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Gratuitous risk: danger and recklessness perception of adventure sports participants

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ABSTRACT

Since the 1970's there has been a major increase in adventure sports participation but it seems that engagement in such sports comes with a stigma: adventure sports participants are often regarded as reckless 'daredevils'. We approach the questions about people's perception of risk and recklessness in adventure sports by combining empirical research with philosophical analysis. First, we provide empirical evidence that suggests that laypeople tend to assess the danger of adventure sports as greater than more mundane sports and judge adventure sports participants as more reckless than participants in non-adventure sports. We contextualise these findings within existing psychological risk perception paradigms and outline new philosophical explanations of the identified pattern in laypeople's risk perception.

KEYWORDS Risk perception; recklessness; adventure sports; concepts of risk

Introduction

Since the 1970's there has been a major increase in adventure sports participation (Breivik 2010). Adventure sports, roughly put, are outdoor sporting activities with direct engagement with nature that in virtue of such engagement involves a distinctive and irreducible kind of risk that can, in the worst case, lead to death. Classic examples of adventure sports activities are climbing, mountaineering, backcountry skiing, or surfing, where *nature* sets the scene in which adventure sports participants can challenge and enjoy themselves.¹ Now, there are indeed some very *extreme* forms of adventure sports that involve an objectively high risk, i.e. a high fatality rate, such as high-altitude alpine style mountaineering, extreme steep skiing, and exploratory wingsuit flying, but many adventure sports, such as sport climbing,

bouldering, and skitouring can be engaged in relatively safely (Neuhof et al. 2011; Winkler, Fischer, and Techel 2016).

There have been studies in philosophy and psychology that discuss philosophically and investigate experimentally to what extent the risk involved in adventure sports is one of the main motivators to engage in those sports (Zuckerman 1979). Yet, the idea that adventure sports participants are mainly driven by sensation or risk-seeking has been widely challenged (Krein 2007). Instead, a much broader and diverse motivation base for engaging in adventure sports has been identified where participants are seen as *rational* engaging with the relevant risk rather than just being thrill-seekers (Ebert and Durbach 2023; Kerr and Houge Mackenzie 2012). Despite these findings, it seems that engagement in adventure sports comes with a stigma: media often portrays adventure sports participants as ‘daredevils’ or worse as individuals who are reckless in accepting the relevant risk. These portrayals often imply a negative moral evaluation of the adventure sport participant’s character – a portrayal that is challenged by adventure sports participants who often see themselves as being misunderstood by the general public (Holland-Smith and Olivier 2013).

In this article, we investigate to what extent laypeople assess the danger of adventure sports as greater than of other sports and to what extent adventure sports participants are judged as more reckless than participants in more mundane, non-adventure sports, holding fixed underlying ‘objective risk’ factors such as the fatality rate. As such, the study connects with the conjecture, put forth by (Ebert and Robertson 2013; Krein 2007) that when it comes to assessing the risk or danger of adventure sports the underlying frequency of a bad outcome will have only a very limited effect on how dangerous or reckless the activity is perceived to be. This suggestion can be motivated using the following kind of *thought experiment* (compare Ebert and Robertson 2013, 55):

Consider two types of activities such as road marathon running and mountaineering and assume that the underlying frequency of a bad outcome (such as death) for a specific instance (of the same duration) of these activities is exactly the same and that both, the runner and the mountaineer, are equally competent, skilled and invested in their activity so that we can expect both to gain roughly the same personal benefit. It nonetheless seems ‘intuitive’ that people will issue quite different risk judgements about the two activities and that people will also provide different recklessness judgements about the respective participants.

Our conjecture is that there seems to be something about the very *nature* of adventure activities that makes people judge mountaineering *riskier* than running, even if the underlying frequency of a fatal outcome is the same. In order to better understand questions about people’s perception of risk in nature and adventure sports, we combine empirical research with

philosophical analysis: first, we motivate seven hypotheses about people's risk perception of adventure versus non-adventure sports, followed by an explanation of our survey design, methods (section 2), and a presentation of our empirical results (section 3). Then, in section 4, we contextualise our findings within existing risk perception paradigms and offer new philosophical explanations of the identified pattern in laypeople's risk perception. We finish by noting limitations of our approach and highlight potential policy implications.

