

Risk Assessment for Extreme Sports & Their Impact on the Economy

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Abstract

Statistics suggest that participation rates in adventure and extreme sports are growing faster than traditional recreational sporting activities such as golf. Between 1998 and 2001 participation rates in extreme sports far outstripped any other sporting activity and this trend seems to be continuing. Interestingly theoretical perspectives that have been used to explain participation still focus on the notion that participants are a minority and assume that participation is about risk-taking. Participation has been explained as a function of a genetic or chemical status that differentiates participants from the norm. Researchers and theorists have also drawn on non-normal and even pathological personality traits, antisocial youth cultures, masculinity and narcissism to explain why some people are drawn to undertaking activities deemed to be socially unacceptable.

Introduction

Extreme sports are activities that are associated with an adrenaline rush that is felt by the participant. These activities are often dangerous and any mistake could result in injury or even death. Extreme sports are usually done by individuals rather than teams. These activities often involve speed, height, a high level of physical exertion, and highly specialized gear. While use of the term "extreme sport" has spread far and wide to describe a multitude of different activities, exactly which sports are considered 'extreme' is debatable. There are however several characteristics common to most extreme sports. While not the exclusive domain of youth, extreme sports tend to have a younger-than-average target demographic. Activities categorized by media as extreme sports differ from traditional sports due to the higher number of inherently uncontrollable variables. These environmental variables are frequently weather and terrain related, including wind, snow, water and mountains. Because these natural phenomena cannot be controlled, they inevitably affect the outcome of the given activity or event.

Background

The origin of the divergence of the term "extreme sports" from "sports" may date to the 1950s. The Dangerous Sports Club of Oxford University, England was founded by David Kirke, Chris Baker, Ed Hulton and Alan Weston. They first came to wide public attention by inventing modern day bungee jumping, by making the first modern jumps on 1 April 1979, from the Clifton Suspension Bridge, Bristol, England. The Club also pioneered a surrealist form of skiing, holding three events at St. Moritz, Switzerland, in which competitors were required to devise a sculpture mounted on skis and ride it down a mountain. Other Club activities included expedition hang gliding from active volcanoes; the launching of giant (60 ft) plastic spheres with pilots suspended in the centre and BASE jumping.(source: Wikipedia)

List of Extreme Sports

Extreme sports cover a vast assortment of activities. This would include land, water, mountain, tall building or sky. In other words this is no limit or line with could stop enthusiastic to attempt the risk. A few of the more common and most popular types include the following:

- **BASE Jumping:** is very extreme activity that includes a parachute (can be used both parachute and wing suit) to jump from fixed objects, with unopened parachute like skydiving. The acronym "B.A.S.E." stands for: Building, Antenna, Span, Earth – four categories of objects from which B.A.S.E. jumper can jump.
- **Hang gliding:** is an air sport in which a pilot flies a light and non-motorized foot-launch aircraft called a hang glider.

- **Skydiving:** is the action sport of exiting an aircraft and returning to Earth with the aid of gravity, then slowing down during the last part of the descent by using a parachute. It may or may not involve a certain amount of free-fall, a time during which the parachute has not been deployed and the body gradually accelerates to terminal velocity.
- **Canoeing:** is a paddle sport in which you kneel or sit facing forward in an open or closed-decked canoe, and propel yourself with a single-bladed paddle, under your own power.
- **Bungee jumping:** is an activity that involves jumping from a tall structure while connected to a large elastic cord. The tall structure is usually a fixed object, such as a building.

Statistics of Fatalities

There is a very famous question in many minds where people often asked about which extreme sport is safer than other? Which has less possibility of getting injured or which has higher fatality rate? After a brief study and comparing different statistics, I came up with some calculation to demonstrate the risk of death is such extreme sports. My calculation are based on the number of average fatalities in each category, it absolutely doesn't make any activity safer or dangerous.

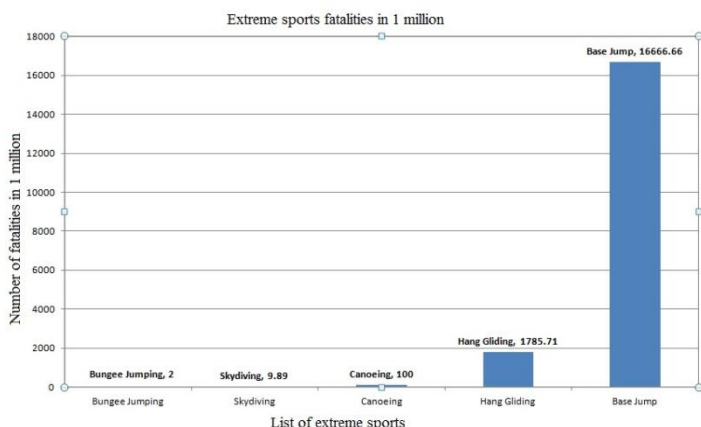
According to studies, the average annual mortality risk (AMR) in United States for extreme sports is:

Base jump : 1 in 60
 Bungee jumping: 1 in 500,000
 Canoeing : 1 in 10,000
 Skydiving : 1 in 101,083
 Hang gliding : 1 in 560

Now let's consider a annual mortality rate (AMR) in 1 million sample and represent it into graphical form.

