Psychological factors as predictors of injuries among senior soccer players. A prospective study

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Abstract

It is reported that between 65–91% of elite soccer players in Sweden have at least one injury per year. Several studies define different physiological and psychological factors affecting athletic injury-risk. A number of models contain proposals that specify relationships between psychological factors and an increased athletic injury-risk. Examples include Williams and Andersen's stress-injury model and Johnson and Ivarsson's empirical model of injury risk factors which proposes that factors such as trait anxiety and ineffective coping skills are influential. The purpose of this study was to examine the relationship between (a) personality factors, b) coping variables, and (c) stress and injury risk. Participants were 48 male soccer players from 3 Swedish teams ranging in age from 16 to 36 years (M = 22 years). Participants completed 5 questionnaires: Football Worry Scale, Swedish universities Scales of Personality, Life Events Survey for Collegiate Athletes, Daily Hassle Scale and Brief COPE. Information on injuries was collected by athletic trainers of the teams over 3-months. Results suggest injury was significantly predicted by 4 personality trait predictors: somatic trait anxiety, psychic trait anxiety, stress susceptibility, and trait irritability. Collectively, the predictors self-blame and acceptance could explain 14.6% of injury occurrence. More injuries were reported among players who score high in daily hassles. These results support previous findings. Recommendations are given for both the athletes and the trainers on working to prevent sport injuries.

Key words: Coping strategies, daily hassles, personality, psychological predictors, sport injury.

Introduction

Most sports including soccer not only require a high level of physical, but also psychological, skills to handle stressful situations etc (Maddison and Prapavessis, 2007). Waldén et al. (2005) found in a prospective study that the injury frequency among international elite soccer players was 9.4 injuries per 1000 hours of sport-related activity. In addition, Hägglund (2007) reported that 65 to 95% of players had at least one injury every year. Several studies show that both physiological (e.g. joint laxity, Östenberg and Roos, 2000), as well as psychological factors (e.g. stress susceptibility, Johnson and Ivarsson, in press) influence the risk of an athletic-injury. The main focus of the present study was to investigate how specific psychological factors will affect the risk of injury among adult male soccer players. A number of models have been created which emphasize a relationship between psychological risk factors and injury occurrence. Among the most influential are Williams and Andersen's (1998) "stress-

injury model" which proposes to divide psychological risk factors into three main categories: personality factors, history of stressors, and coping resources. Other models that accentuate specific injury risk factors are the "model of the influence of psychological factors on sports injury" (Junge, 2000), with three distinct psychological categories: psychological stressors, coping resources, and emotional state. Thirdly, Johnson and Ivarsson's (2010) "empirical model of injury risk factors". The latter one stresses that personality factors, stress and coping influence the injury risk especially among soccer players. The authors in the present study use the Williams and Andersen's (1998) "stress – injury model" as a main core model, focusing on personality variables, history of stressors and coping resources.

Previous models contain proposals that suggest personality factors could affect injury risk among athletes. Several personality factors affect which situations a person experiences as stressful (Lazarus, 1999). Petrie (1993) proposed an existing relationship between an increased injury risk and high trait anxiety. Lavallée and Flint (1996) also highlighted a relationship between high competitive anxiety and increased injury risk. Andersen and Williams (1999) found that athletes with decreased perceptual abilities were reported an increased injury risk. It is also documented that low self-esteem increases injury risk (Smith et al., 1993). Other studies have emphasized that an athlete could decrease the risk of injury by lessening his/her susceptibility to the effects of different stressors (Williams and Andersen, 1998).

Williams and Andersen (2007) found in a review of 40 empirical studies that 85% of them showed a positive relationship between life-event stress and injury risk. The positive relationship between life-event stress and increased injury risk has also been found in a population of junior soccer players (Steffen et al., 2009). In addition, several studies report a positive relationship between *negative* life-event stress and an increased injury risk exists in a population of junior soccer players (for example, Rogers and Landers, 2005; Johnson and Ivarsson, 2010). Pillow et al. (1996) claimed that major stressors most often also affected minor stressors (e.g., daily hassles).For instance when experience a major stressor (for example, ACL injury) it often also affect the athletes capability to cope effective with daily stressors. This line of research is also recognized by De Longis et al. (1982), who claimed that even if daily hassles are less dramatic than a major stressor, they could heavily affect a person's subjective well-being. In a sport population, Fawkner et al. (1999) found a positive relationship between daily

hassles and an increased level of sports injuries based on a prospective design involving sports such as volleyball and triathlon.

