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Psychological Predisposition to Injury in Collegiate Athletes

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PSYCHOLOGICAL PREDISPOSITION TO INJURY IN COLLEGIATE ATHLETES

By

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INTRODUCTION

Over the past several years, injury in sporting activities has become a topic that has received a large amount of interest in both the popular press and academic literature. This is likely attributable to the high incidence of injury among elite athletic populations that continues to increase as individuals become more specialized in specific sports and talent levels rise. Athletic participation rose by 20% in males and 80% in females between the years of 1988-2004 among NCAA championship sports that were monitored during that time (Hootman, Dick, & Agel, 2007). With this increase in participation numbers, it is only natural that an increase in injury rate will be seen as well. Despite different regulations such as concussion policies and monitoring pitch counts in youth baseball that theoretically make athletic seasons safer for the athlete. Injuries are still prevalent with rates of 4 and 14 per 1,000 athlete exposures in practices and competitions combined for men and women respectively (Hootman, Dick, & Agel, 2007).

Injury in sport can not only have a major psychological impact on athletes, but can also have a financial impact on organizations as well. Many institutions (i.e., colleges and universities) covering medical costs for athletes who are injured during participation in intercollegiate activity. Thus, there may be financial benefit for the institution, as well as a psychological benefit for the athlete in determining a link between specific psychological risk factors and injury with the goal of helping to prevent costly injuries.

One of the psychological risk factors that have been associated with injury is the level of perceived risk in a sporting event. Cook, Peterson, & DiLillo (1999) examined risk taking behaviors of youth while jumping off a diving board. Through this study they found that children that were more fearful while participating in the activity engaged in fewer risky behaviors. This

relationship is most likely caused by previous experiences and the outcomes from those experiences with which an individual has been associated. If a person has never incurred any harm due to an activity they have no reason to be fearful, which in turn may cause them to experiment with other similar activities that are more dangerous. This idea is further supported by a study conducted by Kontos, (2004) that involved 260 female and male soccer players aged 11 to 14 years of age. It was found that those participants who had a low perception of risk were almost eight times more likely to experience injury than those with a high perception of risk because of behaviors that are in turn engaged in. The increase in perceived risk however may act as a protective factor when it is coupled with a high estimation of ability (Kontos, 2004). Kontos supports this idea even further stating that participants with low estimations of ability may demonstrate high skill but lack a level of confidence in themselves. This creates a condition where difficult and risky skills are attempted without the belief of success.

Another factor that can be associated with risk taking behavior is the influence of self-efficacy, or the individual's belief in his or her capacity. Those who experience high levels of self-efficacy often believe they can manage threats, which in turn makes these events less stressful to the individual and view them as challenges to be mastered (Bandura, 1997). Therefore individuals with high self-efficacy are more likely to engage in behaviors that they view as calculated risks that they can have success with as opposed to risky behavior that may cause injury. In comparison, those who possess low self-efficacy are more likely to magnify risks that they may experience (Bandura, 1997). With this in mind, it would seem likely that those with low self-efficacy would experience less injury because they do not engage in the risk taking behavior that an individual with high self-efficacy would.

The link between self-efficacy and risk-taking behavior was examined with in-line skaters (Seldes, et al., 1999). Participants were defined as at least 18 years of age who participated in skating at least one hour a week for at least one month out of the year. The study consisted of 964 males and females and information such as injury rates, protective equipment, and medical attention were self reported as part of a survey. The authors found that most of the injuries that were observed had occurred in those that were categorized as self-reported experts with more than one year of experience. Most of the injuries that were seen in these individuals were due to collisions and occurred while performing tricks that are not typically seen by novices. It was also found that this population more often attempted tricks associated with the sport and were less likely to wear safety gear (Seldes, et al., 1999). This lack of safety equipment can be associated with the self-efficacy model belief that if one experiences success with tricks they will become more confident and less likely to believe they will fail at the trick they are attempting. With this increased confidence it can be hypothesized that they would justify their lack of safety equipment with their increased experience.

