Predictors of perceived susceptibility to sport-related injury

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Abstract

Little is known about factors associated with perceptions of susceptibility to sport-related injuries. The purpose of the present study was to examine previous experiences with injury and personality factors as predictors of rugby players’ perceived susceptibility to injury. In line with an individual-based approach, it was hypothesized that neuroticism and global self-esteem would be related to perceived susceptibility to sport injuries over and above previous experiences with injuries. Rugby players (N = 235) were asked to report about previous experiences with injury and were administered measures of neuroticism and global self-esteem. Multiple regression analysis revealed that previous experiences with injury were positively related to perceived susceptibility to sport-related injuries. Analyses also supported that neuroticism and global self-esteem are of crucial importance in colouring perceptions of susceptibility to sport-related injuries, while statistically controlling for previous injuries. Of particular interest, neuroticism predicted perceived susceptibility, over and above global self-esteem and previous experiences with injury. This study is the first to focus on determinants of perceived susceptibility to sport-related injury and supports the potential role of personality factors and individual dispositions in shaping perceived susceptibility to health problems.

Keywords: Previous injuries; Global self-esteem; Neuroticism; Perceived susceptibility

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1. Introduction

Given the frequency of injuries sustained each year by children and adults in sport and recreational activities, sport injury has emerged as a serious public health concern. In addition to short- or long-term physical consequences and limitations, injury occurrence is associated with increased mood disturbance, anxiety, tension, and depression (cf. Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998 for review). Given the disruptive nature of sport-related injuries, it is important to better understand the psychological mechanisms underlying their occurrence.

1.1. Perceived susceptibility to sport-related injuries

Perceived susceptibility to health threat, broadly defined as the individual belief about the likelihood or probability that a health problem will be experienced, is an important component of several models of health behaviour, such as the health belief model (Becker, 1974). These models state that once people perceive themselves as being susceptible to health risks, they form intentions to take preventive actions or to give up risky health behaviour. Considerable evidence has documented, for example, a positive association between perceived risk of breast cancer and preventive behaviours, such as mammography screening (see Katapodi, Lee, Facione, & Dodd, 2004, for review). Conversely, feeling personally invulnerable may seriously hinder efforts to promote risk-reducing behaviours (Gerrard, Gibbons, & Bushman, 1996) and consequently could lead to increased exposure to injury (Boles, Roberts, Brown, & Mayes, 2005; Kontos, 2004). Even if previous investigations and models of sport-related injury have focused mainly on the influence of stress on injury occurrence (Williams & Andersen, 1998), there is evidence that perceived vulnerability to sport-related injuries is positively associated with the proportion of time that protective equipment is worn (Williams-Avery & MacKinnon, 1996) and that low levels of perceived vulnerability are associated with a significant increase in risk of injury, with odds ratio ranging from 3.77 to 7.92 (Kontos, 2004). However, despite the centrality of perceived vulnerability in healthy versus risky behaviours and its potential role in sport injury occurrence, little is known about factors that influence it. Thus, the present study tested the contribution of two factors previously considered in the literature on perceived susceptibility to health problems, namely previous experiences with health threat and individual psychological factors.

1.2. Previous injuries and perceived susceptibility to injury

People frequently use their personal experience with events as a standard by which to assess risks (see Helweg-Larsen & Shepperd, 2001, for review). Studies have consistently found that victims of negative life events tend to report elevated risk estimates for future victimization (Greening, Dollinger, & Pitz, 1996; Weinstein, 1980) or that cancer survivors have heightened perceptions of vulnerability to future health risks (Tyc, Hadley, & Crockett, 2001). Specific to the sport context, Williams-Avery and MacKinnon (1996) reported a significant relationship between injuries received while in-lineskating and perceived risk of re-injury. After injury, athletes could be concerned about putting their body in a situation similar to one in which their initial injury occurred. This concern could have remained prominent for months into athletes’ return to sport (Podlog & Eklund, 2006). In line with these findings, the present study examined the
relationship between previous injuries and perceived susceptibility to sport-related injury in rugby. Of particular interest, participation in rugby often carries with it exposure to injury. By placing frequent and rigorous strain on the body, rugby players are tempted to neglect injury or consider it as an acceptable norm (Flint, 1998). They may believe that it is more the nature of the game rather than previous injuries that could lead them to sustain (another) injury. This may result in a lower or nonsignificant increase in perceived vulnerability after injury, which could, in turn, explain why rugby players have a high risk of reinjury (Kontos, 2004). No study has yet surveyed perceived vulnerability with individuals participating in potentially harmful sport activities. The question remains as to whether participants in high risk sports such as rugby use their previous experience with injury as a standard for helping to assess their (re)injury risks.

