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# Gender Differences in Risk-Taking and Sensation-Seeking Behavior: Empirical Evidence from “ExtremeSports”

Bernd Frick<sup>1</sup>

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## Abstract

Do men and women differ with respect to sensation-seeking behavior, an extreme form of risk preferences? In this paper, I use data from two different high-risk sports—cliff diving and free diving—to test for possible differences between the genders. My findings suggest that, first, women are under-represented in both sports, but that, second, for those who self-select into these occupations, no differences with respect to sensation-seeking behavior can be found between men and women.

**Keywords** Risk preferences · Sensation-seeking · Gender differences · Self-selection · Extreme sports

**JEL Classification** J16 · J24 · J29 · J49 · Z20

## 1 Research Question

Do men and women differ with respect to risk-taking behavior? The available experimental as well as field evidence suggests that the majority of all people are rather risk-averse (e.g. Holt and Laury 2002; Harrison et al. 2007; Dohmen et al. 2011). In representative surveys such as e.g. the German Socio-Economic Panel respondents are typically asked to rate their general willingness to take risks on an eleven-point Likert scale ranging from 0 (“not at all willing to take risks”) to 10 (“very willing

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to take risks”). While the average score for men is usually around 5, the respective value for women is only slightly above 4 (Dohmen et al. 2011; Jaeger et al. 2010), suggesting that women are indeed more risk-averse than men.<sup>1</sup> Moreover, the surveyed individuals’ responses to this general risk question have been found to be a reliable predictor of actual risky behavior such as e.g. being self-employed, investing in stocks and practicing recreational sport (Dohmen et al. 2011; Buser et al. 2020).

A particular, most likely extreme, form of risk-taking is sensation-seeking, a personality trait that has been defined as the need for varied, novel and complex sensations and experience and the willingness to take physical and social risks for the sake of such experience. Thus, sensation seekers typically expect some kind of non-monetary reward to justify the risks they are taking (Zuckerman 1983).

While real-life data is desirable to answer the question, whether (and to what extent) men and women differ with respect to sensation-seeking, that data is rather difficult to obtain, as sensation seekers are likely to be found at the extreme right of the risk-aversion scale, where few men and even fewer women locate themselves (usually less than 5 percent of the respondents score as high as 9 or 10 on the relevant scale). In this paper, I therefore use data from two different “niche sports”—free diving and cliff diving—to test for (potential) differences in sensation-seeking behavior between men and women. The data I use has the advantage that it is truly comparable because men and women compete under identical rules. Since in both sports men compete with men and women with women, the discouraging effect—women tend to self-select out of a tournament if they have to compete against men—that has been found in experimental studies (e.g. Niederle and Vesterlund 2007), cannot occur here.<sup>2</sup>

Compared to the substantial health risks that characterize these two sports, the monetary incentives used in willingness-to-take-risks experiments are typically very small. Notwithstanding the substantial evidence for the existence of a gender difference in the willingness to take risks, the small stakes raise the question of whether the observed behavior can be generalized to (admittedly rare) real-world decisions. If the (mostly non-monetary) returns to sensation seeking are sufficiently large, women may be as willing to accept the risks associated with these activities as men are.

## 2 The Economics (and Psychology) of Sensation Seeking

Rational utility-maximizing individuals constantly compare the (expected) costs of and the (expected) returns to the activities they engage in. As soon as the marginal costs exceed the marginal returns, the individual withdraws. Thus, the utility

<sup>1</sup> However, in a representative sample from Denmark, Harrison et al. (2007) do not find any differences between men and women with respect to risk aversion.