Materials and methods

Hypotheses

In line with the thought experiment, we expected activities such as climbing, skitouring, surfing – activities classed as adventure sports – to elicit significantly higher danger and recklessness judgements than other recreational sports, such as golf or running, with hill-walking occupying an intermediate position, even when the presented fatality rates of engaging in such activities were the same (Hypothesis 1). Even though the relevance of fatality frequency information to lay people's risk judgements has been challenged (Teigen, Brun, and Frydenlund 1999), given the study by Hendrickx, Vlek, and Oppewal (1989), we expected an increase in fatality rates *within* a specific activity to be correlated with an increase in danger and recklessness judgements (Hypothesis 2).

We expected the gender of the sports participant to influence recklessness judgements but not danger judgements (Hypothesis 3). This hypothesis is connected to existing research about gender and risk judgements (Finucane et al. 2000), but also based on suggestive case-specific evidence: when in 1995 the British Mountaineer Allison Hargreaves died descending from the summit of K2, a wide-ranging debate about women in adventure sports ensued, with numerous recent commentators (e.g. Lockwood 2010; Rose and Douglas 2000) noting a distinct gender bias in mainstream media. However, given that Hargreaves was also the mother of a child, we conjectured that dependants may act as a further factor that serves to increase perceived recklessness but not danger judgements (Hypotheses 4).

We also test for motivational factors and how they may influence perceptions of recklessness (Hypothesis 5b) but not perceptions of danger (Hypothesis 5a). We used whether the activity was done for charitable purposes as an example of a motivational factor. Finally, we also test whether other features about the risk-taker's skills and competence has an effect on danger or recklessness judgements. We conjecture that unskilled inexperienced adventure sports participants would be deemed more reckless and that their engagement in the activity would lead to increased danger

judgements (Hypotheses 6a). In contrast, we expected that drawing on the assistance of a professional (such as a mountain guide) would reduce danger and recklessness judgements (Hypotheses 6b).

Lastly, we introduced what we call a *requesting to pay* (RTP) option: we asked survey respondents to make judgements about the need for an increased premium on life insurance to cover sports participants pursuing their respective activities. We expected our RTP options 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).

Survey participants

We recruited roughly 80 respondents for each of the vignettes of our survey, based on a power analysis that 85 respondents would provide 90% power to detect a one-unit difference in mean response on a nine-point scale, assuming a common standard deviation of 2 i.e. a moderate effect size $d = 0.5$, and a type 1 error rate of $\alpha = 0.05$. With each respondent seeing a single vignette, in total we recruited 2166 respondents across the 24 vignettes. Of these we received 2060 complete responses, an average of 86 respondents per vignette (minimum = 77, maximum = 102; due to the automated randomised allocation).

Respondents were recruited using the *Prolific* platform. Given the nature of the vignettes, we restricted participation to native English speakers living in the UK. We paid each respondent £0.40. The respondents' mean age, based on the mid-points of age categories, was 35.2, with substantial variation (21% 18–24, 35% 25–34, 22% 35–44, 15% 45–54, 7% 55–64, 1% 65+). Most respondents identified as female (1436 female, 612 male, 12 other; $N = 2060$). Very few respondents had any previous experience of adventure sports used in the vignettes (6% skitouring, 3% surfing, 3% rock climbing) as well as hill-walking (6%), but many had experience of running (61%) and golf (33%). The survey received ethical approval from the University of Stirling (GUEP395).

Survey scenarios

We developed 24 vignettes describing a hypothetical but named third person performing a one-off sporting activity. For example,

Steve is a ski tourer. He is a very competent and focused athlete and he has carefully developed his fitness and skills to engage in the sport responsibly. He has a lot of experience as a skier and mountaineer. He plans to ski a famous mountain—which lasts on average about 8 hours. Steve is told by the local authorities that over the last few years there have been some fatalities on this ski descent at a rate of roughly 1 in 160,000 skiers (~6 in 1 Million). Steve is 35 years old and has a partner but no dependants.

