed ok, then we should. Eventually they have to "get back in the pool" and give it a try. I have found that over the years most athletes tend to come back too soon, but usually don't do further damage. When it takes them longer to recover they face the inevitable questioning by teammates with regard to their commitment and toughness especially in the more physical sports. It's all about communication with the coaching and medical staffs and developing*

that level of trust that the athlete feels they are not going to be put into a harmful situation.

Coach Rose: *The question is how we determine if a player is 100% ready to return to full participation without getting them in to the competitive arena. The only way to tell is to test them at game speed and this may result in a re-injury, or players risking a new injury because they are afraid to go hard. We try to have the players increase their effort and push the injured body part in small group settings before we return them to full group participation. A sign of bracing in volleyball would be a player returning from a leg injury, and either hurting the other leg, or a different lower body joint by compensating. We have had players try to change their mechanics because of their rehab regiment, and they not only lose power, but confidence in their ability to succeed.*

Coach Kaidanov: *Frankly, I underestimated this particular aspect of consequences of injury, until I recently started thinking about it. First of all we should be certainly sure that no physical signs of injury present before we allow our athletes to practice again. Though, it is important to note that upon return to practice it is reasonable to suggest that non-injured body parts should be “activated” first, to gradually regain the athletes’ confidence that they are fully ready for new challenges. This is very important issue, and I saw in my practice that a lot of athletes “brace” or protect their recently injured leg, leading to enormous technical problems, new skill learning, and possibly to re- injury. Overall, full rehabilitation is the key to prevent the development of bracing behavior. And as soon, as the injured athlete return to participation, we need to start again from fundamentals and gradually re-learn all pre-injury skills. The other interesting thing, the use and/or abuse of “actual braces, cast for example” also should be considered within the scope of this question. Actual braces may be necessary to protect injured joint from overuse. This may also enhance the athletes’ psychological confidence. These braces should be removed as soon as the athlete is fully recovered from injury physically. Otherwise, athletes could develop abnormal dependence on these braces, which may create numerous problems.*

Q4. Holistically, sport medicine specialists as well as most coaches have been concerned primarily with physical aspects of injury and injury rehabilitation. Thus, athletes who attained a pre-injury physical level are assumed to be fully prepared for safe return to practices and competitions. Do you think that athletes’ psychological adaptation to injury may play a role in the rehabilitation process? Do you think that medical symptom-free post-injury athletes are fully ready for 100% sport participation? Please elaborate.

Coach Ganter: *There are two parts to this question. The last part, are they usually ready, I would say yes. That is just based on my coaching experience. Yes, even just looking at one of our offensive linemen, in the training room just coming off of ACL surgery, I do not think there is any question that psychology will play a role in how he recovers and how he approaches his rehabilitation and whether he is ever going to play again. I think that is psychological and that would help either make him rehab at a higher rate versus taking his time and maybe not doing it at all. I do not think there is any question about that.*

Coach Jepson: *I really believe that psychological adaptation to injury plays a very important role in an athlete's rehabilitation post-injury. It is important in order to prepare athletes for the work load as well as for demands of their sport requirement both physically and mentally, to believe in their own abilities to meet high demands of the sport. Without this adaptation, athletes will be frustrated, and coaches will be frustrated with lack of achievement and accomplishment. It has happened a lot in gymnastics. We use in this case a lot of spotting techniques and return to fundamental skills, re-learn every single element of their "used to be automatic skills". Basically, I understand the psychological adaptation to be return to the basics, and gradually regain the athlete's confidence in his/her ability to perform the pre-injury routines.*

Coach Sheppard: *Psychological adaptation is an important component in injury rehabilitation in sport. For example, you can be physically ready from a medical doctor's perspective, but the athlete may be afraid of performing the certain skills that cause the previous injury. So, regardless of physical symptoms resolution, athletes should acquire a healthy psychological status as well to be fully ready to compete. I can give you example, two years ago, one of my gymnasts dislocated her elbow during a "Tkachev" vault. After completed treatment and rehabilitation, she was capable of doing this vault again, but, she was so afraid of doing that, we were forced to change her vault to less complex vault, so she would be psychologically comfortable. Again, the psychological part of it is huge, so, you go back to fundamentals to regain the confidence of doing it consistently, and sometimes, as in this case, you need change the routine.*

Coach Battista: *I firmly believe that athletes must feel they are ready to go mentally as well as physically. Whether it's the concern of reinjuring or further injuring they must feel safe and feel they have the support of the staff and team. However I think there simply needs to be that extra communication which establishes the level of trust between the staff and the athlete. They must be psychologically ready to engage the competition.*