<sup>2</sup> Using data from speedboat races, Booth and Yamamura (2018) find that women race faster in women-only events while men are faster when racing against women. Moreover, Booth et al. (2014) find that in a single-sex environment women are less risk averse than in a mixed-sex environment.

functions of sensation seekers and non-sensation seekers are different in the sense that their appraisal of costs and benefits of a particular activity differs considerably. Sensation seekers differ from non-sensation seekers, first, in that the former tend to estimate risks even in activities they have not experienced to any extent as lower and that, second, their overall level of anxiety is lower. In general, the positive emotion of sensation seeking increases with the novelty of a particular activity and the appraised risk of that activity up to some maximal level and then decreases as a function of further appraised risk. At some point, risk appraisal and the anxiety it induces result in a reduction in the sensation seeking motive and the positive arousal it produces. At the point, where an individual's level of anxiety becomes larger than her sensation seeking, she will withdraw from that particular kind of activity. What then distinguishes sensation seekers from non-sensation seekers? First, among high sensation seekers the anxiety gradient is lower and, second, the sensation seeking curve is shifted to the right compared with low sensation seekers. The result is that high sensation seekers are more likely to enter into risky situations while low sensation seekers are more likely to avoid them (Zuckerman 2007: 65–67). Thus, the typically non-monetary rewards of sensation seeking are perceived as benefits only by high sensation seekers—either because they underestimate the risks associated with a particular activity or because they are willing to accept them because the expected benefits are judged to outweigh the expected costs. However, since high sensation seekers typically prepare very well for the activities they engage in, underestimation of risk is an unlikely explanation for the observable differences in behavior (Zuckerman 2007: 55–57).

### 3 Current State of Research

The empirical study of sensation-seeking behavior has so far been the domain of psychology. Most papers use cross-section data linking the surveyed individuals' scores on a standardized scale to either actual or desired risky behavior (e.g. the now seminal studies by Breivik et al. 1998; Zarevski et al. 1998; Zuckerman 1983).

In a representative survey in Norway ( $n = 1000$  interviewees), Breivik et al. (2017) found that men score significantly higher on an eight-item Likert scale measuring thrill and adventure seeking than women (4.7 vs. 3.8 points). They also asked respondents whether they had been active in sports with a risk of serious injury or even death with 26 percent of all men and 16 percent of all women answering in the affirmative. Those who had participated in risky sports scored significantly higher on the thrill and adventure seeking scale. Cladellas et al. (2017) in a sample of 213 Spanish pupils aged 16 to 18 from three high schools in Barcelona found that sensation seeking behavior (as measured with the Spanish version of the scale already used by Breivik et al. 2017) is negatively correlated with academic performance as reported by the students' teachers and tutors. Crust and Kegan (2010) used a sample of 105 undergraduate students (69 men and 36 women) from two different universities in the North of England and found a statistically significant correlation between mental toughness (measured with a 48-item inventory consisting of 5 point Likert scales)

and attitudes towards physical, but not towards psychological risks. Moreover, men were found to have significantly higher levels of mental toughness than women. A major limitation of the study is that—as in Cladellas et al. (2017)—the emphasis was on attitudes to risk and not actual risk-taking behavior. Finally, Gamble and Walker (2016) used a sample of 80 volunteers who participated in a controlled experiment. 39 of them (15 men and 24 women) wore a helmet and 41 (19 men and 22 women) a baseball cap to which an eye-tracking device was attached. Wearing a helmet was associated with higher risk-taking scores than wearing a cap and participants who wore a helmet reported higher sensation-seeking scores than participants who wore a cap, suggesting that people are likely to increase risks when wearing protective equipment. Interestingly, there was no relationship between risk taking and gender.<sup>3</sup>

Samples including exclusively or predominantly athletes, who are practicing high-risk sports, reveal similar patterns. Merritt and Tharp (2013) found in a sample of 277 parkour runners mostly small, yet statistically significant correlations between neuroticism (positive) and conscientiousness (negative) and risk-taking (measured with three items that each employed a five-point Likert scale). None of the other “Big Five” personality traits (extraversion, openness and agreeableness) turned out to be statistically significant. Again, men were found to be more risk-taking than women. Base jumpers ( $n=77$ ) were all found to be highly self-directed, persistent, and risk-taking, but were heterogeneous in stress reactivity, that is their level of cortisol activation and sympathetic reactivity (Monasterio et al. 2016). Comparing athletes in high (hang-gliding, mountaineering, skydiving, automobile racing,  $n=93$ ) and in low risk sports (golf, swimming, marathon and aerobics,  $n=73$ ), Jack and Ronan (1998) found significantly higher levels of sensation seeking among the former. Moreover, in both groups of athletes, men scored significantly higher on the sensation seeking scale employed than women.<sup>4</sup>

