

ARE AVALANCHE COURSES THE NEW HIGH-RISK SPORT? USE OF SENSATION SEEKING SCALE IN AVALANCHE EDUCATION HIGHLIGHTS THE NEED FOR REASSESSMENT OF PARTICIPANTS' TRUE NATURE AND SUGGESTS THAT THE TEST ITSELF CAN SERVE AS A LEARNING TOOL

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ABSTRACT: In a perfect world, the risk of dying in an avalanche should decrease with knowledge. On the contrary, studies have shown that this risk might increase after an avalanche course. Could it be that participants from the beginning have an appetite for risks? If so, how high is this preference for risk-taking? Can such knowledge of personal risk preference be used to help the participants understand their own risk-taking? A majority of avalanche accidents are caused by the victim itself, but few studies have investigated the personal disposition of risk-taking. This risk preference can be estimated by measuring sensation seeking. Sensation Seeking Scale (SSS) is a psychometric tool and has been used in studies of high-risk sports such as skiing, parachuting, diving or climbing. During two winters the SSS test was used on Swedish avalanche courses, a total of 333 participants completed the test. The instructors also used the test results in a risk-taking module where participants reflected on their personal risk preferences. Results show that sensation seeking is relatively high among participants. The total average is 21.9 (SD 5.1), which is in line with high-risk sports. Another result is that both participants and instructors experience the test as an important and appreciated module. The conclusions are partly that avalanche courses should be regarded as a high-risk sport because the participants have high-risk preferences, partly that the SSS test itself serves as a learning tool for self-reflection and increased understanding of the participants' own risk-taking.

KEYWORDS: Human Factors, Risk-Taking, Education, Sensation Seeking Scale, High-Risk Sports

1. INTRODUCTION

In a perfect world, the risk of dying in an avalanche should decrease with increased knowledge. However, both research and experience implies some uncertainty about this central assumption. Actually, the question can be asked if an avalanche course really reduces the risk of dying? On the contrary, studies have shown that this risk actually may increase after an avalanche course. Studies by Burtcher and Nachbaur (1999) and Sole and Emry (2008) showed that the risk of dying in an avalanche doubled after an avalanche course.

Traditionally, avalanche courses assume participants to be rational agents who make rational decisions. After a course, the participants are

supposed to change their previous (i.e. dangerous) behaviour in the light of new (i.e. avalanche) knowledge. During and after the avalanche course, the participant is expected to be a rational agent with clear preferences, who is collecting all information, assessing any uncertainty, and always choosing the optimal action.

But everyone is not rational and what is considered dangerous is subjective, sometimes the exposure to danger is part of the experience itself. For example, Machlis and Rosa (1990) described what they called "desired risk" and Lupton and Tulloch (2002) investigated voluntary risk-taking and "its pleasures". Mårtensson et al. (2013) showed that Swedish off-piste skiers are well trained, have the right equipment, have been involved in avalanches, but are still willing to take further risks skiing off-piste.

1.1 *Problem*

It is not unreasonable to assume that those who attend an avalanche course also are, or are soon going to be, off-piste skiers. Downhill skiing, in

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general, can be considered hazardous and in particular skiing outside prepared areas, with avalanches as the biggest and most significant danger to the skier. Could it be that off-piste skiers, and thus avalanche course participants, from the beginning, have a high preference for risks? Are the courses attracting those who already have a tendency to risk-taking?

Participation in so-called high-risk sports such as climbing, parachute jumping, B.A.S.E. jumping has been thoroughly investigated by both psychologists and sociologists. Common to these high-risk sports is that participants understand and accept the possibility of serious injury or death as an integral part of their sport.

Should off-piste skiing, and thus avalanche courses, from that perspective be regarded as a high-risk sport? Is risk-taking an integral part of off-piste skiing? Are there elements of voluntary risk-taking in off-piste skiing?