Coach Rose: *I think the severity of the injury and the athlete's previous exposure to injury has a significant impact on how they perceive their readiness to return to full participation. I think it is important for the medical professionals to be familiar with the demands of the sport in question. It is possible that a player is cleared to play because she is functional, but that may not be adequate for the player to fully compete at a high level.*

Coach Kaidanov: *This decision definitely should be made by an experienced professional, that is a coach. However, medical professionals should be also involved in this process; they should be familiar with the demands of our sport and help with the final call in terms of level of recovery from the injury. I should say that full physical recovery may not be an indication of an athlete's 100 % readiness. Other aspects of preparation, including athletes' responses to training demands, attitude, motivation and emotions are important factors to consider as well. I believe that sport psychology may play an important role in the estimation of an athlete's psychological readiness. Also, sport psychology can help athletes regain their status as a full-time, fully recovered individual.*

Q5. Who should be responsible for the final decision in terms of an athletes' return to full sport participation: coach or medical doctor? Do you think that there should be different criteria in terms of athletes' readiness for returning to practices versus returning to competitions?

Coach Ganter: *I would say, first the player, and second the doctor, in no way the coach. As long as there is good judgment used in practice, I can see a green cRose routine (where a green cRose indicates a partial level of activity). I think that is fine. I think getting a kid ready for participation means all out 100%. I had used the old adage about it "do what you can and go till you cannot go any more, until it hurts or whatever, if it starts to bother you, then get out".*

Coach Jepson: *As I said before, I have great relationships with physicians and trainers. This is mutual decision, and I trust our medical staff, because they are well-aware of our sport of gymnastics. They attend our practices and competitions and they know some specifics of sport that allow them to make accurate decision when athletes are ready to return to sport participation. There is no way I push athletes to do something they are not ready to do. Now, it is my responsibility to communicate with the medical staff, so athletes have good representation from both sides. It should be noted, that sometimes medical staff do not fully understand our sport. So, they should be educated as well. They have to know the actual mechanisms*

involved in movement, so, decision in terms of return to play will be made according to this knowledge. So, this is a responsibility of coaches to educate medical personal about the specificity of sport. If a physician knows the medicine, but does not know the sport, it could be difficult to make an appropriate decision. On the other, I not a doctor, and do not know a lot of medical aspects of injury. Thus we have to work together for the safety of our athletes. In fact, as I mentioned before, our medical staff are in the gym with us, and this create a lot of trust, which is critical in terms of an athlete's rehabilitation from injury, in general, and return to participation, in particular.

Coach Sheppard: *I think that the coach and the doctor should collaborate together and make a decision of return to participation based upon physical status of the athlete, first, and other athletic characteristics, second. Some doctors, especially in gymnastics, do not have enough knowledge about what athletes can do after injury, and injury rehabilitation. For example, if a gymnast has an ankle injury, she still can do full bar routine, except for the landing. She also can do a lot of conditioning exercise for the upper body. This situation for sure may create conflict between medical doctors and coaches. So, doctors may be very knowledgeable in terms of physical aspects of injury, but at the same time, they could be ignorant in terms of understanding the sport and gymnastics and possibilities of compensatory training programs for injured athletes without aggravating the injury. So, the final call from a legal stand point should be from a doctor, but from the practical stand point, the coach should be responsible to final decision regarding the return to participation.*

Coach Battista: *I really believe that this needs to be a collaborative decision. But that the coach with the athlete and the Doc's input should be given the opportunity to make the case for an athletes return. But, in this litigious day, I would have to say it is up to the team doc's, especially in cases involving serious injuries which could prove life threatening (hydration, weight issues, heart and lung, concussions, etc.). I believe the athlete's should have some means by which we can "test" their mental and physical readiness for returning to action whether practice or competitions.*

Coach Rose: *I think that the final decision on whether a player is ready to play rests with the coach, however, the medical staff has to be comfortable that the player is capable of competing injury free. The physician should not release a player to a coach unless they are sure the player is ready. Too many times I see a player cleared to play, but nowhere ready to truly compete. There is a difference between contributing and excelling, and in some situations a coach may want the contribution and they can limit the demands placed on the player until they are fully able to compete. Both*

parties share the same goal, and that is a healthy athlete who can offer their best effort.

Coach Kaidanov: *It should be definitely a mutual decision. The medical doctor should clear the athlete for participation based on their clinical signs and regulation. However, the coach should clear the athlete for specific types of activities without compromising the possibility of re-injury. Having said that that medical doctor overall is responsible for final decision based upon clinical symptoms resolution and his or her knowledge and experience dealing with specific sport activities. The medical doctor should predict possibilities of re-injury and make their call accordingly.*

Q6. There are a number of interventions recommended by sport psychology practitioners including: negative thought stoppage, cognitive restructuring, healing imagery, muscle relaxation, goal setting, etc. to speed up rehabilitation of injured athletes. What kind of coaching strategies would you recommend to enhance athletes' readiness for returning to full range of sport participation?