Very few studies have so far analyzed the mental attitudes and dispositions of either free diving or cliff diving athletes. In a sample of 129 Italian elite free divers ( $n=129$ , 86 men and 43 women), Baretta et al. (2017) found that those competing in a high-risk discipline (constant weight) scored significantly higher on the sensation seeking scale than those competing in a low-risk discipline (dynamic free diving). No differences between male and female competitors were found. In the first discipline, athletes cover the vertical distance in apnoea (i.e. without breathing) down to the declared depth without any change in their weight during the whole performance either with or without fins. The event takes place in open water and the risks related to constant weight free diving are surface blackout, deep-water blackout, pulmonary and middle-ear barotrauma, pulmonary edema and, in the worst case, death. In the second discipline, athletes aim to cover the maximal horizontal distance by swimming in apnoea with or without fins in a swimming pool. Here the risks are limited to surface blackout and

<sup>3</sup> However, in a follow-up study using a very similar experimental design, Schmidt et al. (Schmidt et al. 2019) were unable to confirm the findings reported by Gamble and Walker (2016).

<sup>4</sup> Further studies show that risk-taking behavior among rock climbers and downhill skiers is associated with younger age, male gender, higher skiing level, and helmet usage (Llewellyn and Sanchez 2008; Llewellyn et al. 2008; Maher et al. 2015; Ruedl et al. 2012, 2015, Ruzic and Tudor 2011; Slanger and Rudestam 1997; Thomson and Carlson 2014; 2015).

shallow-water blackout. Moreover, using a small sample of 36 Turkish elite free divers and a matched sample of 41 sedentary individuals, Alkan and Akis (2013) found that free diving athletes exhibit higher levels of stress resistance and self-confidence.<sup>5</sup>

Most of the literature reviewed so far has relied on stated preferences as expressed by interviewees. Economists, however, are generally more interested in what people do instead of what people say.<sup>6</sup> Thus, looking at individual behavior in two “extreme sports” (i.e. free diving and cliff diving) offers an interesting opportunity to better understand the preferences and motivations of professional athletes—male as well as female sensation seekers—as they are revealed by these individuals by their choice of job.<sup>7</sup>

## 4 Competition Rules of Freediving

Freediving is a form of underwater diving that relies on breath-holding until resurfacing rather than using a breathing apparatus such as scuba gear. It includes eight different disciplines, of which five are open water and three are pool disciplines.

- In the “Constant Weight” (CWT) competition, the athlete descends and ascends with the use of fins/a monofin and/or with the use of her arms. Pulling on the rope or changing his ballast will result in immediate disqualification. Only a single hold of the rope is allowed in order to stop the descent and start the ascent. Constant weight is the most widely practiced and known sportive depth discipline of freediving.
- In the “Constant Weight without Fins” (CNF) competition, the athlete descends and ascends underwater using a variation of breaststroke swimming without the use of propulsion equipment and without pulling on the rope. Constant weight without fins is the most difficult sportive depth discipline because it requires the most strength and the athlete remains unaided by fins.
- In the “Free Immersion” (FIM) competition, the athlete dives under water without the use of propulsion equipment (fins), but uses the rope to pull to descend and ascend. Free immersion is considered the most relaxing discipline and is used as a training tool to learn equalization techniques.<sup>8</sup>

<sup>5</sup> Finally, free divers were found to display a significantly lower minimum and maximum heart rate than a matched sample of sedentary individuals ( $n=13$  in each group) and a significantly higher cardiac parasympathetic activity (Christoforidi et al. 2011).