Different parts of the vignette description were varied to test the effect of different factors on risk perception. We varied six factors: the type of sporting activity, the gender of the person doing the sporting activity, whether they had dependants, whether the activity was done for charity (e.g. in the skitouring vignette we added: 'Recently his mother was diagnosed with cancer and so he decides to ski a famous mountain to raise funds for the charity that cares for his mother'), whether the person was competent to carry out the activity (we had three factors: competent, not competent, not competent but they use a professional guide), and, finally, the fatality risk associated with the activity (we increased the fatality rate from '1 in 160,000 skiers (~6 in 1 Million)' to '1 in 1,600 skiers (~600 in 1 Million)'). The chosen fatality rates are in most cases not unrealistic and chosen so to have practical validity (competitive marathon-running, see Kipps, Sharma, and Pedoe 2011; climbing and mountaineering, see; McIntosh et al. 2008; Schöffl et al 2010).

Methods

We assessed *independent* judgements about different sport activities having provided the same case-specific fatality rate information (apart from the extreme case where we increased the fatality 100-fold). We used a *between-subject* design in which each respondent was randomly assigned to just one vignette. We did not have the resources to conduct a full factorial experiment, which would have involved $6 \text{ (sports)} \times 2 \text{ (gender)} \times 2 \text{ (dependants)} \times 2 \text{ (charity)} \times 3 \text{ (competence)} \times 2 \text{ (fatality rate)} = 288$ different vignettes. We therefore selected a subset of 24 vignettes that allowed us to address our main research hypotheses.

The survey provided first 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 – also known as a *micromort* (Blastland and Spiegelhalter 2013). This information was given to provide all survey participants a common anchor and to make the role of the fatality risk salient in their assessment. After seeing the vignette respondents were asked 'how dangerous do you think it is for X to engage in this activity' and 'how reckless do you think X is for engaging in this activity'. Responses were recorded using a nine-point Likert-scale ranging from 'not at all dangerous/reckless' to 'extremely dangerous/reckless'. Each assessment was followed by a five-point Likert scale to assess confidence in their judgement ('not at all confident' to 'extremely confident'). Finally, we asked respondents whether sports participants ought to pay additional life insurance premium to receive cover for the specific activities ('Yes/No'). Those who answered positively were asked to identify the additional amount sports participant should pay using an open scale. 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, datasets, code reproducing our results, and more detailed methods section are available at: <https://github.com/iandurbach/gratuitous-risk-taking>.

Statistical analysis

We use linear and generalised linear models (GLMs) implemented in R. Danger and recklessness responses were modelled as Poisson random variables, which are typically used to model counts but which we found captured observed patterns in these responses (discrete and strongly skewed towards lower ratings) well. Requesting additional insurance is a binary response and was modelled using a GLM with a binomial error structure. Standard link functions (log for Poisson, logit for binomial) were used to relate mean responses to a linear combination of predictors, in this case indicators for the presence of one or more vignette scenario (sport type; presence of dependants, charity, low competence, guiding, extreme risk). The additional insurance premium was modelled as log-normal, with the log transformation used to reduce skewness in the original variable. Following model fitting, the Tukey method was used to adjust for multiple comparisons in subsequent post hoc tests. We assessed the overall significance of variables with more than two levels using a likelihood ratio test of models with and without that variable, reporting the associated χ^2 statistic. 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 judgements rated at least moderately confident.

Results

Rock climbing, skitouring, and surfing – activities classed as adventure sports – received higher dangerous and recklessness ratings than golf and running, even though fatality rates were the same for all activities (Danger $\chi^2 = 295, p < 0.001$; Recklessness $\chi^2 = 354, p < 0.001$; [Figure 1a](#); Hypothesis 1 supported). Golf was judged least dangerous, followed by running, then hillwalking and surfing (these judged equally dangerous, $z = 2.5, p = 0.11$), and finally skitouring and rock climbing as equally most dangerous ($z = 1.1, p = 0.87$; all other pairwise differences $z > 3.1, p < 0.027$). Mean recklessness ratings separated sports into three ‘tiers’: golf and running ($z = 1.2, p = 0.85$), hillwalking, and the three adventure sports ($z < 2.2, p > 0.22$; all other pairwise differences $z > 3.6, p < 0.005$). Personal experience in an activity did not significantly affect how dangerous or reckless that activity was judged to be (danger: likelihood ratio test $\chi^2 = 0.32, p < 0.57$; recklessness:

