Are perceived comparative risks realistic among high-risk sports participants?
Cécile Martha, Jason Laurendeau

To cite this version:
Cécile Martha, Jason Laurendeau. Are perceived comparative risks realistic among high-risk sports participants?. International Journal of Sport and Exercise Psychology, 2010, 8 (2), pp.129-146. 10.1080/1612197X.2010.9671938. hal-03988196

HAL Id: hal-03988196
https://hal.science/hal-03988196
Submitted on 14 Feb 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Are perceived comparative risks realistic amongst high-risk sports participants?

Cécile Martha(1) and Jason Laurendeau(2)

(1) University of the Mediterranean, Marseilles, France.

(2) University of Lethbridge, Lethbridge, Alberta.

Full mailing addresses of authors:

Dr. Cécile MARTHA (correspondence author)
Institut des Sciences du Mouvement, Faculté des Sciences du Sport, Université de la Méditerranée
163 avenue de Luminy, case 910, 13288 Marseille, France.
Phone number: +33-4 91 17 04 39; Fax: +33-4 91 17 04 12
E-mail: cecile1martha@aol.com; cecile.martha@univmed.fr

Dr. Jason LAURENDEAU
Department of Sociology, University of Lethbridge,
4401 University Drive, T1K 3M4, Lethbridge, Alberta.
Phone number: +403-329-2717; Fax: +403-329-2085
E-mail: jason.laurendeau@uleth.ca

Date of submission: 22 August 2008
Are perceived comparative risks realistic amongst high-risk sports participants?

Date of submission: 22 August 2008
Abstract

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

Key-words: Comparative optimism; Realism; Perceived abilities; Playing to the limit; Past injury episodes.
Are perceived comparative risks realistic amongst high-risk sports participants?

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

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

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

There exist few quantitative studies that have examined high-risk sports participants’ risk perception from a social comparison perspective. Moreover, existing sports studies have reported contradictory results; high-risk sportspersons such as rock climbers assessed their vulnerability of getting seriously injured either similarly or higher to that of their peers (Martha, Sanchez, & Gomà-i-Freixanet, in press), but the inverse comparative assessment has been observed. Indeed, Moen and Rundmo (2005) have shown that skydivers expressed a comparative optimism, since they assessed their vulnerability of getting seriously injured lower to that of their peers. Such a tendency has also been widely observed for a variety of events in the field of driving (Harré, Susan, & O’Neill, 2005), crime (Perloff & Fetzer, 1986),
and health (Weinstein, 1980). A distinction must be established between dispositional
optimism (Scheier & Carver, 1985), and specific domain-related comparative optimism.
While dispositional optimism is defined as a personality trait, or a generalized positive
expectancy that one will experience good outcomes, domain-related comparative optimism
involves rating one’s risk relative to that of the average peer, and can vary from one event to
another. Thus, comparative optimism examined within a specific context may have no link
with optimism measured as a general personality trait (Davidson & Prkachin, 1997; Martha et
al., in press; Radcliffe & Klein, 2002).
As people’s perceived comparative risks may be related to the way people perceive
safety recommendations (Chappé, Verlhiac, & Meyer, 2007; Perloff & Fetzer, 1986) and
adopt cautious behaviours (Klein, 1997; McKenna, Stanier, & Lewis, 1991), it seems
important to focus on how risk sports practitioners perceive their risk exposure whilst
participating in their activity, in comparison with “others”. This was the purpose of the
present study.
In this paper, we investigated two types of risk sports practitioners: High-risk sportsmen
(i.e., skydivers, BASE-jumpers, and paragliders) and moderate-risk sportsmen (i.e.,
triathletes). We had two objectives. The first was to examine how risk sports practitioners
perceive their personal abilities to manage risks (AMR), and how they perceive their AMR in
comparison to that of a specific referent (i.e., the average sportsman participating in the same
sport). We also examined how risk sports practitioners assess their vulnerability to a serious
injury (VSI) whilst participating in comparison to that of: (1) a specific referent; (2) a non-
specific referent (i.e., the average sportsman).
In the field of road traffic (Armor & Taylor, 1998; Causse, Delhomme, & Kouabenan,
2005), as well as that of high-risk sport such as rock-climbing (Martha et al., in press), studies
have shown that comparative optimism may be not systematic, as respondents may perceive
their own VSI or their own AMR as similar to those of others. Respondents may also express comparative pessimism, perceiving their own VSI as greater, or their own AMR as lower than that of others, particularly when they have experienced negative events such as accidents (Rutter, Quine, & Albery, 1998), or when they feel they have little personal control over dangers (Harris, 1996). Since the present study focused on sports which involve, to different degrees, some risks which remain uncontrollable, we might expect that comparative optimism will not be prevalent amongst risk sports practitioners. More precisely, we hypothesized that:

1. risk sports practitioners would perceive their AMR and their VSI as being similar to those of the specific referent (Hypothesis 1);
2. they would express comparative pessimism when they compare their VSI with that of the non-specific referent (Hypothesis 2), since we hypothesized that they would imagine the non-specific referent as the typical sportsman who does not necessarily practice a dangerous sport.

The second objective of this study was to examine which variables influenced risk sports practitioners’ perceived comparative VSI. We first considered the role of age and sporting experience (e.g., frequency of participation) on perceived comparative VSI. Then we examined the role of perceived personal AMR. Perceived personal AMR has been negatively linked to perceived comparative vulnerability in the field of high-risk sports (Moen & Rundmo, 2005), as well as that of driving (Delhomme, 1991). In this vein, we expected that perceived personal AMR will be negatively linked to perceived comparative VSI (Hypothesis 3). We also aimed to examine the role of the motive of playing to the limit on perceived comparative VSI. Based on the hypothesis that risk sport practitioners’ perceived comparative risks would be in some way realistic, we expected that participants who like playing to the limit will be conscious of the risk they take, and thus will be likely to assess themselves as being more exposed to the risk of injury than the average sportsman (Hypothesis 4). Finally, in line with studies (e.g., Rutter et al., 1998) who found a positive link between accident
history and an increased perceived vulnerability, we expected that past injury episodes will be
positively linked with perceived comparative VSI (Hypothesis 5).

Method

Participants
This study was approved by the local university ethics committee of the University of
the Mediterranean in Marseilles (France). We limited the analysis to men because there were
very few women who responded to the surveys. Although risk sport participation does not
guarantee injury or death and that there are numerous ways to participate in most sports in
relative safety (Donnelly, 2004), risk of serious injury or death is a ubiquitous feature of some
sporting experiences, in comparison with sports involving almost no risk for physical health.
This is the case of skydiving, BASE-jumping, and paragliding, that we qualified as “high risk
sports” in this study. In order to determine the dangerousness of these sporting activities, we
have quantified the risk of activity-related injury (or death) based on the number of injuries
(or deaths) per 1000 participants per year (Spinks & McClure, 2007). According to the French
federations of paragliding and skydiving, each of these sports has claimed about 12 lives per
year in France over the past 5 years, that is to say 1 death per 3500 skydivers and per 2580
paragliders. BASE-jumping, a sport in which participants use a parachute to jump from fixed
objects (e.g., buildings, bridges, cliffs; see Cooper & Laurendeau, 2007), is also a high-risk
sport. This sport has resulted in 1 death per year in France amongst the 200 French BASE-
jumpers over the past 5 years (Di Giovanni, 2007). In contrast to those high-risk sports, other
sports such as dancing, fitness, or swimming, can be classified in the category of low-risk
sports as they involve a very low probability of being seriously injured or killed. Finally, at an
intermediate level, moderate-risk sports are those which usually do not result in fatalities like
do high-risk sports, but which are more likely to involve physical accidents in comparison to
low-risk sport (Zuckerman, 1983). This is the case of triathlon, which involves risk of
collision or falling whilst cycling. According to the French federation of triathlon, this sport
has caused about 90 physical injuries per year over the past 5 years (i.e., 1 injury per 233
participants).