<sup>6</sup> The large body of (mostly experimental) economics literature on gender differences in risk taking is not reviewed here due to space constraints (see e.g. Byrnes et al. 1999, Charness and Gneezy 2012).

<sup>7</sup> Free diving as well as cliff diving requires not only talent and courage, but also many years of training and cannot, therefore, be considered a leisure time activity.

<sup>8</sup> The two remaining open water disciplines are only done as a record attempt and are not a competition discipline. In the “No Limit” discipline, the diver descends with the help of a ballast weight or a sled and ascends via a method of her choice, such as a balloon, a diving suit, or a vest with inflatable compartments. In the “Variable Weight” discipline, the diver descends with the help of a ballast weight or a sled and ascends using her own power: arms and/or legs, either by pulling or not pulling on the rope. The three pool competitions are, first, “Dynamic with Fins” in which the athlete travels in a horizontal posi-

Before jumping into the water, athletes have to announce the depth they want to reach. Failure to accomplish the goal leads to disqualification on that particular day of the event.<sup>9</sup> The data I use here comes from the most prominent annual freediving event (“Dean’s Blue Hole on the Bahamas”) covering the years 2013 to 2018 and is available at <http://verticalblue.net/results>.<sup>10</sup> The dataset includes 109 different athletes with 2–35 attempts, yielding a sample size of 1103 observations. Among them 37 (33.9%) are female with 428 (38.8%) attempts and 72 (66.1%) male athletes with 675 (61.2%) attempts. The dependent variables used in the estimations presented below are, first, the announced as well as the realized depth and, second, the result of each competition measured with four different outcome variables (success, point deduction, disqualification, did not start).

## 5 Competition Rules of Cliff Diving

In cliff diving, athletes are required to display their skill and versatility by executing take-offs from five basic dive groups (front, back, inward, reverse and handstand) when leaving a platform that is 27 m high. There are three different dive positions (pike, tuck and straight) and four different dive definitions (twist, flying, barani and blind entry), that can be combined in one way or another during each individual dive.

Divers are requested to hand in their four planned dives the day before the first day of competition. It is a unique feature of diving competitions that each athlete has to announce her entire dive list before the competition begins. No changes are allowed. Thus, the full list of movements to be performed in a particular competition is completely predetermined. The competition consists of one required dive of a maximum degree of difficulty of 2.8, one intermediate dive with a maximum degree of difficulty of 3.6 and two optional dives assigned a degree of difficulty calculated from a so-called “degree of difficulty formula”. The degree of difficulty of each dive is calculated by taking into account the difficulty of the execution of each manoeuvre and the junction of each element of the dive: take-off, number of somersaults, number of twists, position during the somersaults and entry into the water.

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Footnote 8 (continued)

tion underwater attempting to cover the greatest possible distance. Any propulsion aids, other than fins or a monofin and swimming movements with the arms are prohibited. The second competition is “Dynamic without Fins”, in which the athlete travels in a horizontal position underwater attempting to cover the greatest possible distance using a modified breaststroke. Propulsion aids are prohibited. The third competition is “Static Apnea” in which the athlete holds his breath for as long as possible with her nose and mouth immersed while floating on the surface of the water or standing on the bottom of a pool. Static apnea is the only discipline based on time of breath-hold and not distance.

<sup>9</sup> As already mentioned above, the sport is associated with considerable risks. Natalia Molchanova, considered by many experts “the world’s greatest free diver”, went missing during a training session on Aug. 2, 2015 in Formentera. Nicholas Mevoli died while attempting to set an American record at the Vertical Blue competition at Dean’s Blue Hole on Nov. 17, 2013. Finally, Herbert Nitsch surpassed his own “No Limit” world record with a dive in June 2012 to 253 m and is severely disabled since then.

<sup>10</sup> The 2019 event was cancelled on short notice.

