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4 Are perceived comparative risks realistic amongst high-risk sports participants?

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## 1 Abstract

2 This paper examined how risk sports practitioners perceive their abilities to manage  
3 risks (AMR) and their vulnerability to a serious injury (VSI) whilst participating, in  
4 comparison to those of the average sports participant. We also examined which variables  
5 influence perceived comparative VSI. High-risk and moderate-risk sports participants ( $n =$   
6 432) completed measures of perceived personal AMR, perceived comparative AMR and VSI,  
7 and motive of playing to the limit. Results showed that high-risk sports practitioners  
8 perceived their VSI as being higher than that of the average sports participant, while  
9 moderate-risk practitioners perceived their VSI as being lower. Perceived comparative VSI  
10 was negatively related to perceived personal AMR, and positively related to past injury  
11 episode, sporting experience, and playing to the limit. In conclusion, perceived comparative  
12 risks were in some way realistic amongst high-risk sports practitioners. Future research is  
13 needed to further examine the role that perceived comparative risks play in the risk-taking  
14 decision-making process.

15

16 *Key-words:* Comparative optimism; Realism; Perceived abilities; Playing to the limit; Past  
17 injury episodes.

1           Are perceived comparative risks realistic amongst high-risk sports participants?

2           In a culture in which taking “unnecessary” risks is often seen as foolish, senseless, and  
3 even reckless (Lupton, 1999), there seems to be something of a trend toward increasing  
4 acceptance of risk in recreational activities. In the field of sport participation, there is  
5 considerable evidence that risk, rather than something to be avoided, is constitutive of many  
6 sporting experiences (Celsi, Rose, & Leigh, 1993; Donnelly, 2004; Kusz, 2004; Lyng, 1990;  
7 Young, 1993). Lyng’s (1990; 2005) notion of edgework conceptualizes voluntary risk-taking  
8 as exploring the limits of one’s ability and/or the technology one is using, while maintaining  
9 enough control to successfully negotiate the boundary between “chaos and order” (Lyng,  
10 1990). “Crowding the edge” (Lyng, 1990), or “playing to the limits” (Griffet, 1994) involves  
11 taking progressively greater risks in the activity, such as jumping from lower or more  
12 technical objects in BASE jumping (Martha & Griffet, 2006), or executing a “hook turn” in  
13 skydiving (Laurendeau, 2006). In the literature on the rationale for such edgework  
14 experiences, the sensation seeking trait, defined as the “seeking of varied, novel, complex,  
15 and intense experiences” (Zuckerman, 1994, p.27) has been widely investigated. Numerous  
16 outdoor sports and activities have been found to attract individuals who rate high in sensation  
17 seeking (Breivik, 1996; Rossi & Cereatti, 1993). The need for arousal, thrill and adventure  
18 may go some way towards explaining why high sensation seekers engage in high-risk sport,  
19 or take greater risks whilst participating in the same sport such as rock climbing or kayaking,  
20 than participants who rate low in sensation seeking (Slanger & Rudestam, 1997).

21           However, Zuckerman’s sensation-seeking model does not tell us how high-risk  
22 sportspersons perceive themselves to be exposed to the risk of injury or even death whilst  
23 participating. Social psychologists and sociologists have investigated participants’ perceived  
24 vulnerability, as well as their self-efficacy (Bandura, 1997) in the presence of the risk, that is,  
25 their confidence in their perceived abilities to manage risk. Studies have shown that, despite

1 evidence of hazard in their sports, participants in such activities as mountaineering (Delle  
2 Fave, Bassi, & Massimini, 2003; Demirhan, 2005), rock-climbing (Llewellyn & Sanchez,  
3 2008; Llewellyn, Sanchez, Asghar, & Jones, 2008), skydiving (Laurendeau, 2006; Moen &  
4 Rundmo, 2005), kayakers (Slanger & Rudestam, 1997), and adventure racing (Schneider,  
5 Butryn, Furst, & Masucci, 2007), trust themselves to negotiate risky situations and believe in  
6 their abilities to cope with risk. These studies, however, have not considered whether  
7 participants express a comparative optimism, defined as the perception that they are at lower  
8 risk of getting injured or are better able to manage risks than are their peers (Harris &  
9 Middleton, 1994; Shepperd, Carroll, Grace, & Meredith, 2002). There exist ethnographic-  
10 based studies which have suggested that high risk sportspersons might deny their vulnerability  
11 by comparing themselves to other athletes (Donnelly, 2004; Laurendeau, 2006; Schneider et  
12 al., 2007). For instance, skydivers tended to attribute casualties of accidents to others not  
13 possessing “the right stuff” (Lyng, 1990, p. 859) or to poor judgements peers make regarding  
14 safety (Laurendeau, 2006, p. 596). According to Donnelly (2004), using social comparison  
15 allows sportspersons not only to believe that they are physically safe within their own  
16 perception of risk, but also to intensify their feeling of success as they negotiate risk.

17       There exist few quantitative studies that have examined high-risk sports participants’  
18 risk perception from a social comparison perspective. Moreover, existing sports studies have  
19 reported contradictory results; high-risk sportspersons such as rock climbers assessed their  
20 vulnerability of getting seriously injured either similarly or higher to that of their peers  
21 (Martha, Sanchez, & Gomà-i-Freixanet, in press), but the inverse comparative assessment has  
22 been observed. Indeed, Moen and Rundmo (2005) have shown that skydivers expressed a  
23 comparative optimism, since they assessed their vulnerability of getting seriously injured  
24 lower to that of their peers. Such a tendency has also been widely observed for a variety of  
25 events in the field of driving (Harré, Susan, & O’Neill, 2005), crime (Perloff & Fetzer, 1986),

1 and health (Weinstein, 1980). A distinction must be established between dispositional  
2 optimism (Scheier & Carver, 1985), and specific domain-related comparative optimism.  
3 While dispositional optimism is defined as a personality trait, or a generalized positive  
4 expectancy that one will experience good outcomes, domain-related comparative optimism  
5 involves rating one's risk relative to that of the average peer, and can vary from one event to  
6 another. Thus, comparative optimism examined within a specific context may have no link  
7 with optimism measured as a general personality trait (Davidson & Prkachin, 1997; Martha et  
8 al., in press; Radcliffe & Klein, 2002).

9 As people's perceived comparative risks may be related to the way people perceive  
10 safety recommendations (Chappé, Verhiac, & Meyer, 2007; Perloff & Fetzer, 1986) and  
11 adopt cautious behaviours (Klein, 1997; McKenna, Stanier, & Lewis, 1991), it seems  
12 important to focus on how risk sports practitioners perceive their risk exposure whilst  
13 participating in their activity, in comparison with "others". This was the purpose of the  
14 present study.

15 In this paper, we investigated two types of risk sports practitioners: High-risk sportsmen  
16 (i.e., skydivers, BASE-jumpers, and paragliders) and moderate-risk sportsmen (i.e.,  
17 triathletes). We had two objectives. The first was to examine how risk sports practitioners  
18 perceive their personal abilities to manage risks (AMR), and how they perceive their AMR in  
19 comparison to that of a specific referent (i.e., the average sportsman participating in the same  
20 sport). We also examined how risk sports practitioners assess their vulnerability to a serious  
21 injury (VSI) whilst participating in comparison to that of: (1) a specific referent; (2) a non-  
22 specific referent (i.e., the average sportsman).

