

# Gratuitous Risk: perceived danger and recklessness judgements about outdoor sports participants.

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## ABSTRACT

We investigate perceived danger and recklessness judgements ( $N = 2060$ ) about risk-taking in different outdoor sports ranging from mundane activities (such as golf and running) to more adventurous or so-called extreme sports activities (mountaineering, ski-touring, surfing). We investigate the relationship between danger and recklessness and the extent to which fatality frequency, as well as other contextual factors such as gender, dependants, experience, professionalism, and motivations of the sports participant affect these judgements across different sporting activities. Our main findings are that, after controlling for fatality frequency, the type of sport pursued has a significant effect on danger and recklessness judgements, and despite a 100-fold increase in fatality frequency we found no significant effect on both danger and recklessness judgements. Moreover, pursuing an extreme sport for charitable purposes significantly reduces perceived recklessness, while having dependants increases it. While we found no evidence of gender bias in such judgements, we found some evidence of a more complex gender effect that involves differences in inter- and intra-gender judgments. Finally, we investigated survey respondents' attitude about additional life insurance cover under variations of the type of sport activity and a 100-fold increase in fatality frequency. Results support prior findings that fatality frequency is much less relevant than the type of activity pursued.

## **KEYWORDS**

Risk perception; risk communication; concepts of risk; outdoor sports;

## **1. Introduction**

The potential of a miscalibration between actual and perceived danger involved in adventurous activities was alluded to in the earliest discussion of the availability heuristic.

The risk involved in an adventurous expedition, for example, is evaluated, by imagining contingencies with which the expedition is not equipped to cope. If many such difficulties are vividly portrayed, the expedition can be made to appear exceedingly dangerous, although the ease with which disasters are imagined need not reflect their actual likelihood. (Tversky & Kahneman, 1974, p.1128)

Such a miscalibration has been identified with respect to many kinds of unfavourable events, and Lichtenstein, Slovic, Fischhoff, Layman, and Combs (1978) found, as predicted by the availability heuristic, that certain deaths tend to be judged more likely than others when they are easier to recall. Since then there have been numerous studies discussing the exact mechanisms, such as retrieval fluency or amount of recall, underlying the availability heuristic (e.g. Schwarz et al., 1991; Pachur, Hertwig, & Steinmann, 2012; for an overview, see Wänke, 2013), and the representativeness heuristic (e.g. Kahneman & Frederick, 2002; for an overview, see Griffin, Gonzalez, Koehler, & Gilovich, 2012) which have both been identified as underlying intuitive danger and risk judgements. Research into risk perceptions, influenced by the seminal paper by Starr (1969), went beyond the identification of heuristics and led to the psychometric approach to risk perception (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978; Slovic, Fischhoff, & Lichtenstein, 1982; for an overview, see Brun, 1994; Sjöberg, 2000) that identifies factors such as the catastrophic potential, dread, control, novelty, voluntariness, and others (Slovic, 1987) that influence intuitive risk judgements of a given event. Other research themes focus on the role of emotions in intuitive risk judgement (e.g. Loewenstein, Weber, Hsee, & Welch, 2001; Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000; Slovic, Finucane, Peters, & MacGregor, 2002, 2004) and on whether risk judgements also involve a distinctive moral component (Sjöberg & Winroth, 1986; Bassarak, Pfister, & Böhm, 2017). More recently, the Dospert-scale was developed (Weber, Blais, & Betz, 2002; Blais & Weber, 2006, for an overview of differ-

ent risk measures, see Wilson, Zwickle, & Walpole, 2019) to provide a domain-specific measure of risk perception, which identified recreational activities as one distinctive such domain.

Earlier studies that focus on the perceived risk of different recreational sporting activities (e.g. Hendrickx, Vlek, & Oppewal, 1989; Teigen & Brun, 1999) have shown that both verbal and frequency information influence risk perceptions, and that the former tends to overrule the latter (see Visschers, Meertens, Passchier, & De Vries, 2009 for an overview). These studies, and more recent ones that draw on the Dospert-scale (e.g. Dhimi & Mandel, 2012), have typically adopted a first-person perspective focusing on the respondents' own willingness to engage in potentially risky sporting activities, so as to better understand the different factors (such as expected benefit, perceived risk, or attitudes about perceived risk) that may influence an individual's own behaviour.