The total score of each athlete is calculated as follows: Five international jurors judge each dive on three criteria (take off, position in the air, and entry in the water) with scores ranging from 0 to 10 in half point increments. The highest and the lowest score are discarded and the remaining three scores are added together. This sum is then multiplied by the degree of difficulty for each dive and the scores from all four rounds are cumulated for the final competition result. The men's (women's) competition includes ten (six) permanent divers and up to four wildcards per stop. Wildcard divers, mostly upcoming athletes, can only compete in one or two individual events. Finally, points are awarded from 1st to 14th place (men) and 1st to 8th place (women) respectively.<sup>11</sup>

The data I use here comes from the most prominent series of cliff diving events, the 'Red Bull Cliff Diving World Series' and covers the years 2014 to 2019. It is available at <https://cliffdiving.redbull.com>. The dataset includes 66 different athletes with 1–44 jumps, yielding a sample size of 876 observations. Among them 23 (34.8%) are female with 271 (30.9%) jumps and 43 (65.2%) male athletes with 605 (69.1%) jumps. The dependent variable in the estimation presented below is the number of points as a measure of technical difficulty of a particular jump.

## 6 Hypotheses

Since female as well as male cliff and free divers are to the same extent sensation seekers who have self-selected into their respective high-risk sport, I expect to find that the differences in the performance of men and women have remained constant over time in free diving while they have considerably decreased in cliff diving. The main reason is that the lung capacity of women is significantly lower than that of men (Becklake and Kauffmann 1999; Bellemare et al. 2003; Carey et al. 2007; Ekström et al. 2018; LoMauro and Aliverti 2018; Walsdorff et al. 2016). This deters women from reaching similar depths as men. In cliff diving, physical abilities are less important. Thus, women—who have entered this sport later than men—will be catching up rapidly.

## 7 Descriptive and Econometric Findings

It appears from Table 1 as well as from Figs. 1 and 2 that men announce larger depths than women and that men also reach larger depths than women. This, however, does not say anything about differences in risk-taking and sensation seeking, but simply reflects the differences in lung capacity.<sup>12</sup>

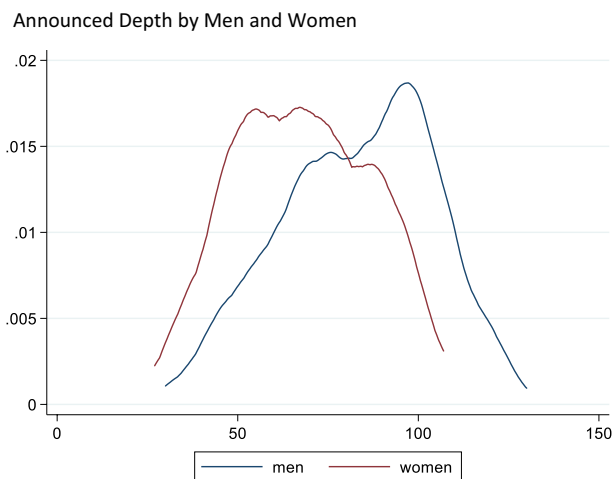
<sup>11</sup> In 2020, the number of competitions would have been—for the second time—equal for men and women ( $n=8$  stops). In 2019, male and female athletes competed in 7 events while up to 2018, the number of events was 7 for men and 5 for women.

<sup>12</sup> Unfortunately, the athletes' age—as a proxy for experience on the one hand and risk preferences on the other hand—is not available for none of the two sports.



**Table 1** Descriptive statistics

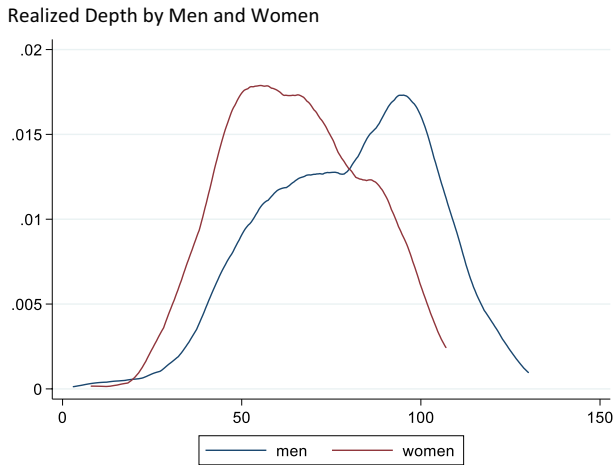
Variable	Mean	SD	Minimum	Maximum
Free diving				
Gender (1 = male)	0.61	–	0	1
Announced Depth Men	82.8	21.0	30	130
Announced Depth Women	68.5	19.0	27	107
Realized Depth Men	79.9	22.7	3	130
Realized Depth Women	65.1	19.3	8	107
Cliff Diving				
Gender (1 = male)	0.69	–	0	1
Points Men	348	95	0	550
Points Women	233	55	0	358