A further factor proposed to influence an athlete's injury susceptibility is his/her ability to cope with major and minor stressors. A number of studies have found relationships between lack of coping resources and sport injury occurrence (e.g. Blackwell and McCullagh, 1990). More specifically, Johnson and Ivarsson (2010) found that increased injury risk among players in a junior soccer was predicted by players having ineffective coping skills, such as worry. Other ineffective coping skills identified in the literature are self-blame and behavioral disengagement (Anshel and Sutarso, 2007) and denial (Lane et al., 2004).

Findings from previous research demonstrate that a number of psychological factors influence susceptibility to injury in sport. According to models forwarded by Williams and Andersen (1998) and Junge (2000), psychological risk factors could be divided into several main categories including, personality, emotional state, history of stressors, and coping resources. Findings from studies including soccer players as participant suggest that psychological factors such as somatic trait anxiety and daily hassles associate with increase injury risk (Johnson and Ivarsson, 2010; Rogers and Landers, 2005). Most of these studies concern younger players (14–18 years) in a sensitive psychosocial developmental phase, with less developed coping skills (Wylleman and Lavallée, 2004). Thus, a research approach focusing on adult soccer gives possibilities for expanded knowledge about relationships between psychological injury risk factors and injury occurrence such as what personality variables and coping strategies influence injury susceptibility among adult soccer players. The purpose of the study is to examine the relationship between injury risk and (a) personality factors, b) coping variables, and (c) daily hassles among adult male soccer players.

Hypotheses:
- Is it possible that personality variables, such as high somatic trait anxiety, stress susceptibility and psychic trait anxiety, which influence the risk of injury among soccer players?
- There are a number of coping strategies, such as high levels of worry, self-blame, and behavioral disengagement that will significantly influence a soccer player's risk of becoming injured.
- The players, who incurred an injury, will experience a significantly higher level of daily hassles than the players who did not incurred an injury.

Methods

Participants
Forty eight male soccer players competing on 3 different teams at a competitive level in Sweden (division 4 – 6, middle – low league), who ranged in age from +16 to 36 years (M = 22 years) were involved in the study. The players reported to practice 2 – 3 times a week and play weekly games (April – October). Most of the players have been playing soccer regularly for approximately 10 – 12 years. All participation was voluntary, and confidentiality of responses was assured. The research design was authorized and approved by the Lund University ethics committee for human studies.

Measurements
Football Worry Scale
The Football Worry Scale (Dunn and Syrotuik, 2003) was used to measure an athlete's competitive worry. The test consists of 16 items, classified into 4 subscales. The subscales are "fear of negative social evaluation," "fear of failure," "fear of injury or physical danger," and "fear of the unknown." Questions are answered on a 5-point Likert scale, ranging from 1 ("not very like me") to 5 ("very like me"). Cronbach alphas ranged from 0.76 to 0.90 (Dunn and Syrotuik, 2003).

Swedish universities Scales of Personality (SSP)
SSP (Gustavsson et al., 2000) was developed at the Karolinska Institute in Sweden and measure personality factors. The test consists of 91 items, classified into 13 categories. The categories, listed with alpha coefficients, are somatic trait anxiety (.75), psychic trait anxiety (.82), mistrust (.78), stress susceptibility, (.74), submission (.78), impulsiveness (.73), adventure seeking (.84), detachment (.77), social desirability (.59), embitterment (.75), trait irritability (.78), verbal trait aggression (.74), and physical trait aggression (.84) (Gustavsson et al., 2000). Questions were answered on a 4-graded Likert scale, ranging from 1 ("not at all") to 4 ("very much so").