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

Material

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

The first section gathered general information on variables such as age and sporting
experience: number of years of participation, frequency of participation, and injury episodes
having necessitated medical attention over the past 3 years whilst participating. Frequency of
participation was measured by means of different criterion for each of the groups. For
skydivers, BASE-jumpers and paragliders, we measured the number of jumps or flights per
year which is considered by these sportsmen to be a good indication of frequency
(Laurendeau, 2006; Martha & Griffet, 2006). For triathletes, we measured frequency of
participation by asking the number of times per week they train for triathlon. We then
converted weekly participation to yearly participation in order to compare frequency of
participation between the four groups.
In the second section, three items developed for the need of the present survey measured perceived personal AMR (Cronbach’s alpha = 0.78): “whilst skydiving, I think that most of the outcomes are under my control”; “I think that my know-how in participating skydiving safely is high”; “whilst skydiving, I feel myself able to manage most of the risks”. Responses were given on a 7-point scale as recommended by Diefenbach, Weinstein, and O’Reilly (1993) in their study on appropriate measures for assessing perceptions of susceptibility to health and safety risks, from 1 (‘I strongly disagree’) to 7 (‘I strongly agree’).

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

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

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

Procedure

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

Skydivers and paragliders were also contacted by e-mail, as the French federations of paragliding and skydiving provided e-mail addresses of their participant members. We contacted 200 skydivers and 75 paragliders. Response rates were high, with 152 skydivers (76%) and 53 paragliders (71%) agreeing to participate. Then, the participation of 22 additional skydivers on their drop-zone followed on from an oral invitation made by the
director of the drop zone. As we did not know how many skydivers were present at the drop zone at this time, response rate was difficult to quantify in this case. We also invited 26 additional paragliders on their practice sites to take part in the survey. Amongst them, 77% (n = 20) agreed to fill out the questionnaire.

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

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

Statistical Analyses

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

One-sample t-tests were carried out to measure whether participants expressed comparative pessimism, comparative optimism, or whether they perceived their AMR and VSI as being similar to those of the non-specific and specific referents (i.e., whether their
perceived comparative VSI and AMR scores were higher, lower, or close to zero).

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

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

In a first step, we aimed at examining whether age and sporting characteristics predicted variance in perceived comparative VSI (step 1), without considering the role of the psychosocial variables correlated to perceived comparative VSI, which may have attenuated the effects of age and sporting characteristics. In a second step, we entered psychosocial variables in the model (step 2): perceived personal AMR and playing to the limit. As we
expected that the link found in correlational analyses between past injury episodes and
perceived comparative VSI might mask the effects of the other variables, we examined the
role of past injury episodes in the last step (step 3). This also allowed us to observe whether
any associations remained significant after accounting for past injury episodes.

Results

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

![TABLE 1 ABOUT HERE](image)

Correlations amongst the measures are shown in Table 2. The pattern of correlations
between the study variables was nearly the same amongst the four groups of sportsmen,
except for the motive of playing to the limit. Amongst BASE-jumpers, paragliders, and
skydivers, playing to the limit was related to perceived personal AMR ($r > 0.28, p < 0.01$) and
perceived VSI in comparison with that of the non-specific referent ($r > 0.30, p < 0.01$), while
these relationships were not significant amongst triathletes. Amongst all the groups, the
association between perceived personal AMR and perceived comparative AMR was small ($r < 0.17$, $p < 0.05$), while the inverse association between perceived AMR and perceived VSI in comparison with that of the specific referent was high ($r < -0.61$, $p < 0.001$). Moderate positive associations were found between past injury episodes and perceived comparative VSI ($r > 0.28$, $p < 0.01$). Past injury episodes was also negatively related to perceived personal AMR amongst all the groups ($r < -0.19$, $p < 0.05$).