Another important factor when considering injury rates in a population is the number of injuries they have suffered in previous experiences. Stephan, Deroche, Brewer, Caudriot, & Le Scanff, (2009) examined 170 competitive long distance runners, both male and female who had been running for approximately 10 years. These participants ranged from running competitive distances from 10km to a full marathon and trained a minimum of three times a week. It was found that athletes who suffered more injuries in the previous season of their sport felt more susceptible to injury in the current season. This is in contrast to the findings of another study (Kontos, 2004) that found that previous injuries are unrelated to perceived risk in events but are positively related to estimation of ability and overestimation of ability. The authors suggested

that this inflated level of ability is most likely caused by the level of confidence that one has in themselves despite the number of previous injuries that one experiences. The idea that previous injuries do not shape future events may be attributed to the nature of that specific injury. If an individual suffers an injury that is quickly resolved with or without medical attention they may become less likely to attribute this injury with future risks since it has been shown that children are more likely to avoid repeating behaviors that led to more severe outcomes (Morrongiello, 1997).

Injury rates and psychological factors have been investigated in many different populations (Ivarsson, Johnson, & Podlog, 2013; Kontos, 2004; Seldes, et. al., 1999; Stephan et. al, 2008). One of the main models used in research of injury psychology is Williams & Anderson's (1998) stress-based model of prediction of injury. This model suggests that personality traits, history of stressors and coping resources predict the occurrence of injury in sport. Therefore those with the undesirable traits such as inadequate coping responses to a history of stressors will be more likely to view an athletic task as stressful and exhibit greater attentional (peripheral narrowing) and physiological responses (increased muscle tension) than athletes with an opposing style (Wadey, Evans, Hanton, & Neil, 2012).

When looking at events before and after the incidence of injury, Wiese-Bjornstal, Smith, Shaffer, and Morrey's (1998) integrated model of injury response hypothesizes how certain events play particular roles. This model suggests that pre-injury factors include personality, history of stressors, and coping resources, while post-injury factors are personal and situational factors. This model takes into account how the individual responds to the injury after the initial experience and how they heal from the incident. This can include anything from length of time, type of rehabilitation, and what level they return to after the time taking to heal the injury.

With the evidence suggested by the integrated model of injury response, it can be suggested that specific programs may be able to reduce injury rates among populations. Tranaeus et. al. 2015 found that a psychological intervention program reduced injury rates in females reduced from 3.9 injury incidence per 1,000 exposure hours to 1.9. Despite the authors not examining injury severity this research it is extremely significant if long term injuries can be prevented as these are the most traumatic to an athlete, both psychological and physically, and cause the most time lost from sport. When examining these long term injuries, research has shown that the personality trait of hardiness may aid those who are injured in recovering sooner. This trait is characterized by deep feelings of involvement and commitment to the activities in their lives and considers a change a challenge and not an opportunity for failure (Wadey, Evans, Hanton, & Neil, 2012). It has also been shown that those who are characterized as being hardy avoid negative health practices that involve using alcohol and drugs (Maddi, Wadhwa, & Haier, 1996) which will also have an impact on the likely hood of injury rates among participants.

While research has shown that there are psychological factors that can contribute to injury rates in a population (Ivarsson, Johnson, & Podlog, 2013; Kontos, 2004; Seldes, et. al., 1999; Stephan et. al., 2008), there has been little research on psychological indicators of injury performed on a collegiate population within the United States. This population makes up a significant amount of those who suffer injury, and typically these individuals do not pay for the medical expenses which have been found to be as high as $709 per injury (Knowles, et al., 2007). Therefore, there is reason to identify specific factors that may be more likely to lead to an injury, which could be associated with developing pre-injury interventions to save institutions money over the course of a several year period by reducing athletic injuries.

The purpose of the present study was to investigate if there are certain psychological indicators (i.e., perception of risk) present in a collegiate population that may indicate a predisposition in injury and days missed from competition. It was hypothesized that those who had a higher perception of risk would have a higher number of days missed from competition. The predictor values were determined using a number of differetn surveys and questions. The risk of injury and sport scale (RISSc) was broken into different categories including: uncontrollable, controllable, overuse, upperbody, surface-related, and re-injury risks. An athletic identity measurement survey (AIMS) was also used as well as two questions asking the particpant to state how likely they were to be injured in the current season on a 10 point likert scale, as well as how many injuries they received the previous season.

CHAPTER 2

METHOD

Participants

Participants consisted of 15 NCAA Division 1 baseball players. To recruit participants a flyer was placed in each individual athletes' personal locker in the baseball clubhouse identifying the purpose of the research and where to report if interested in participating. No demographic information was collected.