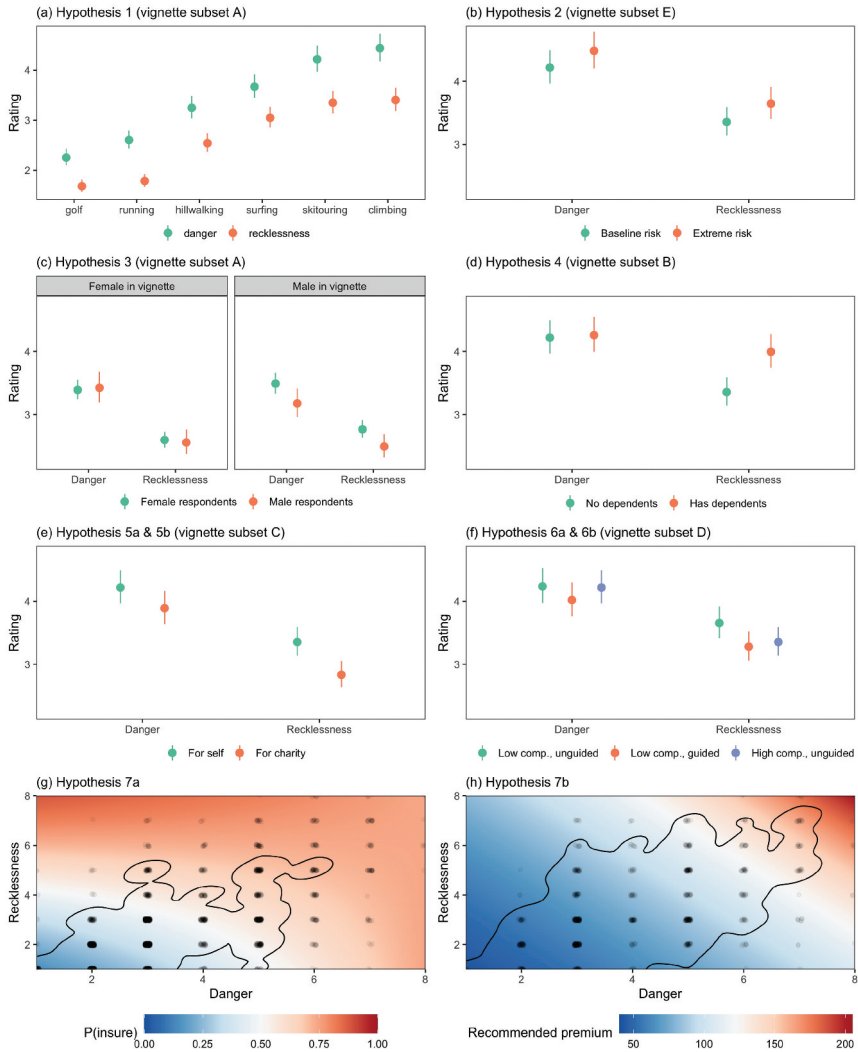


Figure 1. Differences in model predicted mean danger and recklessness evaluations across sports and vignette conditions, with vertical lines denoting 95% confidence intervals (a) adventure sports are judged more reckless than non-adventure sports, although background risks were held constant (hypothesis 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 dependants (H4) and (e) less reckless 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.

$\chi^2 = 0.01, p < 0.97$), nor was there a significant interaction between personal experience and the type of sport involved (danger: $\chi^2 = 2.48, p < 0.87$; recklessness: $\chi^2 = 4.92, p < 0.55$).

Increasing fatality rates 100-fold increased mean perceived danger from 4.22 (95% CI 3.97–4.49) to 4.48 (95% CI 4.20–4.78), and mean perceived recklessness from 3.36 (95% CI 3.14–3.59) to 3.65 (95% CI 3.40–3.91; [Figure 1b](#)), but these increases were not statistically significant for danger ($z = 1.33, p = 0.18$), nor for recklessness ($z = 1.69, p = 0.09$; Hypothesis 2 not supported).

Male and female sports participants received similar recklessness (male 95% CI 2.51–2.75; female 95% CI 2.46–2.70, $z = -0.56, p = 0.58$) and danger ratings (male 95% CI 3.19–3.47; female 95% CI 3.27–3.56, $z = 0.77, p = 0.44$; Hypothesis 3 not supported). Male sports participants were rated less reckless by male respondents than female respondents (male 95% CI 2.32–2.69; female 95% CI 2.64–2.91; $z = 2.28, p = 0.02$), and also in less danger (male 95% CI 2.97–3.41; female 95% CI 3.33–3.66; $z = 2.17, p = 0.03$; [Figure 1c](#), right-hand panel). No significant differences existed for female sports participants (Danger $z = 0.22, p = 0.82$, Recklessness $z = 0.33, p = 0.74$; [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).