Coach Ganter: *I am an old school guy, and I do not have any knowledge or experience in any type of psychological rehabilitation. I think the greatest motivator is playing time and if they want to get back on the field and play, they are going to hurry up and get better. I think, if an injured athlete is worried about regaining a position or playing time, sometimes that will speed the process up too. I have no experience with people giving psychological coaching or anything like that in rehabilitation of my kids.*

Coach Jepson: *I do a lot of visualization, like I said, specifically focused on physical skills that were associated with injury. I truly believe that a major cause of injury in gymnastics is improper techniques and errors in performance of a complex skill. So, gymnasts should be clear minded in terms of the understanding of the fundamental mechanics of skill they need to perform. Also, skill progression, especially in case of injury is critical to return to pre-injury status. We teach gymnasts to focus on the positive, rather than to think about the possibility of re-injury.*

Coach Sheppard: *I think that properly framed, gymnastic oriented and injury recovery focused visualization is a tremendous coaching resource to speed up the rehabilitation of injured athletes. Visualization should include not only "visual imagery per se" but also skill imitation, feeling, sensing the recovery, feeling the pressure and tension in the injured joint producing the required skills. We use this a lot in our program, not only for performance enhancement but also as a part of the psychological intervention program for injured athletes. For example, we have a gymnast with an achilles*

tendon injury, so I required that she should do visualization every day at least 10 minutes per session, with the accent on acquisition of feeling that her tendon get stronger and stronger every day, becoming more flexible. Positive thought process and positive thinking about progress of recovery is a great contributing factor speeding up the whole process. It is important to stress again, that it should be specific and recovery goal-oriented visualization. This should be trained similar to physical skill training.

Coach Battista: *First, I remind them that they are athletes and are in most cases in much better shape mentally and physically than the average person. Most doctors are going to err on the side of the conservative diagnosis. I try to keep them active in team meetings and activities so they look forward to getting back as soon as possible. I firmly believe in the importance of communication with all parties to develop both a written and verbal game plan that helps the athlete remaind focused. We are big into goal-setting, imagery and relaxation exercise, and use our sport psychologist whenever the athlete is willing to participate.*

Coach Rose: *I think that there is a full array of interventions that can assist with the development of an athlete. The use of these items may work with some athletes, and I would encourage their use. The player may have to deal with the fear of returning to full participation and I think anything that can reassure them that they are ready to go is valuable. My communication with my players is that they need to test for themselves before they can get full clearance from me. They need to feel comfortable and capable of reentering the sport.*

Coach Kaidanov: *As a coach, I am in charge of modification of practices, considering the level of recovery from injury. I also change and modify the goals that athletes should set for themselves. They should be realistic, but challenging enough, so athletes would return to full participation sooner. We could also contract a certain routine of injury-free exercise that focused primarily on involvement of non-injured parts of the body. For example, if an athlete is recovering from a hamstring muscle strain, we could recommend a series of exercise programs related to abdominal conditioning. So, athletes are fully involved in the training program but the content of the training is modified and shifted to the upper body conditioning.*

Q7. As ascertained in various studies, it is clear that gender differences in athletes are highly influential in shaping the psychological and emotional experience of injury. For example, females report higher levels of fear related to injury due to movement than males. Are there different coaching strategies for dealing with female athletes as opposed to male, particularly in regard to recovery from injury?

Coach Ganter: *I do not know, I do not have any experience with female athletes or how they are coached. I just know that a little bit since, I have been around the female coaches we have here at PSU. I know for sure, they are probably tougher than we are. You said that they have a little more fear of injury than the males. Maybe the good female coaches have to be tougher.*

Coach Jepson: *Is in clearly not my area of expertise, though I think that there are fundamental differences in coaching males versus female athletes. I guess, female athletes are more emotional and sensitive, therefore coaching strategies in female sports should be oriented on creating extremely positive learning environment.*

Coach Sheppard: *Gender differences are absolutely essential issues to consider when coaching female athletes. They learn differently, they feel differently, they are more sensitive to critique and coaching styles. You have to be very sensitive towards the mentality of the female athletes. I think it is essential that they should have daily team meetings to discuss various aspects of their life, not only athletic life. They should be happy and psychologically well to respond to enormous pressure to be student-athletes. There are delicate issues such as body weight, body image, self-esteem, that extremely important for athletes, especially for female gymnasts. Thus, my primary responsibility to maintain psychological well-being of my gymnasts in any way I can. Unfortunately, not much research presently available for coaches how to deal with female athletes, therefore we mostly orient on our personal experience and experience of my female assistant coach.*