In contrast, the primary focus of our study are general perceptions about dangerous sporting activities and the corresponding moral evaluations of individuals engaging in these kinds of "gratuitous" risks. As such, our study adopts an external, third-person perspective that examines contextual factors influencing social perceptions of danger and of recklessness judgements. Given these aims, a third person perspective is preferable—as is the norm in many studies focusing on moral judgments (e.g. Knobe & Fraser, 2008; Phillips & Knobe, 2009)—not only because it may help to avoid self-serving biases (such as optimism bias, illusions of competence, etc.) but also because it allows us to manipulate and control for specific contextual factors whose influence this study aims to identify.

We provided study participants with short vignettes describing a person involved in a sporting activity and asked them to judge how risky and reckless this activity is, and what additional life insurance premium would be necessary to cover the activity. Adopting the external approach allows us to easily manipulate contextual factors such as fatality rate, gender, experience, competence, and motivation of the sports participant about whom evaluative danger and recklessness judgements are being made. We varied contextual factors about both the person (their gender, whether they had dependants, their level of experience) and the activity (known fatality rate, type of sport, whether done for charity, whether guided or not).

We show that substantial differences in fatality rate or in factors with direct links

to fatality rates, such as expertise, have far less of an effect on danger, recklessness, and insurance judgements than what *kind* of sport is being pursued. This occurs even in the absence of any “vividly portrayed” difficulties (Tversky & Kahneman, 1974), and merely requires mention of the type of sport undertaken. Other contextual factors primarily influence recklessness rather than risk judgments, and the most important of these relate to whether there are external parties such as dependants or charity organisations that might come to harm or benefit as a result of the sports participant’s activity.

Our results have both theoretical and practical implications. Theoretically, significant differences in danger and recklessness judgements, despite identical fatality rate, provide some initial support for non-probabilistic conceptions of risk (e.g. Williamson, 2009; Pritchard, 2016; Ebert, Smith, & Durbach, 2019) and can thus inform a thriving philosophical debate about different conceptions of risk that have not yet received much attention in psychology or social science. Moreover, divergences between danger and recklessness judgement in our survey suggest that the latter is a more complex context-sensitive notion that has a distinct moral dimension (e.g. Sjöberg & Winroth, 1986). Practically, a miscalibration of actual and perceived risk in adventure sports has the potential to deter people from participating in such sports and may negatively impact recent policy initiatives encouraging greater outdoor activity. Moreover, such miscalibration has the potential to create or further reinforce existing stereotypes of adventure sports participants as reckless and irresponsible “daredevils”.

## **2. Materials and methods**

### ***2.1. Hypotheses***

We expected adventurous sports (climbing, ski-touring, big-wave surfing) to elicit significant higher danger and recklessness judgements than more mundane recreational sports (golf, running), with hill-walking occupying an intermediate position, even when the presented fatality rates of sports were the same (Hypothesis 1). Given the study by Hendrickx et al. (1989), we expected variations of fatality rates *within* a specific sport activity to have an effect on danger and recklessness judgements (Hypothesis 2).

We expected contextual features of the sports participant to influence recklessness judgements. So, e.g. when in 1995 the British Mountaineer Allison Hargreaves died

descending from the summit of K2, a wide-ranging debate about women in extreme sports ensued, with numerous recent commentators (e.g. Rose & Douglas, 2000; Lockwood, 2010) noting a distinct gender bias in mainstream media. Hence, we expected female (extreme) sports participants to be perceived as more reckless (Hypothesis 3). Given that Hargreaves was also the mother of a child, we conjectured that dependants would serve to increase perceived recklessness (Hypotheses 4).

We expected motivational factors to influence recklessness (Hypothesis 5b) but not danger judgments (Hypothesis 5a), but for non-motivational factors to influence both danger and recklessness (Hypothesis 6). We used whether the activity was done for charitable purposes as an example of a motivational factor, and experience in the activity, or using a professional guide, as two non-motivational factors.

Lastly, we expected that judgements about additional life-insurance cover when pursuing different sporting activities to be positively associated with perceived danger and recklessness judgements (Hypothesis 7a) and for the amount of additional life-insurance premium to be positively associated with danger and recklessness judgements (Hypothesis 7b).