**Fig. 1** Announced depth by men and women

The estimation results in Table 2 show that controlling for the discipline, women announce 15.30 meters less than men and accomplish 12.83 m less than men, suggesting that all that matters is lung capacity. Table 2 reinforces this finding, as the probability that a woman is successful in accomplishing the announced depth is not different from the probability of a male competitor. Moreover, additional estimations (not reported here but available from the author on request) show that the probability to accomplish a new national or world record is also identical among men and women.<sup>13</sup>

In addition, the insignificant coefficients of the interaction terms of gender and time dummies reveal that the performance of men and women has increased equally

<sup>13</sup> In both figures, the densities have a hint of bimodality which are related to the specific type of diving. Kernel density plots that distinguish between the three types of competition do not reveal that bimodality anymore. These plots are available from the author upon request.



**Fig. 2** Realized depth by men and women

over time, i.e. the gender difference has remained completely stable, pointing to the importance of physical and physiological differences.

It appears from Table 3 that gender has no impact on any of the four outcome dimensions, suggesting that women are as likely to succeed or fail as men. Not surprisingly, announced depth reduces the probability of success and increases the probability of disqualification due to a major rule violation. These effects are virtually identical for men and women (i.e. the coefficient of the interaction term of announced depth and gender turns out to be insignificant). Again not surprisingly, the probability of success decreases with the duration of the competition while the probability of a point deduction due to a minor rule violation and “no show” increases. Additional estimations show that the behavior of neither men nor women is in any way affected by a severe accident or even death of an athlete (recall that Natalia Molchanova died in 2015 and Nicholas Mevoli in 2013). Moreover, success/failure in an athlete’s previous attempt has no impact on success/failure in her next attempt and success/failure of the previous athlete has no impact on success/failure of the following athlete (Fig. 3).

Figure 4 seems to suggest that women’s performance in cliff diving is significantly worse than that of men. Table 3, however, reveals that this is mainly due to the early years of my observation period as women are catching up rapidly. As indicated by the mostly significant year dummies, both, men and women improve their performance significantly from 2014 to 2019. The highly significant coefficients of most of the interaction terms of gender and year dummies, however, suggest that the gap in the performance of men and women is rapidly decreasing.<sup>14</sup>

<sup>14</sup> Genakos et al. (2015) use data from the finals of diving tournaments at the Olympic Games, World and European Championships, and Champions Cups from 1988 to 2012 to analyze the impact of interim rank on performance. They find that competitors systematically underperform when ranked closer to the top, despite higher incentives to perform well. Unfortunately, the authors do not test whether men and women differ with respect to this “choking under pressure”.

**Table 2** The impact of gender on announced and realized depth (linear regression)

Model	(1)	(2)
Dependent variable	Announced depth	Realized depth
Sex (1 = male)	15.30*** (5.145)	12.83** (6.074)
Constant Weight	-16.08***	-16.05***
Without Fins	(1.986)	(2.049)
Constant Weight	7.56*** (2.307)	9.38*** (2.411)
Day Dummies	Included	
Year 2013	Reference year	
Year 2014	12.48*** (3.816)	16.12*** (3.144)
Year 2015	6.41 (4.299)	12.01*** (4.029)
Year 2016	10.48** (4.602)	13.14*** (4.658)
Year 2017	13.53** (5.663)	15.69*** (5.087)
Year 2018	16.86*** (5.714)	22.22*** (5.713)
Male # 2013	3.984 (7.344)	9.037 (7.904)
Male # 2014	-3.236 (6.215)	-2.672 (6.928)
Male # 2015	-0.024 (7.219)	4.397 (7.719)
Male # 2016	-0.846 (6.303)	3.513 (7.888)
Male # 2017	2.066 (5.606)	4.651 (6.321)
Male # 2018	Reference	
Constant	56.99*** (4.186)	50.51*** (3.718)
<i>N of observations</i>	1103	672
<i>R</i> <sup>2</sup> × 100	35.6	37.6