Life Events Survey for Collegiate Athletes (LESCA)
LESCA (Petrie, 1992) was used to measure an athlete's life history stressors. The test comprises a list of 69 events. Athletes were asked to indicate which events they have experienced in the previous 12 months, and then for each event, to rate the experience of the stressors, on an 8-point Likert scale, with the range -4 ("extremely negative") to +4 (extremely positive). The outcome of the test is divided into three categories, negative life-event stress, positive life-event stress and total life-event stress. Test-retest reliabilities for the two scales ranged from .76 to .84 (Petrie, 1992).

Daily Hassles Scale
The Daily Hassles Scale (De Longis et al., 1988) was used to measure an athlete's level of daily hassles. The test consists of 53 items addressing potential daily hassles. The athlete was asked to mark if the situation has been a daily hassle or uplifting during the last day/week. Questions were answered on a 4-point Likert-type scale, ranging from 0 ("not at all") to 3 ("very much"). Cronbach's alpha was. 82 (Fawkner et al., 1999).

Brief COPE
Brief COPE (Carver, 1997) was used to measure athletes' coping skills and how they cope with stressors. The test consists of 28 items, classified into 14 subscales: self-blame, self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, and religion. Items were answered on a 4-point Likert-type scale, ranging

from 1 ("I have not used this at all") to 4 (I have used it a lot"). Cronbach's alpha ranged from 0.50 to 0.90 (Carver, 1997).

Procedure

Data collection took place between 1 April and 30 July 2009. Coaches from the three participating teams were first contacted by phone, and a meeting was set up at which the coaches received information regarding the purpose of the study. At this meeting, time and place for the first gathering with the players was decided. At the test occasion, the players were informed about the study and the ethical considerations. The players were asked to answer four out of the five questionnaires (Football Worry Scale, SSP, LESCA, and Brief COPE). In addition, during the following 12 weeks, 18 of the players (belonging to one team) were asked, on a weekly basis, to complete the Daily Hassle Scale with the assistance of one of the researcher. Injured players were excluded from completing the Daily Hassle Scale during rehabilitation. During the research period, the athletic trainers for each team were asked to register all injuries. Injuries were defined as all types of injuries that lead to at least one missed practice/game. The injury data were continuously collected by the researchers for data analysis. The population was then divided into two groups, injured and non-injured.

Statistical analysis

Multivariate analysis of variance (MANOVA) followed by univariate analysis of variance (ANOVA) were used to compare data between groups of injured and non-injured players. Linear regression analysis, using the backward method, with the dependent variable injury, was used to identify psychological predictors that could increase the injury occurrence among adult soccer players.

Results

A total of 48 participants completed four questionnaires (Football Worry Scale, SSP, LESCA and Brief COPE). Eighteen participants completed the Daily Hassle Scale. Of the 48 players, 15 (30%) reported missing at least one day's practice due to injury.

Hypothesis 1

MANOVA revealed no significant overall group differences between the total groups of non – injured and injured athletes on the 13 categories belonging to the Swedish universities Scales of Personality. Results for subsequent ANOVA analysis showed that the group of injured players compared to non-injured players had a significantly higher level of somatic trait anxiety $(F(1,43) = 5.432, p = 0.025)$, psychic trait anxiety $(F(1,43) = 4.322, p = 0.044)$, stress susceptibility $(F(1,43) = 6,285, p = 0.016)$, and trait irritability $(F(1,43) = 5.517, p = 0.023)$.

A regression analysis with backward elimination was conducted with the 13 personality variables. This analysis showed that the significant predictor stress susceptibility (beta 0.357, p = 0.016) could explain 10% of the total variance (10.7 % adjusted), $F(1,43) = 6.285$, $p = 0.016$.

Hypothesis 2

MANOVA revealed no significant overall group differences between the total groups of non – injured and injured athletes on the 14 categories belonging to the Brief COPE. Results for subsequent ANOVA analysis showed that the group of injured players compared to non-injured players had a significantly higher level of behavioral disengagement $(F(1,47) = 4.461, p = 0.040)$ and self blame $(F(1,47) = 4.264, p = 0.044)$.