## *2.2. Survey participants*

We recruited respondents for our survey using *Prolific* based on some evidence that it is preferable to Amazon Mechanical Turk (Peer, Brandimarte, Samat, & Acquisti, 2017; Palan & Schitter, 2018). Given the nature of the vignettes, we restricted participation to native English speakers living in the UK. We paid each respondent £0.40 (averaging roughly £7.75 per hour).<sup>1</sup> In total we recruited 2166 different respondents for 24 vignettes, of which we received 2060 complete responses. We aimed to collect 80 respondents for each survey with slight variations due to randomized assignments. Respondents were asked for personal information (gender and age) and whether they pursued any so-called extreme sports. The survey received ethical approval from the University of Stirling (GUEP395).

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<sup>1</sup>The National Living Wage in the UK at the time of the surveys was £7.83-8.21. Prolific requires a minimum average pay of £5 per hour.

### 2.3. Method

Rather than probing respondents' intuitive judgements about the (comparative) risks involved in different activities which are then evaluated using objective fatality frequency, as often done in earlier risk perception studies, we assess independent judgements about different sport activities having provided the same case-specific fatality rate information. As a result, we used a *between-subject* design. We considered six different sporting activities: two involve non-extreme sports (golf, running), three involve more adventurous sports (mountaineering, ski-touring, surfing), we had one vignette involving hill-walking, which isn't usually considered an extreme sport but which in the UK leads to numerous fatalities each year. Each survey first offered background information about the general risk of a fatal accident of *any kind* each day in the UK, which is roughly 1 in 1 Million (Blastland & Spiegelhalter, 2013; ONS, 2012, table 5.19). The information was given to provide all survey participants with a common anchor and to make the role of the fatality risk salient in their assessment. Subjects were then offered a vignette describing a sports participant engaging in a specific sporting activity. Each activity had a reported fatality rate of "1 in 160,000 (6 in a million)". The chosen fatality rates are in most cases not unrealistic (for competitive marathon-running, see Kipps, Sharma, & Pedoe, 2011; for some forms of climbing and mountaineering, see McIntosh, Campbell, Dow, & Grissom, 2008; Schussman, Lutz, Shaw, & Bohnn, 1990; Neuhof, Hennig, Schöffl, & Schöffl, 2011; Schöffl, Morrison, Schwarz, Schöffl, & Kupper, 2010, for extreme sports generally, see Blastland & Spiegelhalter, 2013; and see Ebert & Robertson, 2013; Ebert, 2019 for a discussion about variability and relevance of fatality statistics in mountaineering and ski-touring respectively). Variations on the vignettes include gender of the sports participant (for each sporting activity and subsequent condition); dependants, experience/competence of the sports participant (running & ski-touring), professional assistance by mountain guide (ski-touring), motivation "he/she engages in the activity for charity" (ski-touring), and an "extreme" condition involving a fatality rate of 1 in 1600 (600 in a million) (ski-touring).

With six sports and binary factors for dependants, charity, competence, extreme risk, guiding, and sport participant gender, a full factorial design is prohibitively large, requiring  $6 \times 2^6 = 384$  vignettes. We therefore collected data on a subset of these that allowed us to assess all main effects and selected two-way interactions. We first collected responses that varied the type of sport (six levels) and the gender of the

sports participant (two levels), with all other descriptors fixed at baseline conditions (no dependants, not for charity, no guide, high competence, low fatality rate), giving 12 vignettes with which we tested Hypotheses 1 and 3 ( $N = 1,086$ ). We then chose one extreme sport (ski-touring) and one non-extreme sport (running) and, for these two sports, collected responses varying the gender of the sports participant assuming the presence of dependants, with all other descriptors at their baselines (4 vignettes, Hypothesis 4,  $N = 343$ ). Note here that response for the “no dependants” control condition are already available for both these sports. Finally, for ski-touring only, we collected responses specifying the presence of each of the remaining conditions (extreme risk, charity, competence, guiding), again also varying the gender of the sports participant (8 vignettes, Hypotheses 2 ( $N = 338$ ), 5 ( $N = 342$ ), and 6 ( $N = 506$ ), noting that responses for the control group in each case have already been collected). Hypothesis 7 (effect of danger and recklessness on insurance premiums) is tested using all vignettes that use the baseline fatality rate of 1 in 160,000 ( $N = 1,872$  for Hypothesis 7a;  $N = 829$  i.e. those indicating that extra insurance should be paid, for Hypothesis 7b).