Robust standard errors (clustered at athlete id) in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

These findings are consistent with the hypothesis that men and women do not differ with respect to their sensation-seeking behavior. The performance differential between men and women is entirely due to the fact that women entered the sport later (they were offered fewer competition spots in the early years) than men. It is

**Table 3** The impact of gender on success and failure (probit estimation)

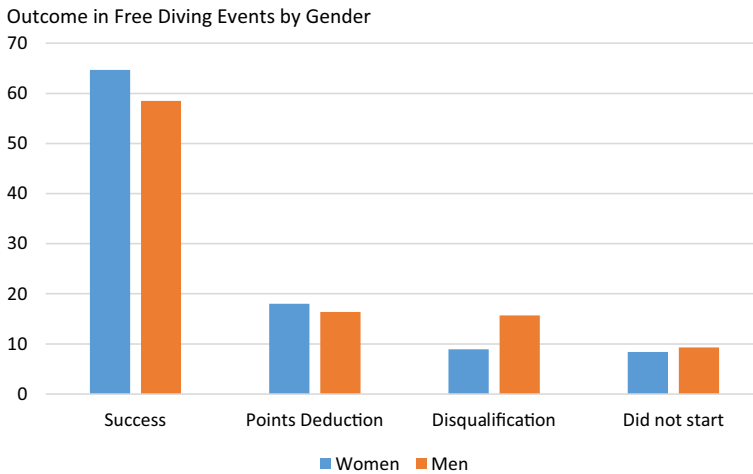
Model	(1)	(2)	(3)	(4)
Dependent variable	Success	Point Deduction	Disqualification	Did not start
Sex (1 = male)	-0.0617 (0.138)	0.0225 (0.118)	-0.0115 (0.156)	0.0372 (0.170)
Announced Depth	-0.00,785*** (0.00282)	-0.00492* (0.00295)	0.0203*** (0.00367)	0.00373 (0.00396)
Constant Weight	-0.339*** (0.120)	-0.595*** (0.171)	1.125*** (0.169)	0.0641 (0.174)
Without Fins	-0.172 (0.112)	0.192 (0.122)	0.0692 (0.140)	-0.0182 (0.144)
Day 1	Reference day			
Day 2	0.154 (0.156)	-0.0634 (0.194)	-0.169 (0.221)	-0.173 (0.299)
Day 3	-0.0256 (0.166)	0.0754 (0.196)	-0.0316 (0.206)	-0.0160 (0.241)
Day 4	-0.133 (0.163)	0.134 (0.196)	-0.159 (0.207)	0.290 (0.227)
Day 5	-0.0149 (0.194)	-0.145 (0.209)	0.0248 (0.216)	0.244 (0.239)
Day 6	-0.314* (0.161)	0.402** (0.194)	-0.219 (0.218)	0.412** (0.191)
Day 7	-0.485*** (0.148)	0.372** (0.174)	-0.112 (0.178)	0.666*** (0.226)
Day 8	-0.553*** (0.211)	0.395* (0.212)	0.230 (0.211)	0.377 (0.273)
Day 9	-0.198 (0.184)	0.222 (0.192)	-0.211 (0.213)	0.409* (0.240)
Year Dummies	Included			
Constant	1.123*** (0.252)	-0.636** (0.268)	-2.884*** (0.347)	-1.969*** (0.364)
<i>N of observations</i>	1103	1103	1103	1103