Coach Battista: *Certainly not my area of expertise, but definitely a factor since the culture of women's sports is inherently different (cultural influences, relatively new and few female coaches who can relate). My gut feeling would be a higher need for communication and reassurance.*

Coach Rose: *I am aware of some research claiming that females and males athletes display similar level of confidence, psychological maturity and toughness when tasks are appropriate for females, when females and males have similar experiences and physical abilities, and when clear evaluation criteria and feedback are present. I fully agree and believe in enormous potential of female athletes in terms of dealing with training load, athletic demand, discipline and commitment to sport. This is at least the philosophy in our team at Penn State. It should be noted that concern about body image definitely affect all women including student-athletes. Athletes just as any other women are extremely sensitive to the general societal pressure towards unhealthy thinness. We, as coaches should be also sensitive to how we communicate with female athletes about this issue. I suggest that we*

should follow nutritional guidelines and focus on healthy eating behavior rather than on weight issues. I also should say that the most important aspect of coaching is to treat the athletes with respect and dignity regardless of gender, race and social preferences.

Coach Kaidanov: *I should say that I agree with the notion that gender influences all aspects of coaching including practices, competition, and coaches' interaction with athletes. Gender influences coaches' interpretation of athletes' responses to work load, their expectations and effects of psychological pressure. It is important to note that gender is an important individual characteristic. Accordingly, if you would like to follow the principle of individualization, you should directly tie this to gender. To my knowledge, there is not much research and recommendations how to deal with gender issues in coaching practice.*

Q8. Among athletes it is common to hide fear in order to avoid appearing weak. However, it is known that in previously injured athletes, fear of subsequent injuries may induce erratic emotional responses, avoidance reactions, and bracing behaviors. In your opinion, and in terms of psychological recovery, do you think that athletes recover better, or faster, from an injury if the injury is given more attention, or less attention? Also, do you feel that there is a difference in response to attention paid to the injury in male vs. female athletes?

Coach Ganter: *I would have to say more attention is needed when you coach injured athletes. I can not picture an injury getting less attention, there is no motivation there. I would have to say more attention would help promote the quicker recovery. I think the better rehabilitation and more attention an athlete receives would get them back quicker. I have no opinion regarding the gender differences.*

Coach Jepson: *I think that fear is important protective mechanism and plays an important role in athletics. As I said, gymnastics is an extremely risky sport and not surprisingly, fear is present every time a gymnast preparing for or performing a routine. Most importantly, however, to dissociate fear per se, from ability to control fear. Successful gymnasts, regardless of gender can control fear, trust their body and their coaches. I also believe that fear coming from uncertainty due to lack of consistency in performing the routines. Thus, the more consistent and the reliable skill, the less fear that is present. Unlike other less risky sports, we should think of the fear in terms of fear of being hurt, versus the fear of being embarrassed, or the fear of failure.*

Coach Sheppard: *I agree that fear is a component of the sports environment. Usually female athletes are more open in term of expressing fear. They are honest and more expressive if they are afraid to learn or to perform new skills. So, my responsibility as a coach to take into consideration the fear factor, and progressively reduce it through consistency of performance of risky routines and acquisition of confidence. It is also important, that athletes should know that we are good “spotters” and are able to protect the athletes in case of falling. In essence, fear can be controlled, if properly trained.*

Coach Battista: *All players are different. Most players would respond better to a coach or trainer who gave positive feedback., “Looking better already, almost there, can’t wait to have you back.” Some however need to have it downplayed while others need to be told straight up that its not that bad, get over it! I definitely feel that females respond differently than males (some are tougher and more stubborn!!!). But the key is still communication. Generally, I would think the females like more than less information.*

Coach Rose: *Fear of injury is not a common emotional reaction in volleyball, unlike fear of failure performing certain skills. My coaching approach to deal with fear of failure is to stress that I reward learning progress, commitment to sport and to team rather than winning or losing issues that unfortunately dominate modern sport, including collegiate sport. On the other hand fear of re-injury as a result of premature return to play is an important factor to consider. Therefore, we have to explore the root of the problem rather than to treat the consequences of our erroneous assumptions about the injury and its impact on athlete’ well-being both physical and psychological. In other words, we should be crystal clear about the severity of injury, its impact on athletes’ status and most importantly about the current emotional status of the previously injured athlete. An athlete should be not only physically injury free at the time to return to play, but also should not experience any signs of irrational thoughts, anticipated pain due to movement etc. These observable signs of premature return to play should be used as red flags for coaches requiring termination of situations when these signs are present and may be additional physical rehabilitation and/or psychological counseling are needed.*

Coach Kaidanov: *There should not be any behavioral signs of fear of injury, otherwise it could potentially lead to injury. Neither should there be any irrational thoughts and expectation of injury. This extremely negative emotional reaction distract athletes from a major focus of control, technical skills, competitive strategies and decision making processes; especially during competition. I guess, if athletes may develop this emotional*

distraction, he or she should be referred to professionals dealing with this issue.