For example:

Base jump = 1 in 60
 Mortality risk in 1 million = Total number of people / 60
 $= 1 \text{ million} / 60$
 $= 16666.66$



As above graph shows, Base jumping is one of the world's most dangerous recreational activities. The nature of BASE jumping is that many of the statistics about this sport have to be taken with a grain of salt. No one keeps records on the many jumps that happen at night, in the boondocks or with no one else around. However, the current BASE number is above 1,800, and the World BASE Fatality List reached 97 on Feb 6, 2013.

Ian Flanders, a 37-year-old BASE jumper and wing suit flyer from Southern California was taking part Tuesday in an extreme sports event in Turkey. It was his first time in the country. The event was being carried by a local TV station. The gorge of the Karasu, or "dark water" river in the eastern part of the country provided a dramatic venue for a pastime that is as spectacular as it is dangerous. Flanders was the 264th jumper to die since record keeping began.

An extreme sports star Dean Potter was one of two men found dead in Yosemite National Park, after attempting a jump from Taft point. Potter, who was well known for his daring exploits, had attempted to descend from around 3,500 feet along with Graham Hunt. Both men's bodies were found during a helicopter search around noon Sunday. Neither of the men appeared to have deployed their parachutes.

According to United States Parachute Association one out of every 20,000-75,000 jumps results in death. Some estimation about the failure rate of mains vs. the failure rate of reserves. It seems to me that reserves would have a greater mean time between failures as a result of more positive openings with a spring-loaded pilot chute. If mains and reserves have an equal failure rate of .003, then the parallel failure rate would be:

$(.003)(.003) = .000009$. In other words we could expect a double malfunction 9 times every million jumps, or once every 111,111 jumps.

The number of BASE jumping fatalities worldwide is currently about twenty-five per year. Every one of those deaths could be avoided if nobody tried to parachute from a fixed object.

Jumpers being irresponsible

The number of road fatalities in the US alone is currently more than thirty THOUSAND per year. The vast majority of those deaths could be avoided if everybody watched where they were going, didn't speed, didn't tailgate, maintained their vehicles properly.

Clearly there is a heck of a lot more people driving than there are taking part in BASE. Clearly BASE carries a much higher risk per participant than driving. Clearly many of the people killed on the road did absolutely nothing wrong, but were victims of other people's behavior. But they are still dead, leaving behind grieving loved ones and a mess for the emergency services to deal with.

So twenty-five people, and tens of thousands of people, are dead because of risky behavior. In the latter case, many of those deaths were because recklessness put OTHER people at risk. So which of these is the serious problem? Are we really going to try and present BASE jumpers as some sort of burden on society?

Why & Who Take Risks

The existence of "risk gaps" between the kind of risky behavior we would recommend for others versus the kind we engage in personally. As one example, while 9 out of 10 drivers support laws banning texting while driving, up to 80 percent of the population has done it at least occasionally. The same gap exists for many other risky behaviors—things we know are illegal or dangerous but which we engage in all the same—impaired driving, not wearing a seatbelt, smoking, etc.

Research into risky decision-making suggests that we are more impartial when asked to evaluate risk for other people than we are when we consider these behaviors ourselves. Not only are we less likely to be swayed by cognitive biases in weighing risks for others, but we are less likely to let our emotions get in the way. For researchers looking at how we make decisions about risks, the process is often regarded as an economic model in which we compare the costs and benefits involved. Still, we are also prone to cognitive biases that can lead us to do things that we might not ordinarily consider. Among the most important of these biases knows that others are engaging in that same risky behavior.

Risk-taking can lead to extraordinary success or extraordinary failure, and is thus an important aspect of the human condition, but for a long time, scientists struggled to define the behavior. "Risk is very widely different in terms of what kinds of risks people are willing to take and the subjective reasons for why they take risks."

A Columbia University psychologist, Elke Weber, was the first to account for this subjectivity, with a model called "domain-specific risk propensity." It holds that everyone has a unique risk propensity in each of five categories: financial, health/safety, recreational, ethical and social.