1.3. An individual-based approach of perceived susceptibility to sport injury

Nearly the potential role of previous experiences with health threat, evidence exists about the contribution of personality characteristics related to negative affects on perceived vulnerability (Gerend, Aiken, & West, 2004b). Neuroticism is precisely related to the tendencies to worry about one’s health, to inflate perceptions of symptoms of disease and health threat, and to report a greater number of medical symptoms and complaints (Costa & McCrae, 1985; Watson & Pennebaker, 1989). Consequently, neuroticism appears as the most consistent individual predictor of perceived susceptibility to health problems and diseases, such as HIV, breast cancer, heart disease, and osteoporosis (Darvill & Johnson, 1991; Gerend et al., 2004b; Johnson, 2000; Vollrath, Knoch, & Cassano, 1999). Thus, it could be an explanatory variable of why some individuals might feel susceptible to sport-related injuries when they practice rugby.

Global self-esteem is another potential, albeit less studied, dispositional variable that could explain why some individuals perceive themselves less vulnerable to injury than others. High self-esteem individuals are likely to engage in self-serving or self-protective cognitive distortions, which lead them to reject information that is inconsistent with their perceptions and opinions (Knight & Nadel, 1986). Thus, Boney-McCoy, Gibbons, and Gerrard (1999) found that in spite of comparable levels of risk behaviour, high self-esteem women reported lower perceived vulnerability to sexually transmitted diseases than did low self-esteem women. Similarly, Smith, Gerrard, and Gibbons (1997) found that self-esteem is a significant predictor of perceived vulnerability to unplanned pregnancy, such that low self-esteem women reported higher vulnerability estimates than high self-esteem women. As Smith et al. (1997) emphasized, high self-esteem individuals engage in cognitive adjustments that allow them to buffer the acknowledgement of actual risks. Thus, self-esteem could be a valuable explanatory variable of why some rugby players feel more or less vulnerable to sport-related injury than others.

Support has been found for an individual-based approach, in which personality characteristics and individual dispositions act as a lens that colours perceptions of vulnerability (e.g. Gerend et al., 2004b; Smith et al., 1997). However, no study has tested for the potential influence of these psychological factors on perceived susceptibility to sport injury. Moreover, previous experience of disease and health problems has not been included in past research to test further for the main role of individual characteristics. In line with an individual-based approach, the present study is therefore the first to test for the possibility that perceived susceptibility to sport injuries is rooted
mainly in individual dispositions, over and above the potential contribution of previous experience with injuries.

1.4. Study hypotheses

The present study set out to identify predictors of perceived susceptibility to sport-related injury among rugby players, for whom injuries are an acceptable norm (Flint, 1998). It examined the unique contribution of previous injuries versus individual psychological factors in the formation of perceived vulnerability. It was hypothesized that previous injury would be positively associated with perceived susceptibility. It was also expected that neuroticism would be positively associated with perceived susceptibility to sport injury, whereas global self-esteem would be negatively related with perceived susceptibility while statistically controlling for the influence of previous injuries.

2. Method

2.1. Participants

Respondents were 235 French male rugby players participating at the local to national levels of competition. The mean age of the sample was 23.06 (SD = 5.81, range = 14–42) years. The majority of rugby players reported at least one injury over the previous 12 months (75% of the sample), with an average of 1.83 (SD = 1.74, range = 0–8) injuries over the previous 12 months.

2.2. Measures

2.2.1. Previous injuries

Players were asked to report the number of injuries they had experienced during the last 12 months. They should report only those injuries that required medical attention or withdrawal from training for one day or more. In addition, time since the last injury was assessed, using a 6-point scale (1 = never injured, 2 = less than one month, 3 = between one and three months, 4 = between three and six months, 5 = between six and twelve months, 6 = more than one year).

2.2.2. Perceived susceptibility

Perceived susceptibility to sport injury was assessed using a 4-item scale adapted from pre-existing scales (Gerend, Aiken, West, & Erchull, 2004a; Gerend et al., 2004b), using three absolute risk items and one comparative risk item. The three absolute risk items were: “What do you believe is the chance that you will get an injury during your sport season?” “How susceptible do you feel you will get an injury during your sport season?” and “What do you believe is the chance that you will get an injury during your sport season in term of percentages?” Participants were asked to answer on a scale from 1 (very low chance) to 5 (very high chance) for the first item, from 1 (not at all susceptible) to 5 (very susceptible) for the second item, and from 1 (less than a 10% chance) to 5 (100% chance) for the third one. The direct comparative risk item was: “What do you believe your chances are of getting an injury during your sport season compared to other rugby players in your league?” Answers were given on a scale from 1 (a lot lower) to 5 (a lot higher). A principal
components analysis revealed that the 4-items loaded on a single factor. The solution explained 64% of the variance, with an eigenvalue of 2.57. Item scores were averaged, giving an overall perceived susceptibility to injury mean ($\alpha = .81$).