Procedure

Approval for utilizing the university baseball team was obtained from the head baseball coach. Access to the medical information of participants was granted by the director of sports medicine for the university. Individuals who agreed to participate provided signed consent and then completed a questionnaire packet containing a Risk of Injury in Sport Scale (RISSc; Kontos, Feltz, & Malina, 2000), Athletic Identity Measurement Scale (AIMS; Brewer, Van Raalte, & Linder, 1993), and two single questions inquiring about the likelihood of getting injured during the current season and how many injuries they experienced the previous season. The RISSc included 6 subcategories that consisted of uncontrollable, controllable, overuse, upper body, surface-related, and re-injury risks. The RISSc asked participants such questions as, "What is the likelihood you will be injured running into an object on the field or court?" Whereas the AIMS asked participants to rate how much they consider themselves an athlete and how important sport is in their life. Each packet took approximately 20 minutes for each participant to complete and once completed the participant was thanked and released. No further contact with the participants was needed after the completion of the packet. The primary researcher then tracked days missed throughout the entire 2015-baseball regular season.

Statistical Analyses

The Statistical Package for the Social Sciences (SPSS, version 16; IBM, Armonk, NY, USA) was used for the statistical analysis. The criterion for significance was set using an alpha level of $p \leq 0.05$. A Pearson product moment correlation was used to determine correlations between information obtained from the surveys and days missed. The correlations are presented in the table below (see Table 1). To examine the research question, a linear regression analysis was performed. Athletic identity, RISSc-Uncontrollable, RISSc-Controllable, RISSc-Overuse, RISSc-Upper Body, RISSc-Surface, RISSc-Reinjury, Previous Injury, and Likelihood of Injury were identified as predictor variables, while the number of days missed due to injury was identified as the outcome variable.

CHAPTER 3

RESULTS

Correlations were calculated using a Pearson product moment correlation and are shown in Table 1. While no significant correlations were found between the RISSc or any of its subscales and days missed, the AIMS did show a significant correlation with days missed at 0.576. Another statistically significant correlation was also found between uncontrollable risk and re-injury at 0.602.

Table 1. Correlations Among Variables

Correlations

		DaysMissed	AIMSTOT	UNCONTROL	CONTROL	OVERUSE	UPPERBODY
DaysMissed	Pearson Correlation	1	.576*	-.358	-.359	-.074	-.286
	Sig. (2-tailed)		.025	.190	.188	.793	.302
	N	15	15	15	15	15	15
AIMSTOT	Pearson Correlation	.576*	1	.094	.018	.179	.122
	Sig. (2-tailed)	.025		.738	.950	.523	.665
	N	15	15	15	15	15	15
UNCONTROL	Pearson Correlation	-.358	.094	1	.919**	.737**	.741**
	Sig. (2-tailed)	.190	.738		.000	.002	.002
	N	15	15	15	15	15	15
CONTROL	Pearson Correlation	-.359	.018	.919**	1	.855**	.797**
	Sig. (2-tailed)	.188	.950	.000		.000	.000
	N	15	15	15	15	15	15
OVERUSE	Pearson Correlation	-.074	.179	.737**	.855**	1	.719**
	Sig. (2-tailed)	.793	.523	.002	.000		.003
	N	15	15	15	15	15	15
UPPERBODY	Pearson Correlation	-.286	.122	.741**	.797**	.719**	1
	Sig. (2-tailed)	.302	.665	.002	.000	.003	
	N	15	15	15	15	15	15
SURFACE	Pearson Correlation	-.182	.026	.776**	.920**	.879**	.651**
	Sig. (2-tailed)	.515	.926	.001	.000	.000	.009
	N	15	15	15	15	15	15
REINJURY	Pearson Correlation	-.140	.251	.602*	.428	.384	.532*
	Sig. (2-tailed)	.618	.368	.018	.112	.157	.041
	N	15	15	15	15	15	15

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The combined effect of the predictor variables was not significant $F(9, 14) = 1.18$, R2 = .10, $p > .05$. Therefore, the predictor variables did not account for a significant proportion of unique variance in days missed from baseball during the 2015 season

CHAPTER 4

DISCUSSION

The purpose of the present study was to investigate if there are certain psychological indicators (i.e., perception of risk) present in a collegiate population that may indicate a predisposition in injury and days missed from competition. It was hypothesized that those who had a higher perception of risk would have a higher number of days missed from competition. The predictor values were determined using a number of differetn surveys and questions. The risk of injury and sport scale (RISSc) was broken into different categories including: uncontrollable, controllable, overuse, upperbody, surface-related, and re-injury risks. An athletic identity measurement survey (AIMS) was also used as well as two questions asking the particpant to state how likely they were to be injured in the current season on a 10 point likert scale, as well as how many injuries they received the previous season.