Having dependants significantly increased recklessness (with dependants 95% CI 3.74–4.27; without dependants 95% CI 3.14–3.59; $z = 3.61, p < 0.001$), but not danger ratings ($z = 0.21, p = 0.83$, [Figure 1d](#); Hypothesis 4 supported). Engaging in a sport for charitable purposes decreased recklessness judgements (for charity 95% CI 2.64–3.05; for self 95% CI 3.14–3.59; $z = 3.31, p < 0.001$; Hypothesis 5b supported), and we found no significant decrease in danger judgements (for charity 95% CI 3.64–4.16; for self 95% CI 3.97–4.49; $z = 1.73, p = 0.08$; [Figure 1e](#); Hypothesis 5a supported). Being highly competent, or otherwise being accompanied by a guide, played no significant role in danger or recklessness assessments (Danger $\chi^2 = 1.52, p < 0.47$; Recklessness $\chi^2 = 5.20, p < 0.07$; [Figure 1e](#); Hypothesis 6a and 6b not supported).

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 ([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

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 $p < 10^{-4}$.

	Outcome variable:	
	RTP Yes/No	log (RTP £)
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 ²	13.4%	11.4%

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; Hypothesis 7a and 7b supported). 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.

Discussion and Limitations

Our main findings are that danger and recklessness judgements vary substantially across different sporting activities despite a fixed case-specific fatality rate (supporting H1). Despite increasing the fatality rate by factor 100(!), we found no significant effect on perceived danger and recklessness judgement (no support for H2). This provides support for the main intuition described in our thought experiment. Additional support for H1 can be derived from the requesting to pay question. Perceived danger and recklessness judgements have a strong effect on the need to purchase additional life insurance cover and its amount (supporting H7a/b). Only 22% of the respondents request additional life-insurance cover for pursuing the non-adventure activity, yet 59% requested additional life-insurance cover for the adventure 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 sport (holding fixed the fatality rating).

While we made the relevance of fatality frequency salient to survey participants, we cannot, given the survey design, distinguish between respondents who issued their danger and recklessness judgements informed by the fatality information and those who simply chose to ignore it, or those that made judgements based on other aspects such as their own perceived injury rate. While the injury rate is, of course, a further aspect of how dangerous a sport is, we would be surprised to find that the identified differences in danger and recklessness is simply due to survey participants shared implicit belief about a higher injury rate in adventurous sports compared to non-adventurous sports. More research on these issues is currently ongoing.

Note that recklessness and danger judgements are strongly correlated ($r = 0.66$), yet they were influenced differently by our chosen contextual factors. The presence of dependants (H4) led to a significant increase in recklessness judgements but not danger judgements. The charity condition, in contrast, led to a significant decrease in recklessness judgement (H5b) while its effect on danger is not significant ($p = 0.08$). On the assumption that perceived recklessness in relation to an activity correlates positively with the perceived need for justification to engage in that activity, it follows that the perceived need to justify personal risk-taking is less affected by variations in the underlying fatality rate and more affected by different external factors that seem tangential to the expected benefits of the individual risk-taker. As such, we may interpret recklessness judgements as responsive to differences in the perceived benefits more broadly construed. Risk-taking for purely personal gain is perceived as more reckless than engaging in the same activity, under the same conditions, but for some distinctive societal gains. Moreover, engaging in an adventure sports activity while having dependants is possibly seen to have some moral costs which would explain why it is perceived to be more reckless.²

To our surprise, we did not identify a gender bias in danger or recklessness judgements even when restricting to adventure sports participants (no support H3). This 'no-finding' finding casts some doubt on the role of gender effects in risk perception and is in line with other recent studies that focus on European study subjects (Olofsson and Rashid 2011). It is worth noting, however, that our study investigated only *ex ante* danger and recklessness judgements and not *ex post*.

In what follows, we want to step back and investigate why it is that some activities seem more dangerous and more reckless to pursue than others, even though objective risk factors such as fatality ratings, competence and experience are held constant, and why some contextual factors have an effect on recklessness. To do so, we will investigate how different existing and new approaches to the nature of risk and its perception could explain our findings.