Respondents assessed how dangerous and how reckless it is to engage in the sporting activity using a nine point Likert-scale, which was followed up by a five point Likert scale to assess confidence in their judgement.

Finally, to evaluate perceived danger and recklessness judgements in a different way, we introduced a willingness-to-pay style question, or what we call a *requested-to-pay* (RTP) question: we asked respondents whether they think that sports participants ought to pay additional life insurance premium to receive cover for the specific activities and if so, how much. Those who answered positively were asked to identify the additional amount sports participant should pay. We used an anchor (“Life insurance for a 35 year old man/woman costs £300 per year”) to give respondents a shared reference point.

All vignettes, data-sets, and code supporting our results are available at <https://github.com/iandurbach/gratuitous-risk-taking>.

#### ***2.4. Statistical analysis***

Data were analysed using linear and generalised linear models implemented in R. Danger and recklessness responses were log transformed as these were strongly right-

skewed. The transformed distributions were approximately symmetric and, although discrete, residual checking suggested that representation by log-normal distributions was reasonable. Requesting additional insurance is a binary response, modelled using a general linear model with a binomial error structure. As usual for binomial GLMs, the linear dependency between the probability of requesting insurance and explanatory variables was specified using a logit link function. The additional insurance premium was modelled as log-normal, with the log transformation again used to reduce skewness in the original variable.

We tested the effect of vignette scenario descriptors (sport type; presence of dependants, charity, low competence, guiding, extreme risk) using a series of models, varying one or two of these variables at a time while holding the rest fixed at baseline levels, as described in the previous section.

Following model fitting, the Tukey method was used to adjust for multiple comparisons in subsequent post hoc tests. Marginal model means reported in the text were obtained by back-transformation of values from the linear scale. Confidence ratings were heavily skewed towards high confidence, with 90% and 91% of danger and recklessness judgments rated at least moderately confident. As a sensitivity analysis we repeated the analyses reported here removing any judgements made with less than moderate confidence, since these may indicate a lack of understanding. No material differences in any results were observed.

### 3. Results

Extreme sports (climbing, ski-touring, surfing) were regarded as more dangerous and reckless to engage in than non-extreme sports (golf and running), even when fatality rates were held fixed, with hill-walking occupying an intermediate position (Danger  $F_{5,1080} = 84.3$ ,  $p < 0.001$ , Cohen's  $d = 0.99$ ; Recklessness  $F_{5,1080} = 59.4$ ,  $p < 0.001$ , Cohen's  $d = 0.82$ ; Figure 1a). Golf was judged least dangerous, followed by running, hillwalking, and surfing, while ski-touring and climbing were judged most, and equally, dangerous ( $t = 1.1$ ,  $p = 0.88$ ; all other pairwise differences  $t > 3.1$ ,  $p < 0.027$ ). Mean recklessness ratings separated sports into three "tiers": golf and running ( $t = 1.3$ ,  $p = 0.80$ ), hillwalking, and the three extreme sports ( $t < 1.9$ ,  $p > 0.4$ ; all other pairwise differences  $t > 3.4$ ,  $p < 0.01$ ).

Increasing fatality rates 100-fold increased mean perceived danger from 4.19 (95% CI 3.97–4.43) to 4.53 (95% CI 4.27–4.80), and mean perceived recklessness from 3.37 (95% CI 3.12–3.64) to 3.64 (95% CI 3.35–3.95; Figure 1b). Increases in recklessness are not statistically significant ( $F_{1,336} = 1.8, p = 0.18$ ), while those for danger are at most marginally so ( $F_{1,336} = 3.6, p = 0.06$ ). Considering that we increased fatality rates by two orders of magnitude, changes in response variables are modest at best.

Male and female sports participants in our vignettes were judged on average similarly reckless (male 95% CI 2.60–2.88; female 95% CI 2.50–2.77) and in danger (male 95% CI 3.29–3.58; female 95% CI 3.40–3.97). Male sports participants were rated less reckless by male respondents than female respondents (male 95% CI 2.31–2.82; female 95% CI 2.70–3.08;  $t_{1230} = 2.3, p = 0.02$ ), and also in less danger (male 95% CI 3.01–3.45; female 95% CI 3.49–3.82;  $t_{1230} = 3.0, p = 0.002$ ; Figure 1c, right-hand panel). No significant differences existed for female sports participants (Danger  $t_{1230} = 0.2, p = 0.82$ , Recklessness  $t_{1230} = 0.38, p = 0.70$ ; Figure 1c, left-hand panel). No significant interactions involving sport occurred, and the results reported here are for responses pooled over the two sports used (skitouring, running).