23 In the field of road traffic (Armor & Taylor, 1998; Causse, Delhomme, & Kouabenan,  
24 2005), as well as that of high-risk sport such as rock-climbing (Martha et al., in press), studies  
25 have shown that comparative optimism may be not systematic, as respondents may perceive

1 their own VSI or their own AMR as similar to those of others. Respondents may also express  
2 comparative pessimism, perceiving their own VSI as greater, or their own AMR as lower than  
3 that of others, particularly when they have experienced negative events such as accidents  
4 (Rutter, Quine, & Albery, 1998), or when they feel they have little personal control over  
5 dangers (Harris, 1996). Since the present study focused on sports which involve, to different  
6 degrees, some risks which remain uncontrollable, we might expect that comparative optimism  
7 will not be prevalent amongst risk sports practitioners. More precisely, we hypothesized that:  
8 (1) risk sports practitioners would perceive their AMR and their VSI as being similar to those  
9 of the specific referent (Hypothesis 1); (2) they would express comparative pessimism when  
10 they compare their VSI with that of the non-specific referent (Hypothesis 2), since we  
11 hypothesized that they would imagine the non-specific referent as the typical sportsman who  
12 does not necessarily practice a dangerous sport.

13 The second objective of this study was to examine which variables influenced risk  
14 sports practitioners' perceived comparative VSI. We first considered the role of age and  
15 sporting experience (e.g., frequency of participation) on perceived comparative VSI. Then we  
16 examined the role of perceived personal AMR. Perceived personal AMR has been negatively  
17 linked to perceived comparative vulnerability in the field of high-risk sports (Moen &  
18 Rundmo, 2005), as well as that of driving (Delhomme, 1991). In this vein, we expected that  
19 perceived personal AMR will be negatively linked to perceived comparative VSI (Hypothesis  
20 3). We also aimed to examine the role of the motive of playing to the limit on perceived  
21 comparative VSI. Based on the hypothesis that risk sport practitioners' perceived comparative  
22 risks would be in some way realistic, we expected that participants who like playing to the  
23 limit will be conscious of the risk they take, and thus will be likely to assess themselves as  
24 being more exposed to the risk of injury than the average sportsman (Hypothesis 4). Finally,  
25 in line with studies (e.g., Rutter et al., 1998) who found a positive link between accident



1 history and an increased perceived vulnerability, we expected that past injury episodes will be  
2 positively linked with perceived comparative VSI (Hypothesis 5).

### 3 Method

#### 4 *Participants*

5 This study was approved by the local university ethics committee of the University of  
6 the Mediterranean in Marseilles (France). We limited the analysis to men because there were  
7 very few women who responded to the surveys. Although risk sport participation does not  
8 guarantee injury or death and that there are numerous ways to participate in most sports in  
9 relative safety (Donnelly, 2004), risk of serious injury or death is a ubiquitous feature of some  
10 sporting experiences, in comparison with sports involving almost no risk for physical health.  
11 This is the case of skydiving, BASE-jumping, and paragliding, that we qualified as “high risk  
12 sports” in this study. In order to determine the dangerousness of these sporting activities, we  
13 have quantified the risk of activity-related injury (or death) based on the number of injuries  
14 (or deaths) per 1000 participants per year (Spinks & McClure, 2007). According to the French  
15 federations of paragliding and skydiving, each of these sports has claimed about 12 lives per  
16 year in France over the past 5 years, that is to say 1 death per 3500 skydivers and per 2580  
17 paragliders. BASE-jumping, a sport in which participants use a parachute to jump from fixed  
18 objects (e.g., buildings, bridges, cliffs; see Cooper & Laurendeau, 2007), is also a high-risk  
19 sport. This sport has resulted in 1 death per year in France amongst the 200 French BASE-  
20 jumpers over the past 5 years (Di Giovanni, 2007). In contrast to those high-risk sports, other  
21 sports such as dancing, fitness, or swimming, can be classified in the category of low-risk  
22 sports as they involve a very low probability of being seriously injured or killed. Finally, at an  
23 intermediate level, moderate-risk sports are those which usually do not result in fatalities like  
24 do high-risk sports, but which are more likely to involve physical accidents in comparison to  
25 low-risk sport (Zuckerman, 1983). This is the case of triathlon, which involves risk of

1 collision or falling whilst cycling. According to the French federation of triathlon, this sport  
2 has caused about 90 physical injuries per year over the past 5 years (i.e., 1 injury per 233  
3 participants).

4        Though 462 male adults gave their informed consent and took part to the survey, the  
5 analysis was based on data from 432 respondents since we removed 30 incomplete  
6 questionnaires. The sample was composed of 313 high-risk sportsmen (73 paragliders, 39  
7 BASE-jumpers, and 201 skydivers), and 119 moderate-risk sportsmen (triathletes). Further  
8 details about response rate and participants' characteristics are provided in the procedure  
9 section and in the results section, respectively.

#### 10 *Material*

11        The questionnaire consisted of four sections. Formulation of the items was sub-group  
12 specific, as specific terms were used to designate the sporting activity, as well as the  
13 participants involved in each activity (e.g., the terms 'skydiving' and 'skydivers' were used in  
14 the questionnaire addressed to the skydivers). For the purposes of illustration, we present the  
15 items that concerned the skydivers.

16        The first section gathered general information on variables such as age and sporting  
17 experience: number of years of participation, frequency of participation, and injury episodes  
18 having necessitated medical attention over the past 3 years whilst participating. Frequency of  
19 participation was measured by means of different criterion for each of the groups. For  
20 skydivers, BASE-jumpers and paragliders, we measured the number of jumps or flights per  
21 year which is considered by these sportsmen to be a good indication of frequency  
22 (Laurendeau, 2006; Martha & Griffet, 2006). For triathletes, we measured frequency of  
23 participation by asking the number of times per week they train for triathlon. We then  
24 converted weekly participation to yearly participation in order to compare frequency of  
25 participation between the four groups.

1           In the second section, three items developed for the need of the present survey measured  
2 perceived personal AMR (*Cronbach's* alpha = 0.78): “whilst skydiving, I think that most of  
3 the outcomes are under my control”; “I think that my know-how in participating skydiving  
4 safely is high”; “whilst skydiving, I feel myself able to manage most of the risks”. Responses  
5 were given on a 7-point scale as recommended by Diefenbach, Weinstein, and O’Reilly  
6 (1993) in their study on appropriate measures for assessing perceptions of susceptibility to  
7 health and safety risks, from 1 (‘I strongly disagree’) to 7 (‘I strongly agree’).

8           In the third section, perceived comparative AMR and VSI were obtained by the direct  
9 method for measuring perceived comparative risks, that was the use of a single item which  
10 asks the respondents to compare themselves directly to the average. This use of a single item  
11 has been validated in surveys investigating perceived comparative vulnerability and AMR  
12 (e.g., Delhomme, 1991; Rutter et al., 1998). We first measured perceived comparative VSI by  
13 asking participants to compare themselves to both a specific (Q1) and a non-specific referent  
14 (Q2), by answering the following: (Q1) “In your opinion, what is your probability of being  
15 seriously injured whilst skydiving in comparison to that of the average same-age and same-  
16 sex skydiver?”; and (Q2) “In your opinion, what is your probability of being seriously injured  
17 in your sport in comparison to that of the average same-age and same-sex sportsperson in his  
18 sport?”. Participants answered on a scale, ranging from -3 (‘much less likely’) to +3 (‘much  
19 more likely’). Thus, scores lower than ‘0’ corresponded with comparative optimism and  
20 scores higher than ‘0’ corresponded with comparative pessimism. Scores close to zero  
21 indicated that participants rate their VSI as being similar to that of the aforementioned  
22 referents. We then measured perceived comparative AMR by asking respondents to compare  
23 themselves to the specific referent (Q3), by answering the following: (Q3) “In your opinion,  
24 how able are you to manage risks inherent to skydiving in comparison to the average same-  
25 age and same-sex skydiver?”. Participants’ responses were given on a scale ranging from -3

1 ('much worse') to +3 ('much better'). Thus, scores lower than '0' corresponded with  
2 comparative pessimism and scores higher than '0' corresponded with comparative optimism.  
3 Scores close to zero indicated that participants rate their AMR as being similar to that of the  
4 specific referent.