Traditional risk perception paradigms

Risk perception has been widely studied by psychologists with many studies finding a wide-ranging miscalibration between the objective risk and the perceived risk for different types of unfavourable events. One approach, the so-called *heuristics & biases* perspective, will draw on various heuristics to explain why people's judgement doesn't track objective risk-factors. For example, in their seminal paper, Tversky and Kahneman (1974) identified the *availability heuristic* according to which bad outcomes tend to be judged more likely than others when their occurrences are easier to recall. So, on the assumption that in adventure sports accidents are often quite memorable, widely publicised, and thus easy to recall, individuals may be more likely to judge these activities as more dangerous than others in which accidents are less sensationalised. In fact, in their original contribution Tversky and Kahneman (1974, 1128) suggested that risk assessment of adventurous activities, in particular adventurous mountaineering expeditions, may be particularly prone to this effect. However, how exactly the availability heuristic operates is still debated (Pachur, Hertwig, and Steinmann 2012), and some doubts have been raised whether media has the kind of influence on people's risk judgement that is often assumed by the proponents of the availability heuristic (Wählberg and Sjöberg 2000).

While the heuristics and biases paradigm focuses mainly on features of the *perceiver* to explain miscalibrated risk judgements, the *psychometric approach* focuses more on the external features of the *hazard*, i.e. the type of risk event, that is judged. This research programme identified factors such as the catastrophic potential, dread, control, novelty, voluntariness, and others that tend to influence risk judgements (Slovic 1987). So, returning to our thought experiment, on this approach differences in how the relevant hazard of *dying while climbing* versus *dying while running* are perceived may lead subjects to different danger and recklessness judgements. One suggestion might be that the hazards in adventurous activities are perceived as less *controllable* than the hazards in running. After all, a little slip may lead to a deadly outcome in climbing and thus involve a high dread factor, which doesn't seem to be so in running. However, not only have there been quite general concerns about whether this psychometric paradigm is suitable to explain danger and risk judgements (Sjöberg 2000), for our purposes, the issue will be how exactly the notion of *controllability* is to be understood – after all, numerous risks while running do not seem controllable either (consider for example heart attacks, etc.).

Now, while we think that both risk perception paradigms have clear potential to explain our findings, we want to introduce other approaches to risk judgements motivated by more philosophical debates about risk and assess how they could explain our results.

Non-probabilistic notions of risk

Some psychologists and philosophers have previously considered non-probabilistic notions of risk and of danger by which our risk judgements should be assessed (Kahneman and Tversky 1982). In particular, Williamson (2009) and Pritchard (2016) have offered so-called *modal accounts* of danger and risk. On these accounts, the danger or risk of an unwanted outcome is determined not by how probable an event is but by how *modally close* it is: roughly speaking, the more similar the event (in relation to the actual world and some to be specified initial conditions), the riskier it is. Now, on the assumption that a fatal accident when mountaineering is considered modally closer than a fatal accident when running, these non-probabilistic accounts will predict the observed pattern in our survey. This assumption could be substantiated as follows: it seems that mountaineers often put themselves into a risky situation where 'there is always the possibility of a minor slip, a little stumble that *'so easily happens'* (yet, statistically speaking, rarely does) but that can kill you' (Ebert and Robertson 2013, 55). And so, in that sense, the 'ease' in which an event *can* happen, can be used as an indicator of how modally risky it is.

Alternatively, Ebert, Smith, and Durbach (2020) have put forth a pluralist conception of risk on which there are numerous equally legitimate notions of risk, such as a probabilistic, modal, and a normic notion of risk. On a *normic* account of risk, an activity is high risk if a bad outcome is a normal outcome, and it is a low risk activity if a bad outcome is an abnormal event. Importantly, whether an event is normal or abnormal isn't determined by its frequency. Rather a heuristic for normality is that an event is considered abnormal if its occurrence requires or calls for an explanation, and it is considered normal if no such explanation is required or called for. We can apply this basic idea to our context: while probabilistically speaking, the two activities in our thought experiment are presented as equally risky, the normic risk of each activity might be considered distinct. A fatal accident in mountaineering is not something that tends to call out for an extensive explanation. While such accidents are rare, they are not that abnormal given the kinds of risks mountaineers tend to expose themselves to – events such as rockfall or natural avalanches that are rare but difficult to predict. Accepting these kinds of risks is akin to playing a form of Russian roulette in which one subjects one's life to a seemingly random chance of death. In contrast, a fatal accident while running, is not merely unlikely but often calls for some sort of explanation: given the kinds of risk a runner exposes themselves too, it seems a more abnormal event, and hence a less (normically) risky one. The suggestion is then that differences in the *kinds* of risks of the two activities – risks to which

the normic and the modal notion are sensitive to – might influence people's danger and recklessness judgements even when these kinds of risk do not, in total, affect the overall probabilistic risk.