Sports participants were judged more reckless if they had dependants ( $F_{1,341} = 8.3, p = 0.004$ , Cohen’s  $d = 0.35$ ), but with no coincident increase in danger ( $F_{1,341} = 0.3, p = 0.602$ ), (Figure 1d). While engaging in a sport for charitable purposes did affect danger judgments, effects on recklessness judgments were substantially greater. (Danger  $F_{1,340} = 3.9, p = 0.05$ ; Recklessness  $F_{1,340} = 10.5, p = 0.001$ , Cohen’s  $d = 0.32$ ; Figure 1e). Being highly competent, or otherwise being accompanied by a guide, had no significant effect on danger or recklessness assessments (Danger  $F_{2,503} = 1.5, p = 0.23$ ; Recklessness  $F_{2,503} = 1.9, p = 0.15$ ; Hypothesis 6 not supported; Figure 1e).

Survey respondents were more likely to request additional life insurance and higher insurance premiums if they judged an activity to be dangerous or reckless or both (hypothesis 7a and 7b; Figure 1g and h, and Table 1). Responses on the log scale and the presence of an interaction effect between danger and recklessness for the binary advocacy response complicates interpretation slightly. Holding recklessness fixed at its mean rating, each one-unit increase in danger increased the odds of advocating additional life assurance by 30%. The same one-unit increase in danger increased recommended insurance premiums by 14%, irrespective of recklessness rating (as no interaction exists here). Similarly, a one-unit increase in recklessness increased the odds

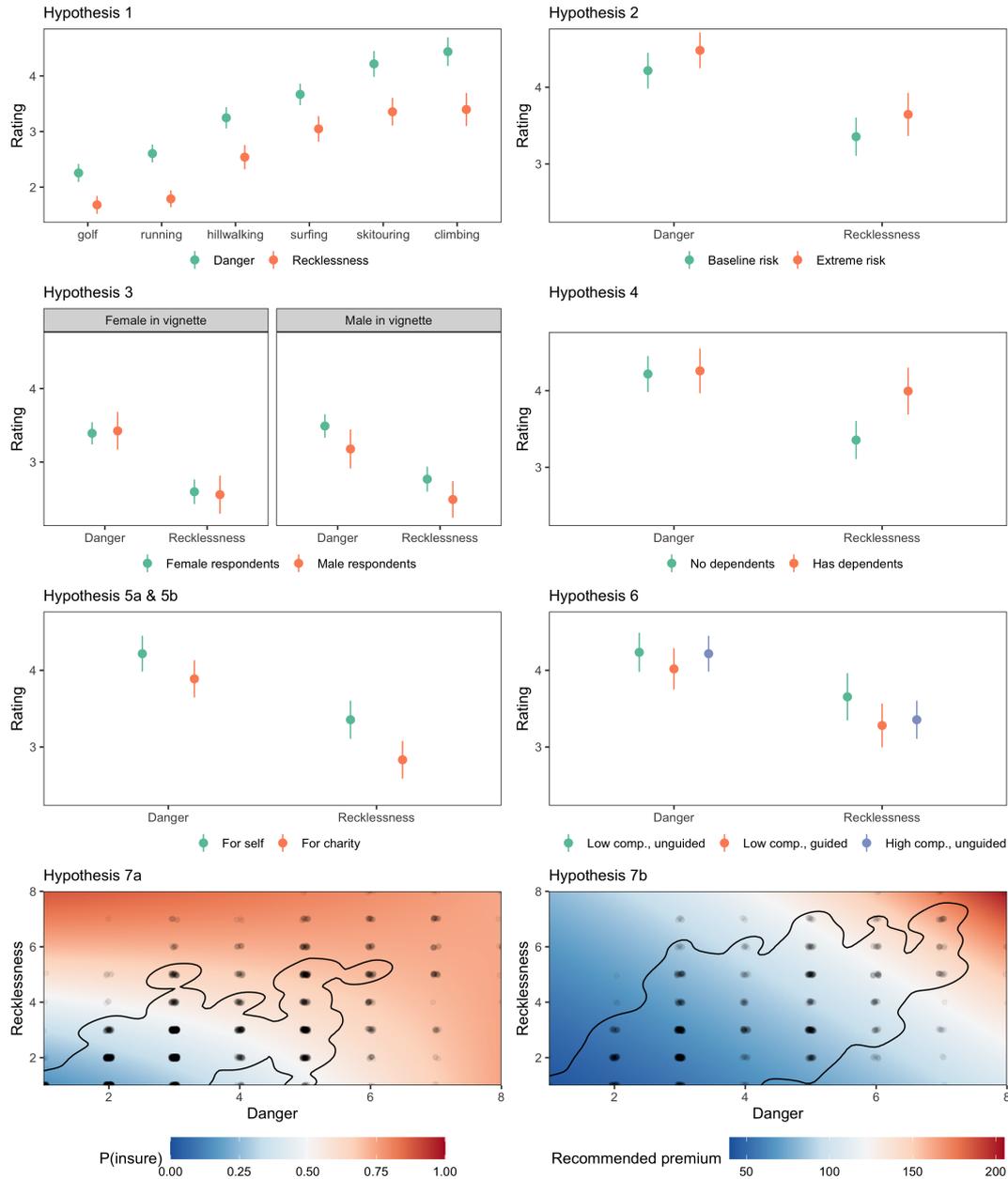
of advocating additional life assurance by 38% (holding danger fixed at its mean rating) and increased recommended insurance premiums by 10% (independent of danger rating). All effects are highly significant (Table 1). A swing from two to five on both danger and recklessness increased predicted probabilities of advocating life insurance from 0.29 to 0.69 (a 429% increase in odds) and increased predicted insurance premiums by 98%, from £53 to £103. By way of comparison, among those answering the skitouring vignette a 100-fold increase in fatality rate increased predicted probabilities of advocating life insurance from 0.57 to 0.62 (a 32% increase in odds) and increased predicted insurance premiums from £99 to £112, a 12% increase.