A regression analysis with backward elimination was conducted regarding coping strategies. This analysis showed that the predictors acceptance (beta 0.316, p = 0.023) and self-blame (beta 0.327, p = 0.019) could explain 14.6% of the total injury variance R2 Adj 0.146, $F(2, 46) = 5.101$, p = 0.010.

Hypothesis 3

A one-way Analysis of Variance (ANOVA) was used to compare the level of experienced daily hassles between the athletes in the injury versus non-injury groups. The result showed no significant result between the groups, but a tendency that the injury group had experienced a higher level of daily hassles before injury than the non-injured group had, in general $(F(1, 16) = 3.376, p = 0.085)$ (see Figure 1).
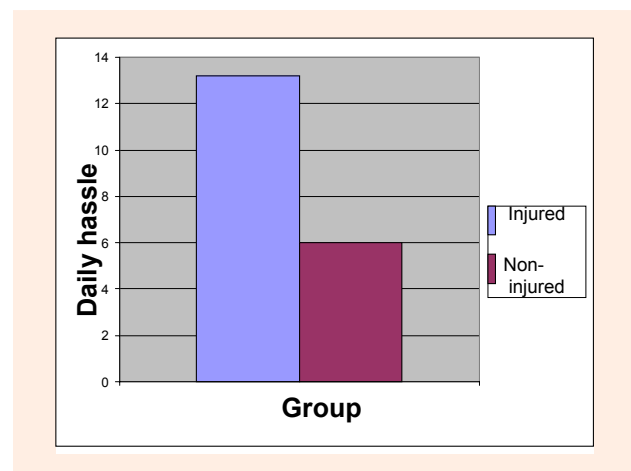

Figure 1. Mean value of daily hassles scores for groups of injured (n = 9) and non-injured (n = 9).

Discussion

The aim of the study was to identify relationships between selected psychological factors and injury occurrence among adult male soccer players. The primary findings indicate that somatic trait anxiety, psychic trait anxiety, stress susceptibility, and trait irritability emerged as significant predictors of injury risk. A model which included self-blame and acceptance could explain 14.6% of the total variance of injury occurrence.

Hypothesis 1

Williams and Andersen (1998) proposed that a number of personality factors that influence an athlete's risk of becoming injured. Results from the present study show that injured athletes had a significantly higher level of somatic trait anxiety and psychic trait anxiety in comparison to non-injured players. These results are consistent with

Johnson and Ivarsson's (2010) findings which found a relationship between injury and somatic trait anxiety. However, their research was conducted on a younger sample of soccer players. A possible explanation of the result concerning the personality variables influence on the injury occurrence could be that players with high level of anxiety appraise situations as stressful, compared to players with a low anxiety level. This process may lead to a decreased peripheral ability which increases injury-risk (Andersen and Williams, 1999).

A second finding of the present study was that injured players reported a higher level of susceptibility to experiencing stress than non-injured players. The players with high stress susceptibility possibly experienced higher level of stress in potential stressful situations, compared to players with a low level of stress susceptibility. Williams and Andersen (1998) support this notion and conclude that reducing an individual's susceptibility to stress will tend to decrease his or her risk of becoming injured. An additional finding reported in the present study was that injured players experienced a higher level of trait irritability than their non-injured counterparts. Junge (2000) claims that an athlete's emotional state and stress level could affect injury risk. An athlete with a high level of irritability probably experiences more situations as stressful and might face them with anger or an aggressive behavior, ultimately increasing injury risk. Results from the regression analysis showed that the variable stress susceptibility could explain 11% of the total variance of injury occurrence. The stress susceptibility variable explains only 1 out of 10 injuries, but it could also influence several other factors, such as a player's coping ability. For example, a player with high stress susceptibility might be more likely to imagine a stressful situation, which could lead to a higher risk of becoming injured.