Robust standard errors (clustered at athlete id) in parentheses

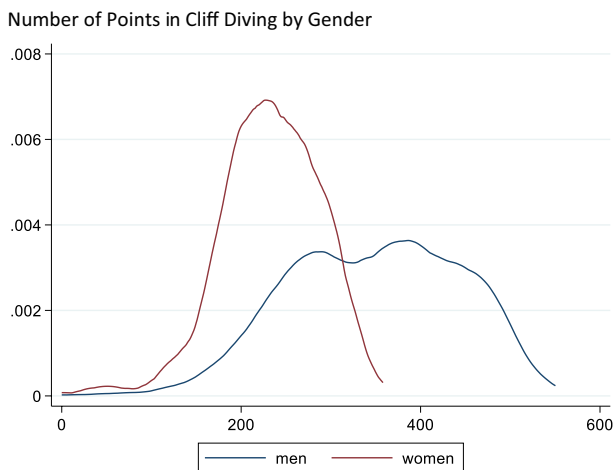
\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

very likely that in a few years the technical difficulty of women's jumps will be as high as the technical difficulty of the men's jumps (Table 4).<sup>15</sup>

<sup>15</sup> Estimation of a multinomial probit or logit model yields identical results. These are available from the author upon request.



**Fig. 3** Outcome in free diving events by gender



**Fig. 4** Number of points in cliff diving by gender

## 8 Summary and Implications

Women are still under-represented in extreme sports—only about one-third of the participants in cliff diving and free diving are female. This is completely in line with the distribution of risk preferences in the general population (e.g. Buser et al. 2020). However, the percentage of women participating in extreme sports has recently been increasing rapidly (the under-representation in cliff diving particularly in the early years is due to the institutional set-up with fewer spots being allocated to female athletes).

**Table 4** The impact of gender on number of points (linear regression)

Dependent Variable	Points
Sex (1 = male)	181.4*** (23.78)
Year 2014	Reference year
Year 2015	19.88 (15.19)
Year 2016	37.50* (19.98)
Year 2017	70.14*** (20.37)
Year 2018	84.23*** (18.95)
Year 2019	78.26*** (21.55)
Male # 2015	-14.55 (20.55)
Male # 2016	-16.19 (24.27)
Male # 2017	-135.2*** (24.75)
Male # 2018	-103.1*** (26.56)
Male # 2019	-105.5*** (24.51)
Location dummies	Included
Series number dummies	Included
Constant	-22.44 (36.77)
Number of observations	876
Number of athletes	66
Observations per athlete	1-44
Adjusted R2 × 100	38.0

Robust standard errors (clustered at athlete id) in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Apart from that, men and women seem not to differ significantly in their preferences for sensation-seeking behavior: First, in cliff diving the performance of women approaches that of men rather quickly (i.e. with respect to technical skills and risk attitudes) and, second, the performance of women remains constantly lower in free diving due to differences in physical ability (lung volume).

“Sorting into occupations is not random, and some occupations are chosen by persons who have an inclination toward non-monetary rewards“(Lazear 2018: 209). Two particularly interesting examples of such occupations are cliff diving and free

diving that both require the complete absence of risk-aversion and come with significant hardship and low average compensation. Those who choose occupations like these value social rewards (like e.g. the thrill of competition and enjoying a particular lifestyle) over monetary ones.

In general, my results are in line with findings from the psychological literature, according to which men generally describe women as being less agentic, most likely a synonym for risk avoidance. However, women describe women as less assertive than men but as equally independent and leadership competent, two dimensions that are likely to be correlated with risk preferences. Moreover, both men and women rate men and women equally high on instrumental competence, a prerequisite for self-selection into and success in high-risk sports (Hentschel et al. 2019). Among managers, female CEOs' mental dispositions do not differ from their male peers. According to Eriksson et al. (2017), women even have significantly more pronounced masculine stereotypes than female managers at lower levels, suggesting that self-selection into leadership positions is comparable to self-selection into high-risk sports.

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