Q9. Sport-related concussion has received significant attention in recent years. Despite some advances of studying concussions, important questions are still to be answered including:

*Which concussion grading scale and return to sport participation guidelines are sufficient to prevent more severe secondary and multiple concussions?

*After how many concussions should an athletic career be terminated?

*Are there long-term cognitive and behavioral deficits after single and especially multiple concussions?

*Collegiate athletes are at high risk for sport-related brain injuries. The likelihood of brain injury is a function of head impact (or sudden acceleration/deceleration) within the context of sport participation. The concussion may occur in any activity, regardless of the nature of this activity, and when the brain injury occurs, it has potential for a lasting effect on the athlete. What do you think the collegiate coach should know about concussions and what should be done from a coaches' point of view in order to prevent concussions?

Coach Ganter: *What they should know is the dangers of and what is a real concussion. I know even personally, I can think of times when I must have had a concussion and remained in the activity, went back out with severe headaches, you know either into the practice or even the next day. I could remember that. I think now, when our kids have severe headaches and maybe they got a blow on the head, it is worth to keep them out for a day or two. I am saying, jeez, I am sure we could have a lot of problems having concussed kids back on the field. Anyway, I think knowledge, what is a concussion, what are the dangers if he continues to participate with any symptoms of a concussion is critical for coaches. What we can do to prevent concussion, is to make sure that we are doing safe drills when players do not have a helmet and just being smart and taking precautions. So, that we do not have any unnecessary concussions because of lack of protection. We do too many things without a helmet. Our summer football camp is without helmets. There are just so many things that worry me about that. Really the more I think about it, the more I worry about it. I have become more knowledgeable about concussions, and what can happen down the road really worries me.*

Coach Jepson: *A couple of cases we had on our gymnastic team. I would like to stress that I am not a neurologist and practically have little knowledge about concussion. Therefore, I think that medical professionals should treat athletes with concussion, regardless the level of injury. I know that there are gradations in terms of mild, moderate or severe concussions.*

I think this is very serious injury and every single case of brain injury should be considered from our coaches' perspectives as a severe injury, requiring immediate medical attention and treatment. I am aware of possible consequences of concussion including learning problems in student-athletes suffering from single and multiple brain injuries. I think that we, as collegiate coaches should be more educated about signs and symptoms of concussion, especially about long-lasting residual abnormalities.

Coach Sheppard: *This is definitely a confusing injury not only for athletes but also for us as coaches, because unlike other injuries, you often do not observe obvious physical evidences of injury, such as broken arm, cast, etc. Unfortunately coaches do not have enough knowledge about this serious type of injury, the brain injury. My understanding was that this injury is temporary, at least in the mild form. Therefore, I thought that athletes suffering from a concussion should be ready to start practices within one week post-injury. However, my recent experience with one of my gymnasts, who suffered a mild concussion 5 weeks ago and still experiencing problems has convinced me that this is a more serious injury than I have ever thought. Therefore, more education is need for coaches to fully realize the danger of brain injuries. I was not aware of procedures, scales, assessments etc., and still do not know the details about this injury. It is important for us to understand long-term consequences of concussion to realistically expect the injured athletes to be back for full participation.*

Coach Battista: *We should be educated on the most up to date information on concussions and recovery from concussions. As someone who has dealt with this both as a youth and adult athlete, it is a primary concern of mine. Any and all data should be collected and analyzed to help determine the short and long term effects of concussions as well as the appropriate time needed to recover. Until such a time that affordable, portable "EEG" machines capable of quickly giving feedback on brain patterns, are available, we need to develop the best alternatives possible. Baseline testing prior to tryouts, "Litmus" tests that give some sense of the magnitude of the concussion administered by trainers/doc's on hand. In general I favor a conservative approach. I do believe we have to be careful on how the test is administered (ex. The first question asked shouldn't be do you have a headache or do you remember what happened, it should be generic like how do you feel?). I worry that sometimes we make suggestive comments that the athlete simply reacts too in an affirmative way. We had an athlete who answered "I guess I have a headache," and jokingly said "I don't know what hit me" and it turned out he was fine.*

Coach Rose: *The concussion issue in one that I feel needs to remain in the medical community. I don't think the coaches are trained to evaluate this*

condition. Although it is rare for a volleyball player to suffer from this injury, I have had a few players that have, and they were monitored and regulated by the physicians and athletic trainers. Not much in my sport can be done to prevent the occurrence of this injury, but certainly adequate instruction in the floor skills area can reduce the exposure to hitting one's head on the playing surface.