5 In the fourth and final section, we used the motives for sport participation scale  
6 (Recours, Souville, & Griffet, 2004), that originally contained thirteen items measuring four  
7 subscales: Exhibitionism, competition, sociability, and playing to the limit. For the purpose of  
8 the present survey, we only used the four-item "playing to the limit" subscale (in the present  
9 survey, *Cronbach's* alpha = 0.74). One example of these items was the following: "what I like  
10 in skydiving is the actions close to the breaking point". Answers were given on a scale  
11 ranging from 1 ('I strongly disagree') to 7 ('I strongly agree').

## 12 *Procedure*

13 Participants were contacted through mail, e-mail, clubs and other practice sites. We first  
14 contacted BASE-jumpers by way of e-mail, using e-mail addresses obtained from the website  
15 of the French base association (<http://www.base-jump.com>). The response rate amongst  
16 BASE-jumpers was the lowest in our study, since of the 57 BASE-jumpers we contacted, 28  
17 (49%) gave their informed consent to take part in the survey. The rest refused to participate  
18 (17%), putting forward reasons for not participating as 'lack of time' or 'lack of motivation',  
19 or did not reply (34%). In addition, 12 BASE-jumpers were invited to take part in the survey  
20 "in the field" and 11 agreed to participate.

21 Skydivers and paragliders were also contacted by e-mail, as the French federations of  
22 paragliding and skydiving provided e-mail addresses of their participant members. We  
23 contacted 200 skydivers and 75 paragliders. Response rates were high, with 152 skydivers  
24 (76%) and 53 paragliders (71%) agreeing to participate. Then, the participation of 22  
25 additional skydivers on their drop-zone followed on from an oral invitation made by the

1 director of the drop zone. As we did not know how many skydivers were present at the drop  
2 zone at this time, response rate was difficult to quantify in this case. We also invited 26  
3 additional paragliders on their practice sites to take part in the survey. Amongst them, 77% ( $n$   
4 = 20) agreed to fill out the questionnaire.

5 We contacted triathletes through a club in Marseilles. We negotiated access to the club  
6 with the assistance of colleagues who worked there, and then asked the triathletes if they were  
7 willing to participate by means of verbal announcements. Again response rate was difficult to  
8 quantify since we did not know how many participants were present each time we followed  
9 this procedure. Amongst the triathletes who were present, 126 were willing to participate, and  
10 provided their address. We contacted them at a later date to complete the questionnaire.

11 We told the participants that we wanted to conduct a study on the theme of sporting  
12 experience, and asked them to consent to fill out a questionnaire. We stressed to participants  
13 that their responses were anonymous, that participants in several sports took part in the  
14 survey, and that it was important for us to receive honest and accurate information. While  
15 some participants asked us to send the questionnaire by mail and subsequently returned it  
16 anonymously in a stamped addressed envelope, many filled out the questionnaires on-site  
17 (e.g., at a skydiving drop zone) and deposited them in a large box containing others'  
18 questionnaires to preserve respondents' anonymity.

### 19 *Statistical Analyses*

20 Pearson correlations were computed to identify the relations among perceived personal  
21 AMR, playing to the limit, perceived comparative VSI, perceived comparative AMR, and  
22 injury episodes.

23 One-sample  $t$ -tests were carried out to measure whether participants expressed  
24 comparative pessimism, comparative optimism, or whether they perceived their AMR and  
25 VSI as being similar to those of the non-specific and specific referents (i.e., whether their

1 perceived comparative VSI and AMR scores were higher, lower, or close to zero).

2 We compared the four sporting activities with regard to several dependent variables  
3 (perceived personal AMR, playing to the limit, perceived comparative VSI and perceived  
4 comparative AMR). For this purpose, we conducted a multivariate analysis of variance  
5 (MANOVA). Then, univariate analyses (ANOVAs) were carried out to test which dependent  
6 variables were responsible for the differences in mean vectors that were shown in MANOVA.  
7 Seeing that increased experience may play a role in perceived comparative risks (e.g.,  
8 Laurendeau, 2006; Lois, 2001), the variable ‘number of years of participation’ was entered as  
9 a covariate. The  $\eta^2$  values were used to control for the effect size of both sporting activity and  
10 number of years of participation. ANOVAs were supplemented by pairwise comparisons with  
11 Tukey-Kramer test, recommended for the situation of unequal sample sizes (Toothacker,  
12 1993) to determine differences between groups.

13 Finally, hierarchical regression analyses were performed to examine factors predicting  
14 perceived comparative VSI in comparison with that of the non-specific referent. We did not  
15 aim to predict other variables such as perceived comparative AMR, or perceived comparative  
16 VSI in comparison with those of the specific referent, since participants expressed no  
17 significant comparative optimism, nor pessimism, when making such comparative  
18 judgements. Since ANOVAs revealed a difference between the four groups on perceived  
19 comparative VSI in comparison with that of the non-specific referent, we analysed the factors  
20 predicting this dependent variable amongst each group of sportsmen separately.

21 In a first step, we aimed at examining whether age and sporting characteristics predicted  
22 variance in perceived comparative VSI (step 1), without considering the role of the  
23 psychosocial variables correlated to perceived comparative VSI, which may have attenuated  
24 the effects of age and sporting characteristics. In a second step, we entered psychosocial  
25 variables in the model (step 2): perceived personal AMR and playing to the limit. As we

1 expected that the link found in correlational analyses between past injury episodes and  
2 perceived comparative VSI might mask the effects of the other variables, we examined the  
3 role of past injury episodes in the last step (step 3). This also allowed us to observe whether  
4 any associations remained significant after accounting for past injury episodes.

## 5 Results

6 Table 1 provides the distribution of the sample, as well as the respondents' average age  
7 and sporting characteristics, including past injury episodes. There were significant differences  
8 between the four groups in mean age ( $F_{(3, 431)} = 8.6, p < 0.001$ ) and in number of years of  
9 participation ( $F_{(3, 429)} = 9.4, p < 0.001$ ), as BASE-jumpers were younger than the three other  
10 groups ( $p < 0.001$ ), and as skydivers had a higher number of years of participation than had  
11 the three other groups ( $p < 0.001$ ). There was a difference between the four group in  
12 frequency of participation ( $F_{(3, 429)} = 36.2, p < 0.001$ ). Triathletes had a higher frequency of  
13 participation than had the three other groups ( $p < 0.001$ ), as well as skydivers in comparison  
14 to paragliders ( $p < 0.001$ ) and BASE-jumpers ( $p < 0.001$ ). It should be noted, however, that  
15 the units measuring "frequency of participation" were not consistent across the sports, due to  
16 different technical elements of the activities. The percentage of respondents reporting having  
17 been injured at least once over the last 3 years was lower amongst the triathletes than amongst  
18 the other groups ( $\chi^2_{(3)} = 14.3, p < 0.001, \phi = 0.18$ ).

19 INSERT TABLE 1 ABOUT HERE

20 Correlations amongst the measures are shown in Table 2. The pattern of correlations  
21 between the study variables was nearly the same amongst the four groups of sportsmen,  
22 except for the motive of playing to the limit. Amongst BASE-jumpers, paragliders, and  
23 skydivers, playing to the limit was related to perceived personal AMR ( $r > 0.28, p < 0.01$ ) and  
24 perceived VSI in comparison with that of the non-specific referent ( $r > 0.30, p < 0.01$ ), while  
25 these relationships were not significant amongst triathletes. Amongst all the groups, the

1 association between perceived personal AMR and perceived comparative AMR was small ( $r$   
 2  $< 0.17, p < 0.05$ ), while the inverse association between perceived AMR and perceived VSI in  
 3 comparison with that of the specific referent was high ( $r < -0.61, p < 0.001$ ). Moderate  
 4 positive associations were found between past injury episodes and perceived comparative VSI  
 5 ( $r > 0.28, p < 0.01$ ). Past injury episodes was also negatively related to perceived personal  
 6 AMR amongst all the groups ( $r < -0.19, p < 0.05$ ).