<i>Outcome variable:</i>		
	RTP Any	log(RTP Amount)
Recklessness	0.61 (0.48, 0.75)	0.09 (0.05, 0.13)
Danger	0.50 (0.39, 0.60)	0.13 (0.09, 0.17)
Interaction	-0.08 (-0.11, -0.05)	
Constant	-2.79 (-3.19, -2.40)	3.52 (3.36, 3.67)
Observations	1,871	829
R <sup>2</sup>	13.4%	11.4%

**Table 1.** Coefficients of models relating requests that sports participants pay additional insurance to take part in activities (RTP) to the perceived recklessness and danger of those activities. RTP increased with perceived recklessness and danger, even when fatality rates were fixed. Model coefficients are shown, with 95% confidence intervals in parentheses. All effects are significant at  $p < 10^{-4}$ .

#### 4. Discussion

Loewenstein (1999) showed how rationalising engagement in adventurous sports can motivate distinctive challenges to standard conceptions of utility. In a similar vein, the present study aims to highlight how danger and recklessness judgements about such sports and its participants offers further insights for studying risk perception. Our main findings are that danger and recklessness judgments vary substantially across different sporting activities despite a fixed case-specific fatality rate (supporting H1).



**Figure 1.** Differences in mean danger and recklessness evaluations across sports and vignette conditions, with vertical lines denoting 95% confidence intervals (a) extreme sports are judged more reckless than non-extreme sports, although background risks were held constant (hypothesis 1); (b) increasing fatality rates by 100× has at most modest effects on ratings (H2); (c) male sports participants are judged in less danger and less reckless by male than female respondents (H3); sports participants were judged as (d) more reckless when the sport participant had dependents (H4) and (e) less reckless and in less danger when doing an activity for charity (H5); (f) experience and guiding had no significant effect on ratings (H6); increasing perceived danger and recklessness increases (g) the tendency to judge additional insurance as required (H7a), and (h) increases insurance premiums (H7b). Contour lines in (g) and (h) denote areas containing 90% of observed responses, which are shown as jittered dots.