INSERT TABLE 2 ABOUT HERE

Descriptive statistics and statistical differences according to the group in perceived personal AMR, motive of playing to the limit, perceived comparative AMR and VSI, are provided in Table 3. MANOVA revealed significant group differences on the dependent variables (Wilks’ Lambda $F_{(15, 1703)} = 3.42$, $p < .001$). There was a difference between the four groups on perceived personal AMR ($F_{(3, 430)} = 7.9$, $p < 0.001$, $\eta^2 = 0.11$), controlling for number of years of participation which had no effect ($F_{(1, 429)} = 1.9$, $p = 0.09$), as triathletes reported higher scores on perceived personal AMR than did skydivers ($p = 0.009$), BASE-jumpers ($p < 0.001$), and paragliders ($p < 0.001$). There was also a difference between the groups on the motive of playing to the limit ($F_{(3, 429)} = 8.8$, $p < 0.001$, $\eta^2 = 0.10$), controlling for number of years of participation which had no effect ($F_{(1, 429)} = 0.8$, $p = 0.32$), since triathletes reported higher scores on this motive than did the three groups of high-risk sports practitioners ($p < 0.001$). The four groups of sportsmen perceived their AMR and their VSI as being similar to those of the specific referent. When the comparison target was the non-specific referent, perceived comparative VSI was different amongst the four groups ($F_{(3, 430)} = 7.72$, $p < 0.001$, $\eta^2 = 0.12$), controlling for number of years of participation which had a positive effect ($F_{(1, 429)} = 3.8$, $p < 0.05$, $\eta^2 = .05$). Only triathletes expressed comparative optimism, scoring -1.11 on a scale that ran from -3 to +3 ($p < 0.001$). Skydivers, BASE-jumpers and paragliders expressed comparative pessimism, scoring more than 0.30 ($p < 0.01$).
Hierarchical regression analyses (Table 4) were performed to examine factors related to perceived VSI in comparison with that of the non-specific referent (i.e., the average same-age and same-sex sportsman), amongst each group of sportsmen. In the first step, the variables age, number of years of participation, and frequency of participation, accounted for between 10% and 14% of the variance (adjusted $R^2; F \geq 4.53, p < 0.01$). Number of years of participation was positively associated with perceived comparative VSI amongst the four groups ($\beta \geq 0.19, p < 0.01$), as was age amongst paragliders, skydivers and triathletes ($\beta \geq 0.14, p < 0.05$), and as was frequency of participation amongst BASE-jumpers, paragliders, and skydivers ($\beta \geq 0.13, p < 0.05$).

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

Perceived personal AMR was an inverse predictor of perceived comparative VSI amongst the four groups ($\beta \leq -0.16, p < 0.05$).

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

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

Discussion

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

High-risk sportmen’s scores on perceived personal AMR were low, since these scores were situated on average beyond the middle of the scale. This seems to speak to high-risk sports practitioners acknowledging that despite their best efforts, they remain highly exposed to uncontrollable risks (e.g., environmental conditions, other participants’ behaviour). This finding sheds further light on the notion of control in edgework (Lyng, 1990). Lyng (1990) highlights that edgeworkers have an illusory sense that they can control the uncontrollable, an idea not supported here. Instead, this suggests that practitioners believe themselves to be in control of many dimensions of their edgework activities, but still recognize that they simply cannot manage everything under conditions of uncertainty (see Laurendeau, 2006). This risk acceptation might be constitutive of the “culture of risk” (Donnelly, 2004), according to which injury and even death “may have become a way of life that is produced and reproduced in sport” (Donnelly, 2004, p.33). Triathletes had higher levels of perceived personal AMR than the three groups of high-risk sportmen. However, we must note that triathletes’ score of perceived personal AMR was not high but only moderate, its value corresponding to the middle of the scale. It may be that the triathletes accept that risk is a part of their daily
training. As they train in traffic, they are subjected to hazards posed by other people’s (i.e., drivers’) behaviours. Moreover, the presence of many other participants may entail risk and uncertainty, particularly whilst riding in close proximity to one another. In his study on physical risk and injury in cycling, Albert (1999) also found risk to be a constituent of the culture of this sport. Again, this points to the importance of (sub)cultural constructions of risk (Donnelly, 2004).

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

Triathletes assessed their VSI as being lower than that of the non-specific referent, and similar to that of the specific referent. According to Helweg-Larsen and Shepperd (2001), if respondents tend to express less comparative optimism when compared to a close and specific referent than when compared with a distant or ambiguous one, it may be because respondents
change their risk estimates for the referent rather than for their personal estimates. The absolute judgements for a close referent would be easier to compute than would be the absolute judgement for a large and generalized referent group such as the average person (Chambers & Windschitl, 2004). However, this explanation can not be applied to the high-risk sportsmen’s perceived VSI in comparison to that of the non-specific referent, as high-risk sportsmen expressed comparative pessimism, supporting H2. We may hypothesize that when the referent is not specific, high-risk sportsmen likely compare themselves with typical sportsmen who do not practice a dangerous sport. Such an explanation would support the idea that high-risk sportsmen’s perceived comparative risks are in some way realistic. Further comprehensive research is needed to identify the type of sportspersons with whom high-risk sportsmen tend to compare themselves when the referent is a non-specific one.