7 INSERT TABLE 2 ABOUT HERE

8 Descriptive statistics and statistical differences according to the group in perceived  
 9 personal AMR, motive of playing to the limit, perceived comparative AMR and VSI, are  
 10 provided in Table 3. MANOVA revealed significant group differences on the dependent  
 11 variables (Wilks' Lambda  $F_{(15, 1703)} = 3.42, p < .001$ ). There was a difference between the four  
 12 groups on perceived personal AMR ( $F_{(3, 430)} = 7.9, p < 0.001, \eta^2 = 0.11$ ), controlling for  
 13 number of years of participation which had no effect ( $F_{(1, 429)} = 1.9, p = 0.09$ ), as triathletes  
 14 reported higher scores on perceived personal AMR than did skydivers ( $p = 0.009$ ), BASE-  
 15 jumpers ( $p < 0.001$ ), and paragliders ( $p < 0.001$ ). There was also a difference between the  
 16 groups on the motive of playing to the limit ( $F_{(3, 429)} = 8.8, p < 0.001, \eta^2 = 0.10$ ), controlling  
 17 for number of years of participation which had no effect ( $F_{(1, 429)} = 0.8, p = 0.32$ ), since  
 18 triathletes reported higher scores on this motive than did the three groups of high-risk sports  
 19 practitioners ( $p < 0.001$ ). The four groups of sportsmen perceived their AMR and their VSI as  
 20 being similar to those of the specific referent. When the comparison target was the non-  
 21 specific referent, perceived comparative VSI was different amongst the four groups ( $F_{(3,430)} =$   
 22  $7.72, p < 0.001, \eta^2 = 0.12$ ), controlling for number of years of participation which had a  
 23 positive effect ( $F_{(1, 429)} = 3.8, p < 0.05, \eta^2 = .05$ ). Only triathletes expressed comparative  
 24 optimism, scoring -1.11 on a scale that ran from -3 to +3 ( $p < 0.001$ ). Skydivers, BASE-  
 25 jumpers and paragliders expressed comparative pessimism, scoring more than 0.30 ( $p < 0.01$ ).



1 INSERT TABLE 3 ABOUT HERE

2 Hierarchical regression analyses (Table 4) were performed to examine factors related to  
3 perceived VSI in comparison with that of the non-specific referent (i.e., the average same-age  
4 and same-sex sportsman), amongst each group of sportsmen. In the first step, the variables  
5 age, number of years of participation, and frequency of participation, accounted for between  
6 10% and 14% of the variance (adjusted  $R^2$ ;  $F \geq 4.53$ ,  $p < 0.01$ ). Number of years of  
7 participation was positively associated with perceived comparative VSI amongst the four  
8 groups ( $\beta \geq 0.19$ ,  $p < 0.01$ ), as was age amongst paragliders, skydivers and triathletes ( $\beta \geq$   
9  $0.14$ ,  $p < 0.05$ ), and as was frequency of participation amongst BASE-jumpers, paragliders,  
10 and skydivers ( $\beta \geq 0.13$ ,  $p < 0.05$ ).

11 In step 2, perceived personal AMR and playing to the limit explained between 4% and  
12 5% of additional variance ( $\Delta R^2$ ;  $F \geq 5.31$ ,  $p < 0.01$ ). Playing to the limit served as a predictor  
13 for perceived comparative VSI amongst the three groups of high-risk sportsmen ( $\beta \geq 0.24$ ,  $p <$   
14  $0.01$ ), as did age amongst paragliders, skydivers, and triathletes ( $\beta \geq 0.12$ ,  $p < 0.05$ ).  
15 Perceived personal AMR was an inverse predictor of perceived comparative VSI amongst the  
16 four groups ( $\beta \leq -0.16$ ,  $p < 0.05$ ).

17 In step 3, injury experience explained between 3% and 10% of additional variance ( $\Delta$   
18  $R^2$ ,  $F \geq 6.91$ ,  $p < 0.001$ ). Injury experience served as a strong predictor for perceived  
19 comparative VSI amongst the three groups of high-risk sportsmen ( $\beta \geq 0.28$ ,  $p < 0.01$ ), while  
20 it was a slight but significant predictor amongst triathletes ( $\beta = 0.12$ ,  $p < 0.05$ ). Playing to the  
21 limit remained positively associated with perceived comparative VSI amongst the three  
22 groups of high-risk sportsmen ( $\beta \geq 0.21$ ,  $p < 0.01$ ), as did number of years of participation  
23 amongst the four groups ( $\beta \geq 0.15$ ,  $p < 0.01$ ), and frequency of participation amongst the  
24 BASE-jumpers, the paragliders and the skydivers ( $\beta \geq 0.11$ ,  $p < 0.05$ ). Perceived personal  
25 AMR remained a significant inverse predictor of perceived comparative VSI ( $\beta \leq -0.12$ ,  $p <$

1 0.01). Age remained positively related to perceived comparative VSI amongst the triathlete  
2 group only ( $\beta = 0.13, p < 0.05$ ).

3 INSERT TABLE 4 ABOUT HERE

#### 4 Discussion

5 In this study, we first aimed to describe how risk sports practitioners assess: (1) their  
6 personal abilities to manage risks (AMR); (2) their AMR in comparison to that of a specific  
7 referent (i.e., the average sportsman participating the same sport); (3) their vulnerability to a  
8 serious injury (VSI) in comparison to that of a specific referent, and a non-specific referent  
9 one (i.e., the average sportsman). The second objective was to examine which variables  
10 influenced perceived comparative VSI.

11 High-risk sportsmen's scores on perceived personal AMR were low, since these scores  
12 were situated on average beyond the middle of the scale. This seems to speak to high-risk  
13 sports practitioners acknowledging that despite their best efforts, they remain highly exposed  
14 to uncontrollable risks (e.g., environmental conditions, other participants' behaviour). This  
15 finding sheds further light on the notion of control in edgework (Lyng, 1990). Lyng (1990)  
16 highlights that edgeworkers have an illusory sense that they can control the uncontrollable, an  
17 idea not supported here. Instead, this suggests that practitioners believe themselves to be in  
18 control of many dimensions of their edgework activities, but still recognize that they simply  
19 cannot manage everything under conditions of uncertainty (see Laurendeau, 2006). This risk  
20 acceptance might be constitutive of the "culture of risk" (Donnelly, 2004), according to  
21 which injury and even death "may have become a way of life that is produced and reproduced  
22 in sport" (Donnelly, 2004, p.33). Triathletes had higher levels of perceived personal AMR  
23 than the three groups of high-risk sportsmen. However, we must note that triathletes' score of  
24 perceived personal AMR was not high but only moderate, its value corresponding to the  
25 middle of the scale. It may be that the triathletes accept that risk is a part of their daily

1 training. As they train in traffic, they are subjected to hazards posed by other people's (i.e.,  
2 drivers') behaviours. Moreover, the presence of many other participants may entail risk and  
3 uncertainty, particularly whilst riding in close proximity to one another. In his study on  
4 physical risk and injury in cycling, Albert (1999) also found risk to be a constituent of the  
5 culture of this sport. Again, this points to the importance of (sub)cultural constructions of risk  
6 (Donnelly, 2004).