Coach Kaidanov: *I should say that concussion is very unusual and seldom traumatic injury in fencing. But if a concussion would happen in my sport, I would definitely refer a concussed athlete to a professional. I truly believe that this is a serious trauma, regardless of the grade, symptoms and/or symptoms resolution. I also suggest that coaches should be educated in advance about this type of injury, so, if it would happen, appropriate actions should be implemented. This is particularly important since we are dealing with student-athletes who should go to school, study, acquire a lot of intellectual knowledge that require memory, concentration, and other mental abilities. Thus, overlooking the symptoms of concussion may cause dramatic consequences in terms of the student-athletes ability to successfully graduate. Again, highly professional medical people should be involved in any case of a concussion in athletes.*

Q10. Many athletes who have had single concussions recover quickly and are able to return to play. However, athletes who have had a history of concussion may exhibit certain symptoms such as an episode of concussion, including headache, dizziness, nausea, emotional lability, disorientation in space, impaired balance and postural control, altered sensation, photophobia, lack of coordination and slowed motor responses. As a coach, do you think it is possible to discern these symptoms as irregular or abnormal in an affected athlete, and if so, how would you adjust your coaching methodology?

Coach Ganter: *I feel that at least personally, I am better educated in what is a concussion, what causes one and the symptoms of concussions, mostly because a previous player of mine had to give up football because of headaches. Because of the emphasis put on by the medical personal, I think that most coaches are better educated on what is a concussion, what causes one, and what are some of the symptoms. I do not know how you do it manually, but just visually you know the stories and interviews I have had with kids about headaches and inability to sleep, and the inability to concentrate when they study, having to get up in the middle of the night to take a shower just to get some heat on their head because their head was killing them, the headaches. I heard guys talk about blurred vision and I mean we have enough of them around here that I think by observation. If you notice any change in the way the practice and their performance and*

then you talk to them, I think most coaches would be able to discern that there is something wrong here. This kid may have been "dinged" yesterday and we better have a doctor look at him.

Coach Jepson: *Again, my expertise and experience dealing with concussions is limited. Therefore, I would follow directions from medical professional on how to treat brain injured gymnasts. One thing I know for sure, I would be very careful coaching gymnasts with concussion, because of the nature of our sport requiring abrupt changes in direction of head motion, hard landings and possible falls. This may cause the situation when previous brain injured gymnasts could suffer from another and more severe concussion. Having said that, it should be noted, if an athlete with previous brain injury would be cleared for participation, I do not think that I would treat this athlete differently. I would keep eye on him, but would not overemphasize my concern. I would consider this as a typical injury, I should be sure that their mind is clear, they know what they are doing, in control of their body and mind, can focus and concentrate on skill performance etc. For example, I had gymnast who suffered from a mild concussion and weeks later he could not remember what he did, and had long lasting memory problems. Of course, he was not ready to come back and we did not allow him to compete. So, I watched him very closely. Actually, I watched every single athlete very closely, regardless of them being injured or not. So, I know if something is wrong with them, I just do not allow them to take of risk. This is my common procedure, concussion included.*

Coach Sheppard: *First of all, I would like to stress again that my expertise and experience are limited, therefore I would follow the recommendations of medical people regarding the treatment and coaching of brain injured athletes. For sure, I would monitor these athletes very closely and will be watching for any signs of lack of concentration, attention, fatigue, reduced motivation. If this happens I would terminate their practices and refer these athletes to medical people for evaluation. It would not push these athletes further without proper assessment of impact of the injury. Again, most coaches have no idea about this type of injury. Therefore, education is a critical factor in terms of preventing multiple concussions in athletics.*

Coach Battista: *Tricky area. I think it depends on your own background as both an athlete and how your coaches dealt with it. In the old days we simply said shake it off or you just got your bell rung you'll be fine so there is a macho thing here. Someone bruises an arm or a knee we put ice on it and everyone feels sympathy for the athlete. Someone complains of a headache and they are either consciously or subconsciously considered a wimp. I do believe coaches who really know their players can spot differences in*

behaviors and motor skills but with a large squad it is not always possible to detect the smaller changes. Again communication is a priority. Working with the training staffs and having assistant coaches on the same page with regard to creating a safe and caring environment. Helping the athletes to feel comfortable about speaking up if they have a concern without fear of losing their spot in the line-up or having the confidential information become public. Educating the players about the potential long term affects without scaring the hell out of them and taking away the aggressive mind set is also important.