Hypothesis 2
The results showed that injured players used the two coping strategies, behavioral disengagement and self blame, more frequently than the players in the non – injured group. Carver, Scheier and Weintraub (1989) propose that behavioral disengagement could be effective when starting to deal with major stressors but over time this strategy will be maladaptive, because it will interfere with more useful coping strategies. Thus, for an injured player such a coping strategy could add to the injury risk. The coping variable self-blame is, according to Anshel and Sutarso (2007), categorized as an ineffective coping strategy that decreases a player's self-esteem. Smith et al. (1993) found that low level of self-esteem could increase the risk of injury.

The result from the regression analysis showed that the two coping variables acceptance and self-blame could explain 14.6% of the total variance of injury when seen collectively. Consistent use of acceptance as a coping strategy could be considered as both effective and ineffective in handling stressors (Litman and Lunsford, 2009). However, up to a given point, it could probably be considered adaptive to accept various things as they are, for example, minor issues that do not affect the player greatly. In this case it could probably be better to accept the stressors as they are. On the other hand, if a player just accepts everything and is not willing to invest energy to overcome a threatening stressor, such behavior could be considered as maladaptive and ineffective coping. It is important to underline that these two coping variables (self-blame and acceptance) could, in some cases, be considered as effective coping variables.

Hypothesis 3
Rogers and Landers (2005) found a relationship between negative life-event stress and an increased injury risk in soccer. This result was not found in the current study. One explanation could be that the average age of the population in present study is higher than above-mentioned studies, and younger players are exposed to partly different situations that could lead to life-event stress than are older ones. According to Wylleman and Lavallée (2004), adolescents tend to experience a number of transitions that could be perceived as stressors. Older persons could perhaps experience different sorts of stressors, such as family and work-related responsibilities, which require mature coping skills. However, the results showed a tendency that the injury group was exposed to a higher level of daily hassles that the non-injury group. Fawkner et al. (1999), using a design consistent with the one used in the present study also yielded similar findings. Even if the current study did not find statistically significant results (as the Fawkner et al. study did), it is interesting to further investigate the relationship between daily hassle and injury.

Limitations of the study
One limitation of the study is the fact that we only had 48 participants. On the other hand, the practical value of predictive factors is very limited, if statistically, results can only be used from studies that involve a large number of participants. Despite the limitations, examining differences between small subgroups can be useful if the results are coherent and interpretable. Another limitation is that we only had the possibility to follow the weekly "daily hassle" report for one of the teams (n = 18). However, prospective small-scale studies have potential to provide in-depth knowledge and may offer statistical baseline material for lager-scale studies (see, for example, Johnson, 2007).

Conclusion

The current study found a number of significant psychological predictors that increase the injury risk among adult male soccer players. Although the two regression models explain several of the injuries that occurred, the results also show both similar and different findings, compared to previous research. One explanation could be that the current study is based on an adult population, while previous research focuses more on younger soccer players (Rogers and Landers, 2005). One implication for both players and coaches is to be aware of identified variables and their impact on injury risk in order to prevent sport injuries. Further research could investigate how daily hassle affects injury risk among soccer players in a larger sample and at more highly competitive levels as well as studying both male and female players. It would also be

interesting if further research, with knowledge from previous studies, could design an intervention based on one experimental and one control group, to investigate the possibility of using mental skills training to prevent sports injuries. Previous research has shown positive results regarding adult soccer players at risk (Johnson et al., 2005), but not involving a low-risk soccer population. Therefore, a research design including non-risk players will enhance the research area even more.

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Key points

- A number of psychological factors, such as high stress levels and ineffective coping could increase the injury risk among athletes.
- The two coping factors, self – blame and acceptance could together explain 14.6 % of injury occurrence.
- Results of the current study suggest that the factors; somatic trait anxiety, psychic trait anxiety, stress susceptibility and trait irritability could increase injury risk among soccer players.
- Suggestion for future research is to investigate how daily hassles affects injury risk among soccer players in larger samples and on premiership levels. Moreover, to investigate the effects of a preventive intervention designs for a representative sample of soccer players.

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