Now, there are thriving philosophical debates about these non-probabilistic notions and how to properly unpack the relevant details. Here, we merely offer these views as further possible explanations of our results. Noteworthy is that the non-probabilistic accounts of risk can also explain some of the observed recklessness judgements provided that the latter is mediated by the former. However, they will not be able to explain, in any straightforward way, variations of recklessness in the dependant conditions where no variations in danger judgement was found. More worryingly, the modal and the normic accounts may struggle to explain why there is no effect on danger judgements in the competence condition since one would naturally assume that it's more *normal* for an incompetent person to be involved in an accident than a competent one.

Transformative experience and risk

An alternative explanation of our results is that survey respondents understand judgements of danger not as judgements that are grounded in the underlying fatality frequency, but always as fundamentally *evaluative* judgements, i.e. whether the relevant risks are *worth* it, given the underlying fatality rating. This evaluative shift could be explained by appeal to a possible substitution attribution effect: the phenomenon that people tend to substitute questions about a difficult target attribute (danger of an activity) with a simpler attribute (the perceived worth of an activity), which would not be overly surprising given that our everyday notions of danger and risk are ambiguous between a more factive and a more evaluative reading.

On the assumption that both mountaineers and runners associate the same expected benefits and disbenefits overall, both activities should be judged as roughly equally dangerous or indeed as equally reckless. However, while most people will know *what it is like* to engage in more mundane sporting activities such as running (in our survey more than 60% did), most respondents did not themselves engage in the more adventurous sports (in our survey less than 10% did). As such, they may find it difficult to appreciate the experiential benefits derived from more adventurous sports. For example, Paul (2016) has recently argued that certain kinds of experiences are *epistemically transformative*, i.e. a subject is not in a position to properly value them until they themselves have experienced them (for a video discussion, see MorroccoMedia 2018). Applied to our case: if one has not engaged in adventure sport, one faces an *epistemic* barrier to understanding what someone finds valuable about more adventurous sports. Someone who has not tried a particular

sport might undervalue its potential experiential benefits, and so be disinclined to judge risks associated with that sport as *worth it*. If taking part in adventure sports is transformative in this sense, divergence of danger judgements should be expected despite equal fatality rating – just as we found in our results. In short, variations in danger judgements should be interpreted as partly grounded in different *epistemic perspectives* towards the value of that activity.

Of course, more will need to be said. For example, what is it about adventure sport experiences that makes them transformative and why, for example, is imagination not sufficient to provide sufficient understanding of the relevant values (Kind 2020). Nevertheless, there are two significant advantages of this way of explaining our results. First, it permits faultless disagreement between different individuals – someone who has never been, for example, mountaineering may *reasonably* judge mountaineering to be more dangerous, while nevertheless accepting that an experienced mountaineer would judge it less dangerous, because they attach different values to it (and, assuming recklessness judgements are mediated by danger judgements, the same observation will also apply to disagreements about recklessness). Second, predictions based on this type of explanation seem easily testable, and in a separate study we found some evidence that, all else equal, people who engage in adventure sports tend to provide lower danger and recklessness judgements than those that do not (Ebert and Durbach 2023). However, given an evaluative perspective on danger, one would expect a significant difference in danger judgements when the worth of engaging in the activity is more easily graspable and of general societal worth, such as in the charity-conditions. It is here that we have less clear results.

Recklessness first

Finally, we can focus on the moral dimension of recklessness judgements, and view this as the primary driver of both danger and recklessness judgements. Evaluations of recklessness traditionally involve a moral evaluation of the character or motivations of someone engaged in a risky activity. For example, those who engage in climbing, skiing, or surfing are often presented in the media as people with a risk-craving or sensation-seeking character – daredevils or thrill-seekers – who take part in these sports out of a desire to take big risks. Those who disapprove of such motivations will be more likely to make a negative moral evaluation of people who engage in adventure sports and regard such activities as a form of *gratuitous* risk-taking: taking risks for risk's own sake. They may thus judge adventure sports participants as more reckless and consequently those activities as more dangerous.