Coach Rose: *As I mentioned in my precious responses, concussion is a rare injury in our sport. I personally do not have enough experience and expertise to deal with concussed players. I truly believe that in general, this injury should be carefully treated, evaluated and re-evaluated in order to prevent residual long-term debilitating effects. It is known that symptoms of concussion may persist long after the accident, so, close monitoring of these symptoms is important.*

Coach Kaidanov: *As I mentioned in my responses to the previous questions regarding concussion, I would be very conservative in terms of dealing with post-concussed athletes. I would closely monitors for any signs of abnormal movement patterns, such as occasional loss of attention, progressive fatigue, unexpected mood swing, inability to concentrate. If these symptoms are present, I would immediately terminate practice and send this symptomatic athlete for professional evaluation and possible treatment.*

Q11. Currently, it is still being debated whether concussions result in permanent neurological damage or in transient behavioral and psychological malfunctions. This controversy is due in part to the lack of assessing the development of fear of re-injury, bracing reactions and overall avoidance behaviors. Is it obvious during practice or in competition, to you as a coach, if a previously injured athlete has developed bracing behaviors? Do you have particular strategies for dealing with athletes who exhibit this type of behavior in response to injury?

Coach Ganter: *In terms of concussion, I would say no. I have never noticed that from the guy coming back for a concussion. I definitely have seen guys who are ginger from a knee or maybe an ankle and self-brace. Remember how I said that I think an athlete knows better when it is time to go all out. That is the way I feel, so I have noticed it from that standpoint, but not from the standpoint of the concussion. For the most part the kids almost, I can not think of anybody except for one player, really who said I need a couple of days because of my head. I can think of dozens that have said I need another week or I am not ready yet or this is not good for other parts of their*

bodies. I have had no experience with a guy saying my head still hurts or I am not all there or I am not ready

Coach Jepson: *In my experience with concussed gymnasts, I observed some cases of “self-protecting” behaviors, similar to those following other traumatic injuries. I do not have enough experience in order to elaborate specific coaching strategies for concussed gymnasts, therefore I would treat these athletes similarly to how I am treating the gymnast with a serious traumatic injury.*

Coach Sheppard: *I guess I should study more about concussion and educate myself about this injury. One thing I know for sure, that from now on I would consider even a mild concussion as a severe injury, due to the accumulated knowledge of long-term disabilities resulted from brain injury.*

Coach Battista: *See my responses to Q10. There is a point where as a coach I think we need to simply put the kids' long term health ahead of short term gains. I have experienced multiple concussions and have dealt with the aftermath. I am not sure of the long term affects of concussions that are spread out over time, but I have no doubt that short term affects can be a hindrance to performance as well as daily functions. Multiple concussions over a short period of time are even a greater concern to me. Since I have experienced this firsthand I am more sensitive to the issue than others may be, thus my dealings with this issue are certainly biased. Some athletes are better than others at hiding their real feelings about things. Again fear of being removed from the line-up, being singled out as a wimp, factor in. Some athletes have a much higher threshold for pain so I really think this is more of an art than a science to some degree. Coaches get to know which athletes tend to cry wolf and which ones try to be tough guys. When I do come acRose the kids who are using bracing reactions we try to make them feel as confident as possible that they will be ok and that the idea of holding back or slowing down may actually put them in a more vulnerable position.*

Coach Rose: *I do not know whether a concussion can induce permanent neurological damage, or transient functional abnormalities in brain and behavior. But I know for sure, that an improperly treated concussion, premature return to practice after a concussion is not permissible, as in case of any other traumatic injuries in sport. Clear and accurate assessments performed by qualified medical personal are essential to prevent risk of brain injury in athletics.*

Coach Kaidanov: *Again, I do not have enough experience dealing with concussion in my sport of fencing. Therefore, I cannot further elaborate on*

this issue. Although, I guess, there certain type of protective patterns that athletes may develop to prevent the second or multiple concussions.

Q12. What advice would you give to young, uprising coaches today regarding how to identify athletes at risk for injury and ultimately to prevent injuries among student-athletes?