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

Although the triathletes reported more motivation for playing to the limit than did the three groups of high-risk sportsmen, this motive was not related to perceived comparative VSI amongst the triathletes. Triathlon involves statistically less risk of serious injury or death than BASE-jumping, paragliding and skydiving. No triathlon-related fatality has occurred in the last five years in France. Thus, playing to the limit whilst training for triathlon probably does not involve as many objective risks as does playing to the limit whilst participating in high-
risk sports. This also speaks to the notion that “the edge” is a fluid construction, contingent on the activity, as well as one’s perceived risk (Lyng 1990).

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

The findings of the present study should be treated with a degree of caution given the following limitations. First, the cross-sectional research design limits the extent to which we can make claims about causality based on these data. Second, the use of self-reported
measures raises concerns about bias in responses. For instance, some of the high-risk sportsmen may have exaggerated their enjoyment of playing to the limit, or their perceived risk of getting injured in their sports, as there are subcultural norms at play around these issues (see Hunt, 1995; Laurendeau & Gibbs Van Brunschot, 2006). However, we endeavoured to limit response bias by taking precautions when inviting participants to take part in the study, stressing the anonymity of their responses and our interest in receiving honest and accurate information. The response rate may also point towards potential response bias. Perhaps we would have had more reliable information about high-risk sportsmen’s risk perception and risk behaviour if we could also have obtained participation of high-risk sportsmen who have a propensity to reject psycho-sociological studies on risk-taking. This issue stresses the necessity of taking precautions while inviting high-risk sportsmen to participate to such a study. In this vein, the use of personal and progressive way of inviting the participants (e.g., after a qualitative study period based only on observation or informal interviews) could be useful. Moreover, our sample only included current participants, which might have influenced the results. Perhaps, having included participants who were no longer active, above all those who were seriously injured, might have involved higher levels of perceived vulnerability. Further research should examine these associations longitudinally.

Third, as we investigated only four types of sporting activities, we must be cautious about generalizing our results to other categories of sportsmen. This is the case even for other risk sports, as there is some evidence that perceptions of control are not simply a function of belief in a survival instinct as Lyng (1990) suggests. Instead, they are contingent on specific bodies of technical knowledge about particular activities (Laurendeau, 2006). This issue of generalization is further compounded by the fact that our analysis considered only men who participate in these activities. Given that women and men do edgework differently (Laurendeau, 2008), future studies should explore the experiences of female participants in
order to examine potential gender differences in risk perception and risk exposure. This is particularly important in light of the argument that whether and how women and men engage in edgework is itself part of the process of constructing a particular kind of masculinity or femininity (Laurendeau, 2008).

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

Conclusion

In this study we set out to explore what has to date been an under-researched area in the study of social comparison and risk behaviours, namely, the perceived comparative risks in the field of high-risk sports. High-risk sports participants’ tendency to perceive their vulnerability as being similar to that of their peers, and as being higher than that of the non-specific referent, suggests that practitioners are not oblivious to the hazards of their sports. In a “culture of risk” (Donnelly, 2004), even participants in risk sports actively engage with the question of how to participate (e.g., what kinds of skydives to do and in what conditions). Contrary to the belief that comparative optimism would be linked to risky behaviours (e.g., Klein, 1997; McKenna et al., 1991), other studies from health (McKenna et al., 1993; Radcliffe & Klein, 2002; van der Pligt, 1998), driving (Causse et al., 2005) or sport psychology (Martha et al., in press) literatures have shown that comparative optimism was not systematically associated with detrimental behaviour, and thus may reflect relative accuracy in risk perception. Our results also lend support to a relative realism amongst high-risk sports
practitioners, since participants whose behaviour puts them at risk are aware of this. Future research is needed to further examine the role that social comparison in general, and perceived comparative risk in particular, play in the risk-taking decision-making process.


being less at risk but no more in control than others. *British Journal of Social Psychology*, 33, 369-86.