Despite increasing the fatality rate by factor 100, we found no significant effect on perceived danger and recklessness judgement (no support for H2). Recklessness and danger judgements, while strongly correlated ( $r = 0.66$ ), were influenced to different degrees by our chosen contextual factors, particularly the presence of dependants (H4) and charity (H5).

So what is it about some sports that makes them seem more dangerous and reckless to pursue than others? One possible explanation is simply to draw on the availability or representativeness heuristic and interpret our findings as further support of their applicability. After all, when considering the danger of engaging in an “extreme” sport, fatal accidents may come more quickly to mind, are easier to recall, or are more readily imagined than in the case of non-extreme sports. However, note that our vignettes do not involve any “vividly portrayed” difficulties or accidents—as Tversky and Kahneman (1974) alluded to in their earlier quote. Moreover, the relevance of media bias and coverage to explain variations in risk judgements has been called into question (Sjöberg & Engelberg, 2010; Pachur et al., 2012). So, one may just be left assuming that the underlying narrative associated with extreme sport itself contains enough dreadful stories to contribute to increased danger and recklessness ratings.

An alternative explanation is to think of danger judgements as being sensitive to (at least) two different underlying ideas, one is captured by a probabilistic notion, the other is captured by a normalcy notion (Ebert et al., 2019; Smith, 2016). On a normic account of risk, while highly improbable, there is nothing “abnormal” about, say, winning a lottery or a raffle (Ebert, Smith, & Durbach, 2018). After all, no specific *explanation* is needed why this ticket rather than another is the winner. So, applying this to our context, while probabilistically speaking, the sports are presented as equally risky and dangerous, from a normic perspective, the normic risk or danger is different: a fatal accident in mountaineering is not something that necessarily calls out for an extensive explanation. While unlikely, such accidents are not that *abnormal*. In contrast, a fatal accident while running or playing golf, is not merely unlikely but also immediately calls out for some sort of explanation: it is a more *abnormal* event. From this perspective, diverging danger judgements need not be conceived as evidence of a bias but rather as evidence that some respondents pick up on a distinctive non-probabilistic notion of risk when issuing their judgements (Ebert et al., 2019). This approach may also be able to identify a common source for danger and recklessness: a

bad outcome that is not that abnormal is one that should be expected and so engaging in an activity that involves a higher (normic) expectation of a bad outcome will be considered more reckless than one with a lower expectation.

In a similar vein, Teigen (1994) and Teigen and Brun (1999) have suggested that there are different concepts of risk implicit in intuitive thinking. On their propensity conception, it may be that some activities have a higher danger-propensity than others, which however, is not fully captured by relevant frequency information (compare also, philosophical conceptions by Williamson (2009) and Pritchard (2016) who adopt so-called modal accounts of danger and risk that are distinct from a probabilistic one). Hence, what makes some activities more dangerous despite identical fatality frequency is because they may well count as more dangerous on some non-probabilistic conceptions of risk.

Lastly, another possible explanation is that respondents rationalise these judgments not as *factive* judgements that are only grounded in the underlying fatality frequency, but as *evaluative* judgements, i.e. whether given the underlying fatality rating, the relevant risks are *worth* it. Naturally, value judgements are more complex and depend also on the desires and values of the individual. On this interpretation, one should expect that non-mountaineers judge the dangers involved in mountaineering as higher than mountaineers even if they both agree on the underlying frequency of a fatal accident, given that they likely disagree on the value (benefits) of experiences when engaging in such sports. Moreover, Paul (2016) has argued that certain experiences are *transformative*, i.e. a subject is not in a position to properly value them until they themselves have experienced them (for discussion, see Pettigrew, 2020). So, if some extreme sports experiences are transformative in that sense, then divergence of recklessness and danger judgements can be interpreted as grounded in different (epistemic) perspectives towards the *value* of that activity.