Coach Ganter: *I think the number one thing is the strength training. If you put a kid in the position where he is overmatched from a strength standpoint and any type of physical over match, you are certainly risking an injury. The second thing is position especially for a young coach if he is coaching young people. You need to teach them proper hitting position, body position, how to fall just how to protect themselves. So, I think the strength training is first, conditioning is probably second, because if they get tired they probably are more venerable to an injury, and then position.*

Coach Jepson: *The biggest thing is that there are no short cuts. Physical preparation, you have to learn the groundwork. Important thing, if athlete psychologically is not ready to do certain things, do not over push. Again, you have to build a good foundation. Athletes should understand what is the proper way to prepare, and this what we do as the coaches. If athletes understand this, it means they are coach able, and if so, they can reach their potentials, whatever it is. Holistic understanding, physical, mental, emotional, understanding that some injury may happen and if so, they should find some “advantages of it” of being tougher and more knowledgeable as athletes and most importantly as individuals. At this point, I think athletes should know that they can trust me, because my primary responsibility is not to make national champions, but to develop quality people. I have their best interest in mind, and they know it. And if they believe that, I am accomplishing my mission as a coach properly. People should be treated as people, not like machines or robots having a goal to be the best in their sport. I treat gymnasts on my team as people and the sport is just a part of their life.*

Coach Sheppard: *Avoid overtraining, and emphasize conditioning especially pre-season when most of the athletes are not in good physical shape. You cannot do just gymnastics to be in good shape for gymnastics. You should be a variety of conditioning programs before you do gymnastics. You have first to prepare your body to absorb the impact during landing, you have to prepare your abdominal muscles to perform the bar routine. And most importantly you have to plan properly given the time you have for preparation. Physical readiness is not the only component of a successful season. Athletes should be ready psychologically as well. Proper motivation, psychological skill training, individual goal setting, stress*

management skill are just a few attributes of the injury free training environment. There is a large preparation period prior to competition. You have to build proper confidence with proper progression of physical skills and general fitness. Slowly, brick by brick build various aspects of an athlete' s progression, with no rush. You must build fundamentals, and certainly discipline and commitment.

Coach Battista: *First, knock off the old school macho stuff and be more concerned about safely factoring in water breaks, taking into account environmental conditions (heat and humidity, lightning, air quality). Educate them about the value of mental training and help them buy into relaxation and feedback as a skill no different than skating or shooting. To be resourceful by utilizing school supplied or community volunteer experts that can help with nutrition, psychology, strength and condition (making sure you do background checks and follow-ups on suspicious behavior ex. a volunteer strength trainer recommending supplements without your knowledge. Teaching the kids the value of proper warm-up and flexibility (not just stretching) is an essential issue. Urging the kids to play within the rules and to not “cheat” by hitting away from the play or pushing the rules to extremes which may incite retaliations (in the more physical sports and the stick yielding sports especially) is another fundamental rule. Educating parents about the new research and findings is crucial also. Numerous times we have had parents argue with us when we held their son out of competition due to concussion and in their minds the kid needs to just “suck it up and tough it out.” Parents should understand the coaches and the team's policies in advance.*

Coach Rose: *I think my advice would be to monitor the amount of jumping used in training and instruction because I think many injuries occur because of lack of sufficient strength to handle the training level. When athletes tire, they become more susceptible to injury, and the coach needs to pull back their demands as opposed to pushing the players harder. There is no question that proper instruction in the performance of the necessary skills correlates with a safer environment, and coaches are responsible for making sure the training facility is safe and properly maintained. In closing, it is critical for the coaches to work with the health professionals in assuming that their athletes are ready to restart their participation and not listen only to the athlete.*

Coach Kaidanov: *I would say that the most important thing in coaching is to be patient. Encourage challenge when only an athlete is ready to meet this challenge. Do not expect quick success but build fundamental skill, conditioning and character.*

CONCLUSIONS

Injury in athletics is a growing concern. Despite technological innovations, coaches' advanced knowledge about their loved sports, progress in scientific research concerning the athletes' preparation, the number of injuries has progressively increased. Premature return to sport participation base solely upon physical injury symptoms resolution considerably enhances the risk for re-injury. Moreover, multiple traumatic injuries induce psychological trauma that is often overlooked while making decisions regarding the return to participation. This psychological trauma as evidenced by cognitive impairment, sensory-motor disabilities, and overall behavioral properties may lead to "bracing reactions" or "self-protective responses". This is a dangerous symptom that ultimately may contribute to a high risk of re-injury. Our current research and the interviews with collegiate coaches clearly demonstrate that physical injury symptoms resolution is not indicative of injury resolution. Incomplete recovery of either physical/functional (i.e., strength, range of motion, endurance) or psychological functions (emotional status, irrational thoughts, preoccupation with possible injuries, motivational attributes, inadequate goals) are definite warning signs for possible re-injury. The most important message from the coaches' responses is that education about traumatic brain injury is currently lacking. Most coaches rely on professional opinion regarding the impact of brain injury and time frame for return to play. Taking into account that the symptoms of traumatic brain injury may persist months after the incident, mean that there could be long-term functional disabilities even after mild brain injuries; it is essential that coaches be properly trained and educated in terms of potential long-term effects of concussion.

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