Based on the results from this study, the hypothesis was not supported. The study showed that there was no significant correlation between days missed and perceived risk in sport. This is in contrast to the study performed by Kontos, (2004) that showed that participants that recorded a low perception of uncontrollable risk were eight times more likely to be injured than those who had a high perception of uncontrollable risk. The current study did show that there was a strong correlation between several perceived risk factors. A significant correlation was found when looking at perceived risk between uncontrollable factors and upper extremity related injuries. This is most likely attributed to the nature of the sport of baseball being an overhead sport with a high occurrence of elbow and shoulder pathologies, specifically to the ulnar collateral ligament and glenoid labrum (Oyama, et al., 2014). Specifically with this program, there have been eight

elbow injuries that have required surgical intervention over the past three years which may lead participants to believe it's inevitable that they will become injured themselves.

The current study found that for the group that was tested, the level of the participant's athletic identity did not impact the number of days missed from competition. Research has shown that athletes who suffer from injury often have high ratings of depression when removed from their sport due to a particular injury (Appaneal, Levine, Perna, & Roh, 2009). This is understandable as those who score high on the AIMS will have goals and relationships that are associated around the sport they identify with. When this connection that has been developed over a course of time is taken away, individuals often have trouble coping with the different role. The hypothesis for this study that predicted fewer missed days of competition linked to an athletic identity was due to the participants' desire to return to the team that they associate with.

Of further significance, this study also showed that there was no correlaiton between days missed and the participant's belief in whether they would be injured during upcoming season. This data supports previous findings from Kontos (2004) who found that injuries individuals have experience in the past are unrelated to risk taking and perceived risk. This suggests that this information is contrary to Bandura (1997) that suggests that past experiences (i.e., previous injuries) will negatively influence future levels of estimation of ability and possible lead to future injury. However, since the current study did not examine the extent of previous injuries that had been experienced and the number of days missed due to injury, it is hard to determine the effect on the individual. Severe injuries that remove an individual from competition for extended periods of time, may cause more psychological factors predisposing to injury.

Although this study adds to the existing body of literature that examines psychological factors and injury by being the first to examine psychological indicators to injury in collegiate

baseball players participating at an NCAA Division I institution, it does have limitations. First, the most noticeable limitation of the study was the small sample size that was used. With most baseball programs at this level having approximately 30 players, and this study having 15 willing participants, this may not have been enough participants to elicit more significant differences with days missed.

A second limitation would be the type of injuries that are typically seen in the sport of baseball. Those who do become injured often experience injuries that take significant time to heal. This is the case in this study as the two participants who saw the most significant time lost (85 and 55 days missed respectively), both experienced season-ending injuries that required surgical intervention. Ten of the 15 participants did not missing a single day of competition throughout the entire season. Since the current study only examined the group over the course of one season, it makes it difficult to evaluate the psychological approach to future injury in those returning. It would be beneficial to evaluate this mentality over the course of the college athlete's career, as some of these individuals who miss a majority of a current season may return to a previous level of competition. This area of research would benefit greatly from evaluating individuals who suffer minor injuries that after only missing 5-7 days of competition return to a previous level.

The results of this study have meaningful implications to those working with athletic populations, specifically those who have the ability to implement different intervention programs. This benefit can be made evident when examining the expenses that many universities suffer from due to payment of medical services to student athletes. A study performed by (de Loes, Dahlstedt, & Thomee, 2000) examined the cost of knee injury in sport and found that the overall mean cost of medical treatment was $1,131 and $1,097 per injury in females and males

respectively. Three out of the four individuals who had season ending injuries received surgical intervention to be able to participate the following season. The university these individuals are a part is responsible for any out of pocket costs after the student's primary and secondary insurance. On top of this, universities also employ a number of athletic trainers and physical therapists to perform post operative rehabilitations on these individuals as well as any other injury another athlete may experience. With this study showing the correlation between re-injury and perceived risks, it is essential to ensure these individuals are returning to a level at or above where they were before becoming injured. Not only to ensure the health of the athlete but also due to a financial incentive as well. When considering that injuries can be detrimental to a specific sports program depending on the level and sport, every measure should be taken to prevent days missed from competition.

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