7       When participants assessed their AMR and VSI in comparison to those of the specific  
8 referent, their scores on perceived comparative AMR and VSI were all positive and all  
9 negative, respectively, but these trends were not statistically significant. This suggests that  
10 risk sport practitioners perceived their AMR and their VSI as being similar to those of the  
11 specific referent, supporting H1. High-risk sportsmen expressed comparative pessimism when  
12 comparing their VSI with that of the non-specific referent. These results support H2 and go  
13 hand in hand with previous studies conducted in the field of road traffic (e.g., Causse et al.,  
14 2005), illness (McKenna, Warbuton, & Winwood, 1993; van der Pligt, 1998), or high-risk  
15 sports (Martha et al., in press), which showed that adults' risky behaviours were not  
16 systematically related to comparative optimism. It is important to note that this result  
17 contradicts the findings of Moen and Rundmo (2005) that showed that skydivers expressed  
18 comparative optimism regarding their VSI. However, in Moen and Rundmo's (2005) study, a  
19 lower percentage (44%) of skydivers experienced at least one skydiving injury, in comparison  
20 to our respondents (67%). Thus, we may hypothesize that participants' past injury episodes  
21 may help to explain why we found that skydivers did not express comparative optimism.

22       Triathletes assessed their VSI as being lower than that of the non-specific referent, and  
23 similar to that of the specific referent. According to Helweg-Larsen and Shepperd (2001), if  
24 respondents tend to express less comparative optimism when compared to a close and specific  
25 referent than when compared with a distant or ambiguous one, it may be because respondents

1 change their risk estimates for the referent rather than for their personal estimates. The  
2 absolute judgements for a close referent would be easier to compute than would be the  
3 absolute judgement for a large and generalized referent group such as the average person  
4 (Chambers & Windschitl, 2004). However, this explanation can not be applied to the high-  
5 risk sportsmen's perceived VSI in comparison to that of the non-specific referent, as high-risk  
6 sportsmen expressed comparative pessimism, supporting H2. We may hypothesize that when  
7 the referent is not specific, high-risk sportsmen likely compare themselves with typical  
8 sportsmen who do not practice a dangerous sport. Such an explanation would support the idea  
9 that high-risk sportsmen's perceived comparative risks are in some way realistic. Further  
10 comprehensive research is needed to identify the type of sportspersons with whom high-risk  
11 sportsmen tend to compare themselves when the referent is a non-specific one.

12 We observed a negative link between perceived comparative VSI and perceived  
13 personal AMR amongst all the participants. This result supports H3, as well as the association  
14 between risk perception and self-efficacy which has been observed amongst sports  
15 participants, whether they were engaged in high-risk (e.g., Moen & Rundmo, 2005) or low-  
16 risk (e.g., Kontos, 2004) sports, as well as amongst drivers (Delhomme, 1991). The role of  
17 both past injury episodes and the motive of playing to the limits on perceived comparative  
18 VSI support H4 and H5. It also lends support to a relative realism of perceived comparative  
19 risks amongst high-risk sportsmen.

20 Although the triathletes reported more motivation for playing to the limit than did the  
21 three groups of high-risk sportsmen, this motive was not related to perceived comparative VSI  
22 amongst the triathletes. Triathlon involves statistically less risk of serious injury or death than  
23 BASE-jumping, paragliding and skydiving. No triathlon-related fatality has occurred in the  
24 last five years in France. Thus, playing to the limit whilst training for triathlon probably does  
25 not involve as many objective risks as does playing to the limit whilst participating in high-

1 risk sports. This also speaks to the notion that “the edge” is a fluid construction, contingent on  
2 the activity, as well as one’s perceived risk (Lyng 1990).

3 Finally, our results showed that the more experienced (in terms of years of participation  
4 and frequency of participation) the BASE-jumpers, the skydivers, and the paragliders, the  
5 more exposed to the risk of injury they perceived themselves to be (in comparison to the non-  
6 specific referent). This may suggest that when individuals first take up these activities, they  
7 express comparative optimism because they do not yet understand the hazards of their sports.  
8 After a time in the sport, though, hearing about (and perhaps witnessing) others being hurt or  
9 killed, it is more difficult to maintain this optimism. In the case of skydiving, senior jumpers  
10 take it upon themselves to ‘coach’ junior jumpers in how to make sense of witnessing  
11 traumatizing events in the sport (Laurendeau, 2006). Zuckerman (1994) reported results  
12 different than ours regarding the link between risk experience and risk perception. Taking into  
13 account individuals’ sensation seeking trait, he suggested that sensation seeking allows  
14 individuals to engage in risk situations that push their comfort zone and elevate their  
15 experience level. In return, the more risk experiences sensation seekers acquire, the more  
16 comfortable they feel with perceived risk. As Lyng (1990) pointed out, though, this level of  
17 comfort is indicative that one is no longer on the edge. As a result, edgeworkers often push  
18 themselves, their equipment, etc. even further (Laurendeau, 2006). Future studies should  
19 examine the role of increased sporting experience in perceived vulnerability, using  
20 longitudinal protocols, and taking into account past experience, coping strategies, as well as  
21 personality traits, that may contribute to explain the link between risk experience and risk  
22 perception.

23 The findings of the present study should be treated with a degree of caution given the  
24 following limitations. First, the cross-sectional research design limits the extent to which we  
25 can make claims about causality based on these data. Second, the use of self-reported

1 measures raises concerns about bias in responses. For instance, some of the high-risk  
2 sportsmen may have exaggerated their enjoyment of playing to the limit, or their perceived  
3 risk of getting injured in their sports, as there are subcultural norms at play around these  
4 issues (see Hunt, 1995; Laurendeau & Gibbs Van Brunschot, 2006). However, we  
5 endeavoured to limit response bias by taking precautions when inviting participants to take  
6 part in the study, stressing the anonymity of their responses and our interest in receiving  
7 honest and accurate information. The response rate may also point towards potential response  
8 bias. Perhaps we would have had more reliable information about high-risk sportsmen's risk  
9 perception and risk behaviour if we could also have obtained participation of high-risk  
10 sportsmen who have a propensity to reject psycho-sociological studies on risk-taking. This  
11 issue stresses the necessity of taking precautions while inviting high-risk sportsmen to  
12 participate to such a study. In this vein, the use of personal and progressive way of inviting  
13 the participants (e.g., after a qualitative study period based only on observation or informal  
14 interviews) could be useful. Moreover, our sample only included current participants, which  
15 might have influenced the results. Perhaps, having included participants who were no longer  
16 active, above all those who were seriously injured, might have involved higher levels of  
17 perceived vulnerability. Further research should examine these associations longitudinally.

18 Third, as we investigated only four types of sporting activities, we must be cautious  
19 about generalizing our results to other categories of sportsmen. This is the case even for other  
20 risk sports, as there is some evidence that perceptions of control are not simply a function of  
21 belief in a survival instinct as Lyng (1990) suggests. Instead, they are contingent on specific  
22 bodies of technical knowledge about particular activities (Laurendeau, 2006). This issue of  
23 generalization is further compounded by the fact that our analysis considered only men who  
24 participate in these activities. Given that women and men do edgework differently  
25 (Laurendeau, 2008), future studies should explore the experiences of female participants in

1 order to examine potential gender differences in risk perception and risk exposure. This is  
2 particularly important in light of the argument that whether and how women and men engage  
3 in edgework is itself part of the process of constructing a particular kind of masculinity or  
4 femininity (Laurendeau, 2008).

5 Finally, we did not gather qualitative information on respondents' past injury episodes,  
6 which could influence perceived comparative VSI. Moreover, we only took into account  
7 injuries requiring medical attention, but we could have also measured injuries that involved  
8 withdrawal from participation, or those seeking treatment or advice from non-medics (Jones,  
9 Asghar, & Llewellyn, 2007). Thus, further research should explore such qualitative and  
10 quantitative information in order to better understand the relationship between risk perception  
11 and risk exposure.