Acknowledgements

The authors would like to thank to the reviewers and to the section editor for their helpful comments on this manuscript.
Table 1

Participants’ characteristics regarding age and sporting activity \((n = 432)\)

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

Note: \(^{(a)}\) Injury episodes experienced over the last 3 years whilst participating, and having necessitated medical attention. \(^{(b)}\) Since data on injury episodes are skewed, medians and inter-quartile ranges are provided, instead of means (SDs).
Correlations between perceived personal AMR, motive of playing to the limit, perceived comparative AMR, perceived comparative VSI, and past injury episodes, amongst each group of participants.

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

Note: * p < 0.05 (2-tailed). ** p < 0.01 (2-tailed). *** p < 0.001 (2-tailed). AMR = abilities to manage risks inherent to the sporting activity. VSI = vulnerability to a serious injury whilst participating. a The specific referent was the average same-age and same-sex sportsman participating in the same sport. b The non-specific referent was the average same-age and same-sex sportsman.
Table 3

Means, standard deviations, and group differences in perceived personal AMR, motive of playing to the limit, perceived comparative AMR and VSI \((n = 432)\)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>(n)</th>
<th>Mean</th>
<th>SD</th>
<th>(t) ((p) value)</th>
<th>(F)-value ((p) value) (\text{and Tukey-Kramer post-hoc tests} (p) value) on the four groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived personal AMR</strong></td>
<td>BASE-jumpers</td>
<td>39</td>
<td>2.1</td>
<td>1.2</td>
<td>-</td>
<td>(F_{(3, 430)} = 7.9 \ (p &lt; 0.001))</td>
</tr>
<tr>
<td></td>
<td>Paragliders</td>
<td>73</td>
<td>2.4</td>
<td>1.3</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skydivers</td>
<td>201</td>
<td>2.9</td>
<td>1.4</td>
<td>-</td>
<td>Triathletes &gt; BASE-jumpers, Paragliders ((p &lt; 0.001))</td>
</tr>
<tr>
<td></td>
<td>Triathletes</td>
<td>119</td>
<td>4.1</td>
<td>1.0</td>
<td>-</td>
<td>Triathletes &gt; Skydivers ((p = 0.009))</td>
</tr>
<tr>
<td><strong>Playing to the limit</strong></td>
<td>BASE-jumpers</td>
<td>39</td>
<td>3.8</td>
<td>1.4</td>
<td>-</td>
<td>(F_{(3, 429)} = 8.8 \ (p &lt; 0.001))</td>
</tr>
<tr>
<td></td>
<td>Paragliders</td>
<td>73</td>
<td>3.6</td>
<td>1.2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skydivers</td>
<td>201</td>
<td>3.4</td>
<td>1.1</td>
<td>-</td>
<td>Triathletes &gt; BASE-jumpers, Paragliders, Skydivers ((p &lt; 0.001))</td>
</tr>
<tr>
<td></td>
<td>Triathletes</td>
<td>119</td>
<td>4.5</td>
<td>1.2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived AMR in comparison with that</strong></td>
<td>BASE-jumpers</td>
<td>39</td>
<td>0.09</td>
<td>1.0</td>
<td>1.1 ((p = 0.132))</td>
<td></td>
</tr>
<tr>
<td>of the specific referent*</td>
<td>Paragliders</td>
<td>73</td>
<td>0.12</td>
<td>0.9</td>
<td>1.3 ((p = 0.101))</td>
<td>(F_{(3, 430)} = 1.64 \ (p = 0.234))</td>
</tr>
<tr>
<td></td>
<td>Skydivers</td>
<td>201</td>
<td>0.11</td>
<td>1.0</td>
<td>1.2 ((p = 0.115))</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Triathletes</td>
<td>119</td>
<td>0.08</td>
<td>0.8</td>
<td>1.0 ((p = 0.202))</td>
<td></td>
</tr>
<tr>
<td><strong>Perceived VSI in comparison with that</strong></td>
<td>BASE-jumpers</td>
<td>39</td>
<td>-0.10</td>
<td>0.7</td>
<td>1.1 ((p = 0.133))</td>
<td>(F_{(3, 430)} = 1.78 \ (p = 0.145))</td>
</tr>
</tbody>
</table>
### Perceived comparative risks in high-risk sports