2.2.3. Neuroticism
The neuroticism scale of the French version of the NEO-PIR (Rolland & Petot, 1994) was used. Participants rated their agreement with 48 short phrases reflecting prototypical traits (anxiety, anger-hostility, depression, social shy, impulsiveness, and vulnerability) on a scale from 0 (strongly disagree) to 4 (strongly agree). Cronbach’s alpha for the present study was .89.

2.2.4. Global self-esteem
The 5-item global self-esteem scale of the Physical Self Inventory (PSI, Ninot, Delignières, & Fortes, 2000), and adapted from the French version of Coopersmith’s Self-Esteem Inventory (Coopersmith, 1984), was used in the present study. The subjects were asked to rate themselves using a scale from 1 (not at all) to 6 (completely). Coefficient alpha for global self-esteem in the present sample was lower than that obtained in the validation study (Ninot et al., 2000), but still acceptable ($\alpha = .62$).

2.3. Data analysis

Multiple regression analyses were performed to test the hypotheses. For each analysis, perceived susceptibility was the criterion variable. To test the influence of previous experience with injury on perceived vulnerability, the number of previous injuries was entered on the second step after having controlled for age and time since the last injury on the first step. To test the contribution of psychological factors to perceived vulnerability, neuroticism and self-esteem were entered in the last step, both in separate and in the same analysis, after having controlled for age and time since injury in the first step and number of previous injuries in the second step.

2.4. Procedure

Three hundred and fifty-seven rugby players were originally contacted via the coaching staff and were informed of the purpose of the study. Consent was obtained from the players after they were informed that anonymity would be preserved. At the time of recruitment, participants were told that the investigators were interested in learning more about the different antecedents of maintaining safety in playing rugby and that data would be gathered by administering a questionnaire before training time. Criteria for inclusion were not being injured at the time of the study, and playing rugby during the previous season. Two hundred and eighty-one individuals satisfied inclusion criteria. Of the 281, 46 did not complete the entire questionnaire and were excluded from the analyses. A total of 235 surveys were finally included in the current study’s analyses.

3. Results

Means, standard deviations, and Pearson correlations among the study variables are presented in Table 1.
3.1. Pearson correlation analysis

The analysis revealed significant relationships between perceived susceptibility and previous injuries \( (r = .20, \ p < .001) \), global self-esteem \( (r = -.15, \ p < .05) \), and neuroticism \( (r = .25, \ p < .0001) \).

3.2. Regression analysis

The analysis revealed a significant contribution of previous injuries to the prediction of perceived susceptibility to injury in the second step \( (b = .18, \ p < .05, \Delta R^2 = .02) \) after controlling for age \( (b = .03, \ ns) \) and time since the last injury \( (b = -.12, \ ns) \) in the first step. The equation was significant, \( F(3, 227) = 2.99, \ p < .05, \ R^2 = .04. \)

A separate regression analysis revealed significant contributions of neuroticism \( (b = .25, \ p < .001, \Delta R^2 = .06) \) and global self-esteem \( (b = -.16, \ p < .05, \Delta R^2 = .03) \) to the prediction of perceived susceptibility to injury in the third step, after controlling for previous injuries in the second step, and age and time since the last injury in the first step for each analysis. When introducing neuroticism in the third step, the contribution of previous injuries became nonsignificant \( (b = .15, \ ns) \) and the equation was significant, \( F(4, 226) = 5.90, \ p < .001, \ R^2 = .09. \) When introducing global self-esteem in the third step, the contribution of previous injuries remained significant \( (b = .17, \ p < .05) \) and the overall equation was significant, \( F(4, 226) = 3.81, \ p < .01, \ R^2 = .06 \) (see Tables 2 and 3).

Lastly, we explored whether each psychological variable continued to influence perceived susceptibility when they were entered simultaneously in the equation. All the variables were centred.