## 12 Conclusion

13 In this study we set out to explore what has to date been an under-researched area in the  
14 study of social comparison and risk behaviours, namely, the perceived comparative risks in  
15 the field of high-risk sports. High-risk sports participants' tendency to perceive their  
16 vulnerability as being similar to that of their peers, and as being higher than that of the non-  
17 specific referent, suggests that practitioners are not oblivious to the hazards of their sports. In  
18 a "culture of risk" (Donnelly, 2004), even participants in risk sports actively engage with the  
19 question of *how* to participate (e.g., what kinds of skydives to do and in what conditions).  
20 Contrary to the belief that comparative optimism would be linked to risky behaviours (e.g.,  
21 Klein, 1997; McKenna et al., 1991), other studies from health (McKenna et al., 1993;  
22 Radcliffe & Klein, 2002; van der Pligt, 1998), driving (Causse et al., 2005) or sport  
23 psychology (Martha et al., in press) literatures have shown that comparative optimism was not  
24 systematically associated with detrimental behaviour, and thus may reflect relative accuracy  
25 in risk perception. Our results also lend support to a relative realism amongst high-risk sports

- 1 practitioners, since participants whose behaviour puts them at risk are aware of this. Future
- 2 research is needed to further examine the role that social comparison in general, and
- 3 perceived comparative risk in particular, play in the risk-taking decision-making process.



## References

- 1  
2 Albert, E. (1999). Dealing with danger: The normalization of risk in cycling. *International*  
3 *Review for the Sociology of Sport*, 34, 157-171.
- 4 Armor, D. A., & Taylor, S. E., (1998). Situated optimism: Specific outcome expectancies and  
5 self-regulation. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology*, 30  
6 (pp. 309-379). San Diego: Academic Press.
- 7 Bandura, A. (1997). *Self-Efficacy. The exercise of control*. New York: Freeman.
- 8 Breivik, G. (1996). Personality, sensation seeking and risk taking among Everest climbers.  
9 *International Journal of Sport Psychology*, 27, 308-320.
- 10 Causse, P., Delhomme, P., & Kouabenan, D. R. (2005). Jugements comparatifs et absolus de  
11 deux risques routiers contextualisés et raisons invoquées quant à ces jugements  
12 [Absolute and comparative judgements of two situated road risks and reasons evocated  
13 for these judgments]. *Psychologie du Travail et des Organisations*, 11, 191-208.
- 14 Celsi, R. L., Rose, R. L., & Leigh, T. W. (1993). An exploration of the high risk consumption  
15 through skydiving. *Journal of Consumer Research*, 20, 1-23.
- 16 Chappé, J., Verlhac, J. F., & Meyer, T. (2007). Optimisme et pessimisme comparatifs  
17 consécutifs à l'exposition à plusieurs messages menaçants [Comparative optimism and  
18 pessimism following exposure to several threatening messages]. *Revue Européenne de*  
19 *Psychologie Appliquée/European Review of Applied Psychology*, 57, 23-35.
- 20 Chambers, J. R., & Windschitl, P. D. (2004). Biases in social comparative judgments: The  
21 role of nonmotivated factors in above-average and comparative-optimism effects.  
22 *Psychological Bulletin*, 130, 813-838.
- 23 Cooper, J., & Laurendeau, J. (2007). BASE jumping. In D. Booth and H. Thorpe  
24 (Eds.) *Berkshire Encyclopedia of Extreme Sports* (pp. 20-26). Great Barrington, MA:

- 1 Berkshire Publishing Group.
- 2 Davidson, K., & Prkachin, K. (1997). Optimism and unrealistic optimism have an interacting  
3 impact on health-promoting behaviour and knowledge changes. *Personality and Social  
4 Psychology Bulletin*, 23, 617-625.
- 5 Delhomme, P. (1991). Comparing one's driving with others': Assessment of abilities and  
6 frequency of offences. Evidence for a superior conformity of self-bias? *Accident  
7 Analysis and Prevention*, 23, 493-508.
- 8 Delle Fave, A., Bassi, M., & Massimini, F. (2003). Quality of experience and risk perception  
9 in high-altitude rock climbing. *Journal of Applied Sport Psychology*, 15, 82-98.
- 10 Demirhan, G. (2005). Mountaineers' risk perception in outdoor-adventure sports: A study of  
11 sex and sports experience. *Perceptual and Motor Skills*, 100, 1155-1160.
- 12 Diefenbach, M. A., Weinstein, N. D., & O'Reilly, J. (1993). Scales for assessing perceptions  
13 of health hazard susceptibility. *Health Education Research*, 8, 181-192.
- 14 Di Giovanni, N. (2007). World BASE Fatality List. Available at: <http://www.splatula.com/bfl/>.  
15 Accessed October 8, 2007.
- 16 Donnelly, P. (2004). Sport and risk culture. In K. Young (Ed.), *Sporting bodies, damaged  
17 selves: Sociological studies of sports-related injury* (pp.29-58). Boston: Elsevier Press.
- 18 Griffet, J. (1994). Décision, risque, émotion. [Decision, risk, emotion]. *Science et Motricité*,  
19 23, 3-12.
- 20 Harré, N., Susan, F., & O'Neill, M. (2005). Self-enhancement, crash-risk optimism and the  
21 impact of safety advertisements on young drivers. *British Journal of Psychology*, 96,  
22 215-230.
- 23 Harris, P. (1996). Sufficient grounds for optimism? The relationship between perceived  
24 controllability and optimistic bias. *Journal of Social and Clinical Psychology*, 15, 9-52.
- 25 Harris, P., & Middleton, W. (1994). The illusion of control and optimism about health: On

- 1 being less at risk but no more in control than others. *British Journal of Social*  
2 *Psychology*, 33, 369-86.
- 3 Helweg-Larsen, M., & Shepperd, J. A. (2001). Do moderators of the optimistic bias affect  
4 personal or target risk estimates? A review of the literature. *Personality and Social*  
5 *Psychology Review*, 5, 74-95.
- 6 Hunt, J. C. (1995). Divers' accounts of normal risk. *Symbolic Interaction*, 18, 439-62.
- 7 Jones, G., Asghar, A., & Llewellyn, D. J. (2007). The epidemiology of rock climbing injuries.  
8 *British Journal of Sports Medicine* [Epub ahead of print].
- 9 Klein, W. M. P. (1997). Objective standards are not enough: Affective, self-evaluative, and  
10 behavioural responses to social comparison information. *Journal of Personality and*  
11 *Social Psychology*, 72, 763-774.
- 12 Kontos, A. P. (2004). Perceived risk, risk taking, estimation of ability and injury among  
13 adolescent sport participants. *Journal of Paediatric Psychology*, 29, 447-455.
- 14 Kusz, K. (2004). Extreme America: The cultural politics of extreme sports in 1990s America.  
15 In B. Wheaton (Ed.), *Understanding Lifestyle Sports: Consumption, Identity and*  
16 *Difference* (pp.197-209). London: Routledge.
- 17 Laurendeau, J. (2006). "He didn't go in doing a skydive": Sustaining the illusion of control in  
18 an edgework activity. *Sociological Perspectives*, 49, 583-605.
- 19 Laurendeau, J. (2008). "Gendered risk regimes": A theoretical consideration of edgework and  
20 gender. *Sociology of Sport Journal*, 25, 293-309.
- 21 Laurendeau, J., & Gibbs Van Brunschot, E. (2006). Policing the edge: Risk and social control  
22 in skydiving. *Deviant Behavior*, 27, 173-201.
- 23 Llewellyn, D. J., & Sanchez, X. (2008). Individual differences and risk taking in rock  
24 climbing. *Psychology of Sport and Exercise*, 9, 413-426.
- 25 Llewellyn, D. J., Sanchez, X., Asghar, A., & Jones, G. (2008). Self-efficacy, risk taking and