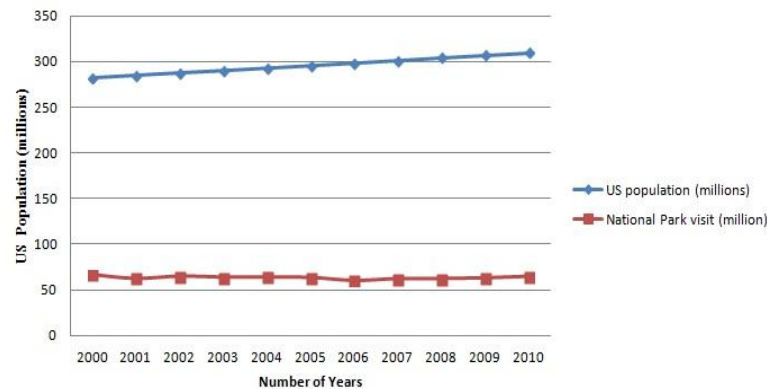
Extreme Sports Economic Effects Analyses

With regard to extreme sports, the perception of the general public is that people who choose to take risks are irresponsible 'adrenaline junkies' who are ultimately a burden to society. When a person takes unnecessary risks, and becomes injured or in need of rescue, the expenses for coming to their aid are often borne by taxpayers. It should not be surprising then, that these same taxpayers question why they should have to pay for these seemingly foolish actions. A backcountry rescue after skiers trigger an avalanche, for example, will cost thousands of dollars. Skateboarders cause damage to both private and public property, and injure themselves. While these issues have been discussed at great length in the media, rarely does discussion focus on the negative impact of limiting access to these types of risky sports. What would be the effect on society if we made it more difficult for people to engage in these types of activities? In fact, by curbing a person's passions and limiting access to their chosen sports, even those the public may consider risky, these athletes may well find outlets for their energy that is much more burdensome to society.

There are several serious direct or indirect effect over our general economy. These impacts from thousands to millions. As we noticed that majority of such extreme activities were taken place in National Parks, public bridges etc. The deaths of extreme athlete Dean Potter and his friend Graham Hunt in Yosemite National Park brought renewed attention to the risks of BASE jumping and its more dangerous offshoot. This send out a negative message to many National Park enthusiasts and they start discussing about is this safe to visit National Park like Yosemite??.

Studies shows National park visitation is in flux. While recreational visits to the system as a whole have remained fairly stable, visitation to the 58 major nature-based national parks-the "crown jewels" such as Yellowstone, Yosemite, and the Grand Canyon-actually peaked in 1997 at 69.4 million visits, and has since declined nearly 7% to 64 .6 million visits in 2010.

Growth in Population vs Visitors in National Parks in United States



Visitors to NPS lands spend money in local gateway regions, and these expenditures generate and support economic activity within these local economies. Economies are complex webs of interacting consumers and producers in which goods produced by one sector of an economy become inputs to another, and the goods produced by that sector can become inputs to yet other sectors. Thus, a change in the final demand for a good or service can generate a ripple effect throughout an economy as businesses purchase inputs from one another. For example, when visitors come to an area to visit a park or historic site these visitors spend money to purchase various goods and services. The sales, income and employment resulting from these direct purchases from local businesses represent the direct effects of visitor spending within the economy.

In order to provide supplies to local businesses for the production of their goods and services, input suppliers must purchase inputs from other industries, thus creating additional indirect effects of visitor spending within the economy.

Types of Economic Effects Measured

The economic effects of visitor spending to local economies are estimated by multiplying visitor spending by regional economic multipliers. Two regional economic metrics, economic contributions and economic impacts are described in this report:

- *Economic contributions* describe the gross economic activity associated with National Park visitor spending within a regional economy. Economic contributions can be interpreted as the relative magnitude and importance to regional economies of the economic activity generated through National Park visitor spending. Economic contributions are estimated by multiplying total visitor spending by regional economic multipliers.
- Economic impacts describe the net changes to the economic base of a regional economy that can be attributed to the inflow of new money to the economy from non-local visitors. Economic impact estimates only include spending by non-local visitors. Economic impacts can be interpreted as the economic activity that would likely be lost from the local economy if the National Park were not there. For both of these metrics, four types of regional economic effects are described:

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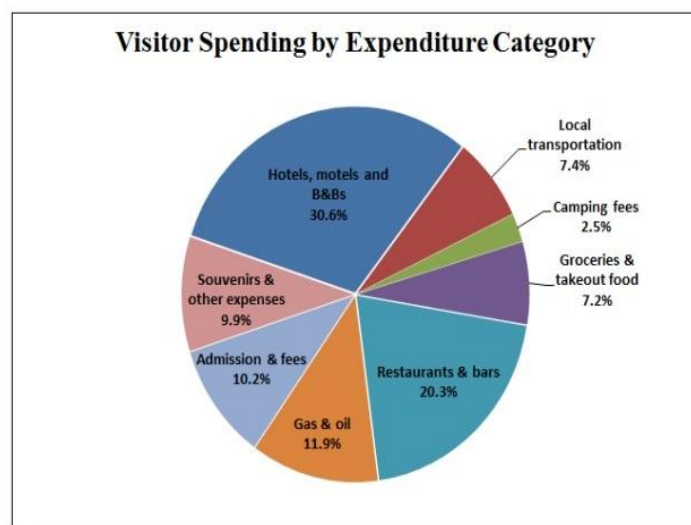
- Jobs are measured as annualized full and part time jobs that are supported by National Parks visitor spending.
- Labor Income includes employee wages, salaries and payroll benefits, as well as the incomes of sole proprietors that are supported by National Parks visitor spending.
- Value Added measures the contribution of National Parks visitor spending to the Gross Domestic Product (GDP) of a regional economy. Value added is equal to the difference between the amount an industry sells a product for and the production cost of the product.
- Economic Output is a measure of the total estimated value of the production of goods and services supported by National Parks visitor spending. Output is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).

Visitor Spending Estimates

Visitor spending data from the VSP surveys are reported as spending per party per night for overnight trips, and spending per party per day for day trips. A party is defined as a group that is traveling together and sharing expenses (e.g., a family). Party days/nights are defined as the number of days (for day trips) and the number of nights (for overnight trips) that parties spend visiting a park. To estimate total party days/nights, park visit data from the National Park Statistical Abstract are combined with trip characteristic information derived from the VSP surveys. Trip characteristic data includes average party sizes, re-entry rates, and lengths of stay. Visitation data are converted to total party days/nights using the following conversion:

Total party day/night=
(Visits/Party size)(1/Reentry Rate)(length of stay)

Visitor Segment	Total Spending (\$ Millions, \$2014)	Percent of Total Spending	Average Spending per Party per Day/Night (\$2014)
Local Day Trip	\$925.4	5.9%	\$40.72
Non-Local Day Trip	\$2,473.4	15.8%	\$88.23
NPS Lodge	\$542.6	3.5%	\$402.71
NPS Camp Ground	\$435.6	2.8%	\$128.61
Motel Outside Park	\$9,565.8	61.0%	\$276.66
Camp Outside Park	\$922.1	5.9%	\$123.45
Other	\$824.0	5.3%	\$41.34
Total	\$15,688.9	100%	\$133.56



Distribution of NPS visitor spending by spending category. In 2014, visitors to NPS lands spent an estimated \$15.7 billion in local gateway regions. Source: <http://www.nps.gov/aboutus/news/index.htm?id=1615>

Accident Statistics Applied to an Average Adventure Business

- If,
- 2,500 client days per year
 - 2,500 x 10 years = 25,000 client days 6 hours per day activity time
 - 6 x 25,000 = 150,000 client hours over 10 years
 - This is approximately 1/7 of 1 million hours (15%)
 - If the business met adventure industry average of 40 events (injuries)/1million hrs, then we could expect 6 events over 10 years
 - We could also expect .75 fatalities over 10 years or 1 every 200,000 hours.

Conclusion

Instead of shunning and discouraging extreme sports athletes, we should celebrate them for their differences and do what we can to support them as they climb higher, go faster and push the limits of human endurance and athleticism. With public support, extreme sport athletes can expand our boundaries and contribute to our diverse and evolving society. By curbing their passions and limiting access to activities some consider too dangerous, we may be inviting even greater risk in the form of addictions, crime and health problems the end result of which is a heavy burden for society to bear.

Here some useful suggestions for extreme sports enthusiast:

- Experienced BASE jumpers who use ground rush as an altitude indicator must exercise caution during their initial jumps. The low fall rate and high horizontal speeds can fool the jumper that they are higher than they actually are. The wing suit ground rush for a minimal canopy ride is a lot less intense than for normal freefall.
- The wing suit jumper must also pay attention to his altitude when flying down a talus or over sloping terrain. The jumper often focuses on the airspace they are flying towards, giving the illusion they have lots of altitude available.
- Experienced wing suit BASE jumpers may attempt to make jumps that would be otherwise impossible without a wing suit. The jumper must be absolutely sure of his own capabilities and those of his equipment when undertaking jumps that allow little margin for error.
- No two BASE jumps are the same, so it is very difficult for a jumper to predict what will happen once he starts plummeting towards the ground. This means that to survive a BASE jump you need a level head, the ability to react to surprises without panicking and lightning quick reflexes that will allow you to make instantaneous adjustments in your position or trajectory.

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