<table>
<thead>
<tr>
<th>Sports</th>
<th>AMR</th>
<th>VSI</th>
<th>Comparative AMR and VSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paragliders</td>
<td>73</td>
<td>-0.11</td>
<td>0.8 1.2 (p = 0.110)</td>
</tr>
<tr>
<td>Skydivers</td>
<td>201</td>
<td>-0.12</td>
<td>0.7 1.2 (p = 0.102)</td>
</tr>
<tr>
<td>Triathletes</td>
<td>119</td>
<td>-0.13</td>
<td>0.9 1.3 (p = 0.088)</td>
</tr>
</tbody>
</table>

**BASE-jumpers**

<table>
<thead>
<tr>
<th>Sports</th>
<th>AMR</th>
<th>VSI</th>
<th>Comparative AMR and VSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paragliders</td>
<td>39</td>
<td>0.45</td>
<td>1.2 4.6 (p &lt; 0.001)</td>
</tr>
<tr>
<td>Skydivers</td>
<td>73</td>
<td>0.38</td>
<td>1.0 3.7 (p = 0.007)</td>
</tr>
<tr>
<td>Triathletes</td>
<td>201</td>
<td>0.30</td>
<td>0.9 3.2 (p = 0.009)</td>
</tr>
</tbody>
</table>

**Note:**
- The specific referent was the average same-age and same-sex sportsman participating in the same sport.
- The non-specific referent was the average same-age and same-sex sportsman. Possible range for perceived comparative AMR and VSI was -3 to +3.
Perceived comparative risks in high-risk sports

Table 4

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

<table>
<thead>
<tr>
<th></th>
<th>BASE-jumpers (n = 39)</th>
<th>Paragliders (n = 73)</th>
<th>Skydivers (n = 201)</th>
<th>Triathletes (n = 119)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.10 (-0.02, 0.19)</td>
<td>0.14* (0.04, 0.30)</td>
<td>0.15* (0.03, 0.31)</td>
<td>0.18* (0.07, 0.29)</td>
</tr>
<tr>
<td>Number of years of participation</td>
<td>0.20** (0.05, 0.30)</td>
<td>0.22** (0.05, 0.41)</td>
<td>0.24** (0.11, 0.39)</td>
<td>0.19** (0.06, 0.32)</td>
</tr>
<tr>
<td>Frequency of participation</td>
<td>0.13* (0.04, 0.28)</td>
<td>0.14* (0.03, 0.28)</td>
<td>0.14* (0.05, 0.26)</td>
<td>0.10 (0.02, 0.21)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.12</td>
<td>0.14</td>
<td>0.15</td>
<td>0.16</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.10</td>
<td>0.12</td>
<td>0.12</td>
<td>0.14</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.09 (-0.01, 0.21)</td>
<td>0.12* (0.04, 0.31)</td>
<td>0.13* (0.03, 0.27)</td>
<td>0.16* (0.03, 0.30)</td>
</tr>
<tr>
<td>Number of years of participation</td>
<td>0.18** (0.04, 0.29)</td>
<td>0.21** (0.04, 0.30)</td>
<td>0.20** (0.11, 0.37)</td>
<td>0.17** (0.06, 0.32)</td>
</tr>
<tr>
<td>Frequency of participation</td>
<td>0.12* (0.05, 0.29)</td>
<td>0.13* (0.04, 0.29)</td>
<td>0.12* (0.06, 0.29)</td>
<td>0.09 (0.01, 0.21)</td>
</tr>
<tr>
<td>Perceived personal AMR</td>
<td>-0.16* (-0.31, -0.02)</td>
<td>-0.18** (-0.33, -0.01)</td>
<td>-0.20*** (-0.35, -0.04)</td>
<td>-0.24*** (-0.41, -0.07)</td>
</tr>
<tr>
<td>Playing to the limit</td>
<td>0.32** (0.14, 0.45)</td>
<td>0.24*** (0.08, 0.35)</td>
<td>0.24*** (0.07, 0.35)</td>
<td>0.09 (-0.05, 0.18)</td>
</tr>
</tbody>
</table>
Perceived comparative risks in high-risk sports

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

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

$^a$ Past injury episodes experienced over the last 3 years while participating, and having necessitated medical attention.