We are not able to test which of these explanation is to be preferred, and of course, it may well be that all three (and maybe some others) play a role in explaining why some sports seem more dangerous than others despite equal fatality frequency. Having said this, we did ask survey respondents to indicate whether they engage in any extreme sports. Pooling answers of extreme sports respondents and comparing their average score with those that have not experienced any extreme sport, we found that respondents who had engaged in an extreme sport tended to give slightly lower danger

and recklessness ratings (Danger: mean 3.86, 95% CI 3.21–4.63; Recklessness: mean 2.74, 95% CI 2.17–3.48) than those who had not engaged in such sports (Danger: mean 4.14, 95% CI 4.00–4.30; Recklessness: mean 3.24, 95% CI 3.09–3.39). However, with only twenty respondents engaging in the same extreme sports as their assigned vignette, our power to detect differences is very limited, and indeed the difference is not statistically significant (Danger:  $t = 0.76$ ,  $p = 0.45$ ; Recklessness:  $t = 1.34$ ,  $p = 0.18$ ), although a weakly significant interaction between a binary indicator for whether the sport is extreme or not and engagement is suggestive (Danger:  $t = 2.6$ ,  $p = 0.11$ ; Recklessness:  $t = 1.8$ ,  $p = 0.07$ ). These very tentative findings cohere with findings in Hendrickx et al. (1989, p.54).

We did not identify a straightforward gender bias in danger or recklessness judgement even when restricting to extreme sports participants (no support H3). It is worth noting, however, that our study investigated only *ex ante* danger and recklessness judgements and not *ex post*. Future research is planned to investigate whether there is a gender bias once the outcome of the given sports activity, in particular when a negative outcome, is specified. We found, however, a more complex gender-specific result that connects to other findings about the “white male effect” (Finucane et al., 2000; Flynn, Slovic, & Mertz, 1994), but with a twist: male respondents give on average lower ratings (both danger and recklessness) than female respondents when they judge male sports participants. However, importantly, at least with respect to recklessness judgements, this “male effect” is partly driven by a corresponding “female-effect”: female respondents seem to rate male sports participants as more reckless compared to female sports participants, however, this effect was weak ( $t = 1.7$ ,  $p = 0.10$ ; see Figure 1c). Hence, the “twist” in the story is that there is no simple “male effect” or “female effect” but we found some evidence of a complex “gender-effect”: male and female respondents broadly agree in their assessment of female sports participants, they disagree in their judgements about male sport participants. Future studies aim to probe these findings and further investigate an intra-gender vs inter-gender divide in danger or recklessness judgements.

We found that perceived danger and recklessness judgements have a strong effect on requesting additional life insurance cover and its amount (supporting H7a/b). Only 22% of the respondents request additional life-insurance cover for the non-extreme activity, yet 59% requested additional life-insurance cover for the extreme activity

despite equal fatality frequency. Increasing the underlying fatality frequency by factor 100 had much less of an effect on the need for life-insurance and premiums than changing the nature of the outdoor activity while keeping fatality rating the same (see section 3). Although our use of an external perspective means that we could not meaningfully assess a respondent's own willingness to pay, strong affective relationships that operate independently of probability run the risk of being exploited by those on the other side of the insurance equation, and suggest a need for scrutiny by, for example, consumer protection agencies.

Competence and professionalism have no effect on recklessness judgements (no support H6). However, when engaging in a sporting activity with no benefits to others it is considered more reckless than when the same activity is engaged in with a benefit for the wider society, e.g. by collecting money for a charity, no such effect was found for danger judgements (support for H5a/b). This finding could either be explained by an appeal to the well-known halo effect or because the expected societal benefit of a risky activity is now perceived to be greater than when people take risks "gratuitously", i.e. for their own personal satisfaction.

Also, engaging in a sporting activity with dependants resulted in significant higher recklessness judgments but not danger judgements than without. This suggests that recklessness judgements, in contrast to danger judgements, are more complex judgements and sensitive to the motivations of the sports participants and their background.

Finally, our results have the potential to inform public policy. Governments aim to encourage more physical outdoor activities and engagements with nature. More specifically, one governmental performance indicator of the Scottish government, for example, is to increase "visits to the outdoors".<sup>2</sup> Now, while our study did not investigate to what extent danger and recklessness judgement play a de-motivating role in participation, we would expect that an information campaign that aims to educate people about the actual fatality risk has very little effect on danger and recklessness judgements. However, one promising avenue, motivated by our findings about the effects of the charity condition, is to highlight how individual participation has benefits to the wider public. In particular, given the existence in the UK of a National Health Service which, in effect, is a society-wide shared resource, changing the underlying narrative of activities and highlighting their long-term health benefits or, indeed, mental

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<sup>2</sup>Compare <https://nationalperformance.gov.scot> under the tab "Environment".

health benefits when pursuing such seemingly “extreme” activities is potentially a more promising candidate to effect change about their social acceptability.

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