Table 1
Means, standard deviations, and correlation matrix among the study variables \( (N = 235) \)

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived vulnerability</td>
<td>2.92</td>
<td>0.76</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>23.06</td>
<td>5.81</td>
<td>.03</td>
<td>.04</td>
<td>.03</td>
<td>.03</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>Time since last injury</td>
<td>3.93</td>
<td>1.40</td>
<td>-.12</td>
<td>.04</td>
<td>.03</td>
<td>-.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous injuries</td>
<td>1.83</td>
<td>1.74</td>
<td>.20</td>
<td>.03</td>
<td>-.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global self-esteem</td>
<td>4.19</td>
<td>0.71</td>
<td>-.15</td>
<td>.13</td>
<td>-.02</td>
<td>-.03</td>
<td>-.03</td>
<td>-.03</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>78.46</td>
<td>20.28</td>
<td>.25</td>
<td>-.23</td>
<td>-.11</td>
<td>.14</td>
<td>-.50</td>
<td></td>
</tr>
</tbody>
</table>

Note: All correlations \( \geq |.13| \) are significant at \( p < .05. \)

Table 2
Prediction of perceived vulnerability scores by neuroticism, with previous injuries controlled \( (N = 235) \)

<table>
<thead>
<tr>
<th>Step</th>
<th>Independent variables</th>
<th>Total $R^2$</th>
<th>$R^2$ change</th>
<th>$F$ ratio for $R^2$ change</th>
<th>$\beta$</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age</td>
<td>.015</td>
<td>–</td>
<td>.03</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time since last injury</td>
<td></td>
<td>–</td>
<td>-.12</td>
<td>-1.84</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Previous injuries</td>
<td>.038</td>
<td>.023</td>
<td>5.39*</td>
<td>.18</td>
<td>2.32</td>
</tr>
<tr>
<td>3</td>
<td>Neuroticism</td>
<td>.094</td>
<td>.056</td>
<td>14.10**</td>
<td>.25</td>
<td>3.75</td>
</tr>
</tbody>
</table>

Note:
* \( p < .05. \)
** \( p < .001. \)
to avoid multicollinearity. Only the relationship with neuroticism remained significant ($\beta = .22$, $p < .01$) after controlling for the effect of age and time since the last injury in the first step and previous injuries in the second step. The overall equation was significant, $F(5, 225) = 4.82$, $p < .001$, $R^2 = .10$ (see Table 4).

### 4. Discussion

The present study focused on variables that may contribute to the formation of perceived susceptibility to sport-related injuries among rugby players. Little research has been conducted on perceived susceptibility to sport-related injuries, and little is known on potential determinants of this dimension. Based on existing research, previous injuries, neuroticism, and global self-esteem were identified and investigated as potential explanatory variables of perceived susceptibility to sport-related injury.

Our first hypothesis was supported by the analysis. Although this study was conducted in the context of a specific activity (i.e., rugby) that features an abundance of aggressive behaviours and the view that injury is an acceptable norm (Flint, 1998), previous experience with sport injury contributed positively to the prediction of perceived susceptibility to sport-related injuries. This result is consistent with research that has found that victims of negative life events tend to report ele-
vated risk estimates for future victimization (Greening et al., 1996; Weinstein, 1980). The results also support previous work in the sport setting indicating that injuries received while practising were related to perceived susceptibility to injury (Williams-Avery & MacKinnon, 1996). By the use of logical shortcuts, which are called heuristics (Slovic, Fischhoff, & Lichtenstein, 1980), personal experience with a threat (e.g. sport injury) can increase cognitive availability of the threat and, in turn, perceived likelihood (Weinstein, 1980). Recent studies have demonstrated that this sort of heuristic reasoning is relevant to construct risk assessment for a variety of diseases, such as breast cancer and osteoporosis (e.g., Gerend et al., 2004a; Katapodi, Facione, Humphreys, & Dodd, 2005; Smith et al., 1997). After injury, athletes could be concerned about putting their body in a situation similar to one in which their initial injury occurred (Podlog & Eklund, 2006) and therefore could heighten their perceptions of susceptibility to injury when they practice their sport activity.

It was secondly hypothesized that neuroticism would be positively related to perceived susceptibility over and above the contribution of previous injuries. This hypothesis was supported by the analysis, with neuroticism explaining a small but incremental portion of the variance in the prediction of perceived susceptibility. An interesting result emerged as well, with the nonsignificant contribution of previous injuries on perceived susceptibility when neuroticism was introduced into the regression equation. This result supports existing research that found that neuroticism was a consistently significant predictor of perceived susceptibility to health problems and diseases (Darvill & Johnson, 1991; Gerend et al., 2004b; Johnson, 2000; Vollrath et al., 1999). Individuals high in neuroticism are likely to worry about their health and the likelihood of injury occurrence because of their tendency to inflate perceptions of symptoms of potential injury.