- 1 performance in rock climbing. *Personality and Individual Differences*, 45, 75-81.
- 2 Lois, J. (2001). Peaks and valleys: The gendered emotional culture of edgework. *Gender &*  
3 *Society*, 15, 381-406.
- 4 Lupton, D. (1999). *Risk*. London: Routledge.
- 5 Lyng, S. G. (1990). Edgework: A social psychological analysis of voluntary risk taking.  
6 *American Journal of Sociology*, 95, 851-86.
- 7 Lyng, S. G. (Ed.) (2005). *Edgework: The sociology of risk taking*. New York: Routledge.
- 8 McKenna, F. P., Stanier, R. A., & Lewis, C. (1991). Factors underlying illusory self-  
9 assessment of driving skill in males and females. *Accident Analysis and Prevention*, 23,  
10 45-52.
- 11 McKenna, F. P., Warbuton, D. M., & Winwood, M. (1993). Exploring the limits of optimism:  
12 The case of smokers' decision making. *British Journal of Psychology*, 84, 389-394.
- 13 Martha, C., & Griffet, J. (2006). Le BASE-jump, le jeu le plus sérieux du monde [BASE-  
14 jumping: The most serious play in the world]. *Ethnologie Française*, 36, 635-642.
- 15 Martha, C., Sanchez, X., & Gomà-i-Freixanet (in press). Risk perception as a function of risk  
16 exposure amongst rock climbers. *Psychology of Sport and Exercise*.  
17 doi:10.1016/j.psychsport.2008.07.004.
- 18 Moen, B., & Rundmo, T. (2005). Predictors of unrealistic optimism: A study of Norwegian  
19 risk takers. *Journal of Risk Research*, 8, 363-382.
- 20 Perloff, L. S., & Fetzer, B. S. (1986). Self-other judgments and perceived vulnerability to  
21 victimization. *Journal of Personality and Social Psychology*, 50, 502-510.
- 22 Radcliffe, N. M., & Klein, W. M. P. (2002). Dispositional, unrealistic, and comparative  
23 optimism: Differential relations with the knowledge and processing of risk information  
24 and beliefs about personal risk. *Personality and Social Psychological Bulletin*, 28, 836-  
25 846.

- 1   Recours, R., Souville, M., & Griffet, J. (2004). Expressed motives for informal and club /  
2       association-based sports participation: Validation of a questionnaire. *Journal of Leisure*  
3       *Research, 36*, 1-22.
- 4   Rossi, B., & Cereatti, L. (1993). The sensation seeking in mountain athletes as assessed by  
5       Zuckerman's Sensation Seeking Scale. *International Journal of Sport Psychology, 24*,  
6       417-431.
- 7   Rutter, D. R., Quine, L., & Albery, I. P. (1998). Perceptions of risk in motorcyclists:  
8       Unrealistic optimism, relative realism and predictions of behavior. *British Journal of*  
9       *Psychology, 89*, 681-96.
- 10   Scheier, M. F., & Carver, C. S. (1985). Optimism, coping and health: Assessment and  
11       implications of generalized outcome expectancies. *Health Psychology, 4*, 219-228.
- 12   Schneider, T. A., Butryn, T. M., Furst, D. M., & Masucci, M. A. (2007). A qualitative  
13       examination of risk among elite adventure racers. *Journal of Sport Behavior, 30*, 330-  
14       357.
- 15   Shepperd, J. A., Carroll, P., Grace, J., & Meredith, T. (2002). Exploring the causes of  
16       comparative optimism. *Psychologica Belgica, 42*, 65-98.
- 17   Slanger, E., & Rudestam, K. E. (1997). Motivation and dishinibition in high risk sports:  
18       Sensation seeking and self-efficacy. *Journal of Research in Personality, 31*, 355-374.
- 19   Spinks, A. B., & McClure, R. J. (2007). Quantifying the risk of sports injury: A systematic  
20       review of activity-specific rates for children under 16 years of age. *British Journal of*  
21       *Sport Medicine, 41*, 548-557.
- 22   Toothacker, L. E. (1993). *Multiple comparisons procedures*. Thousand Oaks, CA: Sage  
23       Publications.
- 24   van der Pligt, J. (1998). Perceived risk and vulnerability as predictors of precautionary  
25       behaviour. *British Journal of Health Psychology, 3*, 1-14.

1 Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality*  
2 *and Social Psychology*, 39, 806-820.

3 Young, K. (1993). Violence, risk and liability in male sports culture. *Sociology of Sport*  
4 *Journal*, 10, 373-396.

5 Zuckerman, M. (1983). Sensation seeking and sports. *Personality and Individual Differences*,  
6 4, 285-293.

7 Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*.  
8 New York: Cambridge University Press.

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## 1 Table 1

2 Participants' characteristics regarding age and sporting activity ( $n = 432$ )

	BASE-jumpers ( $n = 39$ )	Paragliders ( $n = 73$ )	Skydivers ( $n = 201$ )	Triathletes ( $n = 119$ )
Mean age (SD)	31.6 (5.9)	37.6 (11.8)	36.0 (9.7)	36.3 (8.6)
Mean frequency of participation (SD)	55.2 (12.1) jumps per year	43.1 (16.6) flights per year	82.3 (14.3) jumps per year	150.8 (62.4) times per year
Mean number of years having participated (SD)	3.1 (1.4)	4.5 (1.9)	6.4 (2.0)	4.6 (1.4)
% ( $n$ ) of respondents having experienced at least one injury episode <sup>(a)</sup>	61 (24)	55 (40)	67 (134)	23 (27)
Injury episodes <sup>(b)</sup> : Median (first, third quartile)	1.0 (0.0, 2.0)	1.0 (0.0, 1.0)	1.0 (0.0, 2.0)	0.0 (0.0, 0.0)

3 *Note:* <sup>a</sup> Injury episodes experienced over the last 3 years whilst participating, and having necessitated medical attention. <sup>b</sup> Since data on injury  
4 episodes are skewed, medians and inter-quartile ranges are provided, instead of means (SDs).

5



## 1 Table 2

2 Correlations between perceived personal AMR, motive of playing to the limit, perceived  
 3 comparative AMR, perceived comparative VSI, and past injury episodes, amongst each group  
 4 of participants.

		1	2	3	4	5
1. Perceived personal AMR	BASE-jumpers	–				
	Paragliders	–				
	Skydivers	–				
	Triathletes	–				
2. Motive of playing to the limit	BASE-jumpers	0.31**	–			
	Paragliders	0.29**	–			
	Skydivers	0.28**	–			
	Triathletes	0.09	–			
3. Perceived AMR in comparison with that of the specific referent <sup>a</sup>	BASE-jumpers	0.15*	0.14	–		
	Paragliders	0.16*	0.15*	–		
	Skydivers	0.17*	0.14	–		
	Triathletes	0.15*	0.12	–		
4. Perceived VSI in comparison with that of the specific referent <sup>a</sup>	BASE-jumpers	-0.15*	0.17*	-0.61***	–	
	Paragliders	-0.12	0.20*	-0.64***	–	
	Skydivers	-0.14*	0.22*	-0.66***	–	
	Triathletes	-0.19*	0.10	-0.62***	–	
5. Perceived VSI in comparison with that of the non-specific referent <sup>b</sup>	BASE-jumpers	-0.30**	0.35**	-0.18*	0.20*	–
	Paragliders	-0.31**	0.32**	-0.19*	0.21*	–
	Skydivers	-0.34**	0.30**	-0.17*	0.22*	–
	Triathletes	-0.31**	0.11	-0.16*	0.19*	–
6. Past injury episodes	BASE-jumpers	-0.27**	-0.20*	-0.15*	0.35**	0.42**
	Paragliders	-0.25**	-0.21*	-0.16*	0.34**	0.40**
	Skydivers	-0.25**	-0.22*	-0.17*	0.36**	0.40**
	Triathletes	-0.19*	-0.13	-0.15*	0.28**	0.31**

5 Note: \*  $p < 0.05$  (2-tailed). \*\*  $p < 0.01$  (2-tailed). \*\*\*  $p < 0.001$  (2-tailed). AMR = abilities to  
 6 manage risks inherent to the sporting activity. VSI = vulnerability to a serious injury whilst  
 7 participating. <sup>a</sup> The specific referent was the average same-age and same-sex sportsman  
 8 participating in the same sport. <sup>b</sup> The non-specific referent was the average same-age and  
 9 same-sex sportsman.