We can find an example of this moralised usage of recklessness in the law. Here, recklessness is a *mens rea*—mental component – of various crimes. The

law generally understands recklessness as the conscious disregard of a substantial and unjustifiable risk (see e.g. Husak 2010, 146). When defendants are evaluated as reckless, what is important is not whether their own personal values and preferences made the risk worth it *for them*, but rather whether the risk was justified according to an objective standard of behaviour upheld *by society more widely*. Recklessness has been characterised by some legal theorists as an *indifference* towards the possible harm brought about by taking a risk and thought criminally culpable because it shows that the defendant showed insufficient regard for what society and the law considers important (Duff 2019). People can be judged as reckless by this objective standard regardless of their own personal values.

Applying this insight to our results, we may interpret survey respondents as making recklessness judgements in a way that is similar to what the law does – appraising people who engage in different activities based on what that engagement indicates about their motivations, character, and values. If they see those who engage in adventurous sports as risk-craving and thus somehow irresponsible – exhibiting indifference to important things such as their own life or the lives of others – then they are likely to judge participants in adventure sports as more reckless than participants in more traditional sports, and adventure *sports* as more dangerous. The moral dimension of recklessness judgements might also help to explain why risky activities undertaken for charitable purposes were judged to be less reckless: the motivation to engage in a risky activity to raise money for a common good is viewed as valuable to society, and indicative of good moral character. Finally, we had previously assumed that danger judgements mediate recklessness judgements, but if danger judgements themselves involve a moral component (see e.g. Sjöberg and Winroth 1986), then this could also explain why danger judgements are increased in the case of adventure sports.

Conclusions

So then, what is it about so-called *adventure sports* that they seem more dangerous and reckless to engage in? We presented, what we hope is a more comprehensive overview of the different potential determinants that explain laypeople's judgements, such as the availability heuristic, controllability, sensitivity to non-probabilistic notions of risk, lack of experience with the values of adventure sports, or moralised judgements of recklessness and danger. While the aim of our study was to establish whether laypeople do in fact perceive adventure sports as inherently more dangerous and reckless and provide an overview of different possible explanations of this finding, the follow-up question, namely which determinant is in fact operative in the survey respondents' judgements is not something we can identify given our survey design. It is, however, worth noting that we should not simply assume that

there is just *one* determinant that grounds the differences in danger and recklessness judgements. For all we know, maybe some respondents reasoned along the lines of the availability heuristic, and other respondents' judgements were influenced by the modal or other considerations. Future research that investigates the extent to which modal or normic reasoning is used in other judgements about personal risk-taking is currently in progress, and we expect that our discussions are also relevant to ongoing debates about how best to define adventure and extreme sports and nature sports.

Finally, it is worth noting that our findings have wider implications for public policy. Many governments actively encourage more physical outdoor activities and engagements with nature.³ Now, while our study did not investigate to what extent danger and recklessness judgements play a demotivating role in participation, we expect that an information campaign that aims to educate people about the actual fatality risk would have very little effect on danger and recklessness judgements. A more promising avenue, motivated by our findings about the effects of the charity condition, would be 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 such activities by highlighting their long-term health benefits or, indeed, mental health benefits is potentially a more promising strategy to effect change in their social acceptability.⁴

Notes

1. For further discussion about the nature of nature or adventure sports, see (Krein 2018).
2. In Ebert and Durbach (2023) we compare the laypeople responses with responses by experienced adventure sports participants and find significantly different responses.
3. So, e.g. one governmental performance indicator of the Scottish government is to increase 'visits to the outdoors'. Compare <https://nationalperformance.gov.scot> under the tab 'Environment'.
4. We are grateful to audiences at Edinburgh, Nottingham, Stirling, Tromsø, UCL, Zürich, and the members of the Varieties of Risk and the GUESSED Project for their feedback. Detailed comments on earlier drafts by Miloud Belkonienne, David Comerford, Nora Hanson, Kevin Krein, Gerit Pfuhl, Petronella Randell, Simon Robertson, Martin Smith, Joe Ulatowski, Conny Wollbrant, as well as anonymous referees, significantly improved our manuscript.

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