The hypothesis that global self-esteem would be negatively related to perceived susceptibility over and above previous experiences with injury was supported by the results. As for neuroticism, global self-esteem explained a small but significant portion of the variance, beyond the influence of previous experiences with injuries. Thus, athletes with high global self-esteem may possess lower perceived susceptibility to the likelihood of injury occurrence than those with low global self-esteem. Global self-esteem could serve self-protective goals through cognitive distortions, which may lead individuals to reject information that is inconsistent with their perceptions and opinions. People with high global self-esteem may protect themselves against negative feedback or perceptions of failure (Shrauger & Kelly, 1988) by the use of self-enhancing and self-serving strategies (Boney-McCoy et al., 1999). These strategies, which may produce a lower perception of vulnerability, could be considered as helpful for individuals because of their positive influence on psychological well being (Taylor & Brown, 1994). However, studies with longitudinal designs have also demonstrated that self-esteem moderates the relationship between naturally occurring changes in individual risky behaviour and changes in their risk perception (Smith et al., 1997). By enhancing the use of self-serving cognitive strategies to maintain low perceived vulnerability in spite of increased dangerous behaviour, high self-esteem could therefore place individuals at risk for being (re)injured. Of particular interest nevertheless, the relationships between previous injuries or global self-esteem and perceived susceptibility were clearly reduced to nonsignificance in the presence of neuroticism. In a potentially harmful activity such as rugby, predispositions rooted in stable personality traits such as neuroticism could be helpful in assessing risk for (re)injury.

As a whole, the current study contributes to existing knowledge on perceived susceptibility to sport-related injury with the identification of several predictors of this dimension. The findings are
consistent with previous research that has shown the important role of personality factors and individual dispositions in shaping perceptions of health susceptibility (Gerend et al., 2004b; Johnson, 2000; Vollrath et al., 1999). The present results provide support for an individual-based approach in which individual dispositions and personality characteristics are of crucial importance in colouring perceptions of susceptibility to sport-related injury over and above the contribution of previous experiences with injuries. Given that previous studies have not controlled for previous experiences with diseases or health problems when testing the relationship between neuroticism or global self-esteem and perceived susceptibility, the current study adds to existing literature on the topic.

Contributions to the literature notwithstanding, the current study has several limitations that should be considered when interpreting the results. First, the cross-sectional nature of this research precludes drawing casual inferences regarding the relationships between the predictor variables and perceived vulnerability to injury. A prospective design with several measures of perceived susceptibility administered both before and after injury could highlight the acute influence of the predictor variables on perceived vulnerability and yield information on potential lingering psychological effects of injury across time. Second, this study examined only a few predictors of perceived susceptibility, and even though neuroticism and global self-esteem explained incremental variance over and above previous experiences with injury, these variables explained only a small portion of the variance. Future research should identify additional personality and individual dispositions that could lead people to perceive themselves more or less susceptible to sport-related injury. Optimism and locus of control, for example, have been consistently reported as influential factors on perceived susceptibility, and are likely to influence perceived susceptibility to sport-related injuries (Gerend et al., 2004b; McGregor et al., 2004). Moreover, possible mediating variables that could explain why personality factors and individual dispositions influence perceived susceptibility to health problems were not considered in the present study. Gerend et al. (2004b) showed that perceived disease characteristics, such as perceived controllability, severity, prevalence, and preventability, mediate the link between personality traits and perceived susceptibility to disease. Further research should test these additional mechanisms to provide a better understanding of the process underlying perceived susceptibility to sport-related injuries. Lastly, the participants in this study were all male rugby players, which raises a methodological issue. In this particular sport, injury is a concomitant aspect of the nature of the game and rugby players could be tempted to continue playing even when injured (Flint, 1998). Obviously, this creates problems for injury data collection because some injuries may not be reported. Future research should therefore include medical history information gained from both injured athletes and health care professionals.

As a whole, this study is a first step toward the identification of determinants of perceived susceptibility to sport-related injury. Given the centrality of this dimension in healthy versus risky behaviour and in the occurrence of health problems, future research should be conducted to better understand both the determinants and the consequences of perceived susceptibility in the sport setting. The individual-based approach advocated in the present study seems to be a relevant basis for the understanding of perceived susceptibility to sport-related injury, and could help explain the consequences of perceived susceptibility to injury. Of particular interest is the potential clarification provided by perceived susceptibility in the relationship between previous injury and reinjury risk (Williams & Andersen, 1998). The present findings seem promising and research
in this line of inquiry has the potential to enhance the promotion of health behaviour in the sport setting.

References