## 1 Table 3

2 Means, standard deviations, and group differences in perceived personal AMR, motive of playing to the limit, perceived comparative AMR and

3 VSI ( $n = 432$ )

Variables	Groups	$n$	Mean	SD	$t$ ( $p$ value)	$F$ -value ( $p$ value) and Tukey-Kramer post-hoc tests ( $p$ value) on the four groups
Perceived personal AMR	BASE-jumpers	39	2.1	1.2	-	$F_{(3, 430)} = 7.9$ ( $p < 0.001$ ) Triathletes > BASE-jumpers, Paragliders ( $p < 0.001$ ) Triathletes > Skydivers ( $p = 0.009$ )
	Paragliders	73	2.4	1.3	-	
	Skydivers	201	2.9	1.4	-	
	Triathletes	119	4.1	1.0	-	
Playing to the limit	BASE-jumpers	39	3.8	1.4	-	$F_{(3, 429)} = 8.8$ ( $p < 0.001$ ) Triathletes > BASE-jumpers, Paragliders, Skydivers ( $p < 0.001$ )
	Paragliders	73	3.6	1.2	-	
	Skydivers	201	3.4	1.1	-	
	Triathletes	119	4.5	1.2	-	
Perceived AMR in comparison with that of the specific referent <sup>a</sup>	BASE-jumpers	39	0.09	1.0	1.1 ( $p = 0.132$ )	$F_{(3, 430)} = 1.64$ ( $p = 0.234$ )
	Paragliders	73	0.12	0.9	1.3 ( $p = 0.101$ )	
	Skydivers	201	0.11	1.0	1.2 ( $p = 0.115$ )	
	Triathletes	119	0.08	0.8	1.0 ( $p = 0.202$ )	
Perceived VSI in comparison with that	BASE-jumpers	39	-0.10	0.7	1.1 ( $p = 0.133$ )	$F_{(3, 430)} = 1.78$ ( $p = 0.145$ )

of the specific referent <sup>a</sup>	Paragliders	73	-0.11	0.8	1.2 ( $p = 0.110$ )	$F_{(3, 430)} = 7.72$ ( $p < 0.001$ ) Triathletes < BASE-jumpers, Paragliders, Skydivers ( $p < 0.001$ )
	Skydivers	201	-0.12	0.7	1.2 ( $p = 0.102$ )	
	Triathletes	119	-0.13	0.9	1.3 ( $p = 0.088$ )	
	BASE-jumpers	39	0.45	1.2	4.6 ( $p < 0.001$ )	
Perceived VSI in comparison with that of the non-specific referent <sup>b</sup>	Paragliders	73	0.38	1.0	3.7 ( $p = 0.007$ )	
	Skydivers	201	0.30	0.9	3.2 ( $p = 0.009$ )	
	Triathletes	119	-1.11	1.0	6.5 ( $p < 0.001$ )	

- 1 *Note:*  $t$  = one-sample  $t$  test value against 0. AMR = abilities to manage risks inherent to the sporting activity. VSI = vulnerability to a serious
- 2 injury whilst participating. <sup>a</sup> The specific referent was the average same-age and same-sex sportsman participating in the same sport. <sup>b</sup> The non-
- 3 specific referent was the average same-age and same-sex sportsman. Possible range for perceived comparative AMR and VSI was -3 to +3.

- 1 Table 4
- 2 Hierarchical regression analysis for variables predicting perceived comparative VSI in comparison with that of the non-specific referent (i.e., the
- 3 average same-age and same-sex sportsman), amongst each group of participants

	BASE-jumpers ( <i>n</i> = 39)	Paragliders ( <i>n</i> = 73)	Skydivers ( <i>n</i> = 201)	Triathletes ( <i>n</i> = 119)
Step1				
Age	0.10 (-0.02, 0.19)	0.14* (0.04, 0.30)	0.15* (0.03, 0.31)	0.18* (0.07, 0.29)
Number of years of participation	0.20** (0.05, 0.30)	0.22** (0.05, 0.41)	0.24** (0.11, 0.39)	0.19** (0.06, 0.32)
Frequency of participation	0.13* (0.04, 0.28)	0.14* (0.03, 0.28)	0.14* (0.05, 0.26)	0.10 (0.02, 0.21)
<i>R</i> <sup>2</sup>	0.12	0.14	0.15	0.16
Adjusted <i>R</i> <sup>2</sup>	0.10	0.12	0.12	0.14
Step2				
Age	0.09 (-0.01, 0.21)	0.12* (0.04, 0.31)	0.13* (0.03, 0.27)	0.16* (0.03, 0.30)
Number of years of participation	0.18** (0.04, 0.29)	0.21** (0.04, 0.30)	0.20** (0.11, 0.37)	0.17** (0.06, 0.32)
Frequency of participation	0.12* (0.05, 0.29)	0.13* (0.04, 0.29)	0.12* (0.06, 0.29)	0.09 (0.01, 0.21)
Perceived personal AMR	-0.16* (-0.31, -0.02)	-0.18** (-0.33, -0.01)	-0.20*** (-0.35, -0.04)	-0.24*** (-0.41, -0.07)
Playing to the limit	0.32** (0.14, 0.45)	0.24*** (0.08, 0.35)	0.24*** (0.07, 0.35)	0.09 (-0.05, 0.18)

Adjusted $R^2$	0.15	0.17	0.16	0.18
Step 3				
Age	0.04 (-0.04, 0.13)	-0.02 (-0.10, 0.06)	-0.06 (-0.18, 0.03)	0.13* (0.01, 0.24)
Number of years of participation	0.16** (0.02, 0.34)	0.18** (0.03, 0.32)	0.17** (0.03, 0.31)	0.15** (0.04, 0.28)
Frequency of participation	0.11* (0.02, 0.24)	0.12* (0.03, 0.26)	0.12* (0.03, 0.27)	0.07 (-0.02, 0.19)
Perceived personal AMR <sup>a</sup>	-0.12* (-0.22, -0.01)	-0.14** (-0.30, -0.02)	-0.16*** (-0.31, -0.01)	-0.23*** (-0.40, -0.08)
Playing to the limit	0.27** (0.14, 0.42)	0.21*** (0.10, 0.33)	0.22*** (0.11, 0.34)	0.13 (0.01, 0.22)
Injury experience <sup>b</sup>	0.31** (0.15, 0.43)	0.29** (0.14, 0.40)	0.28** (0.13, 0.42)	0.12* (0.01, 0.24)
$R^2$	0.24	0.25	0.28	0.23
Adjusted $R^2$	0.22	0.22	0.26	0.21

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2 *Note:* Standardized coefficients (95% confidence intervals) are reported. \*  $p < 0.05$ . \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$ . AMR = abilities to manage risks.

3 <sup>a</sup> Past injury episodes experienced over the last 3 years while participating, and having necessitated medical attention.

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