If avalanche course participants have a high-risk preference and a will to take risks, if so, are then important contents in avalanche course curriculums missing? Then it may not be sufficient, as in the traditional rational assumption, to just describe the danger and assume that the participants then make rational and safe decisions.

How should an avalanche course be designed to also include opportunities for reflection on participants' personal risk preferences? Is it possible to add modules in avalanche courses in order for participants to understand their own preference of risk-taking?

1.2 Research Questions

From the above, the question is if avalanche course participants really have a high predisposition to take risks, and if so, how should that knowledge be used to alter today's avalanche courses to suit participants who are seeking risks, not avoiding them. Based on this reasoning we formulate our main research question:

RQ 1: Measured by psychometrics, how high is the preference for risk-taking of avalanche course participants in Sweden?

We also ask a supplementary question:

RQ 2: Can such knowledge of personal risk preference be included as a course module and thereby helping the participants understand their own risk-taking?

2. METHOD

There are different methods to investigate and measure individuals' preference to take risks. Harrison et al. (2005) summarize a dozen different instruments that measure risk propensity. Of these, perhaps the most widely known research is Marvin Zuckerman's work on sensation seeking (Zuckerman et al., 1964, 1978).

2.1 Sensation Seeking Scale

Sensation Seeking Scale (SSS) is one of the most common methods of measuring sensation seeking, that is, "The need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such an experience". By measuring sensation seeking, an estimate of the tendency to take risks is obtained (Zuckerman et al., 1964).

SSS has been developed and validated for almost 50 years and the most common form today is version five (SSS-V) which has good validity and reliability (Ridgeway & Russell, 1980). SSS-V consists of a questionnaire with 40 questions in four sub-scales:

- Thrill and Adventure Seeking (TAS), example: "I often wish I could be a mountain climber"
- Experience Seeking (ES), example: "I would like to take off on a trip with no preplanned or definite routes, or timetable"
- Disinhibition (Dis), example: "Keeping the drinks full is the key to a good party"
- Boredom Susceptibility (BS), example: "I can not stand watching a movie that I've seen before"

A high total value (TOTAL) indicates a greater sensation seeking and thus a greater risk taking. SSS total score decreases with increasing age and men generally have higher SSS than women (Zuckerman et al., 1978), see figure 1.

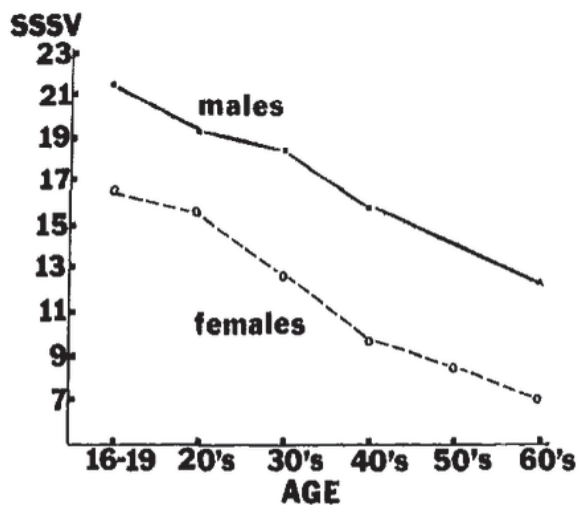


Figure 1: Changes in sensation seeking total scores as a function of age and gender (Zuckerman et al., 1978).

Over the years, SSS-V has been used in approximately 30 studies of various high-risk sports, for example; alpine skiing, snowboarding, backcountry skiing (Kopp et al., 2016), parachute jumping, wakeboard, snowboarding, diving, alpinism, hang gliding (Guszkowska & Bofdak, 2010), hang gliding, alpinism, parachute jumping, car sport (Jack & Ronan, 1998), Himalayan climbing (Breivik, 1996).

2.2 Data Collection

To winter of 2016/2017, SSS-V was introduced in Sweden on SVELAV Freeride 1, a two-day introductory recreational avalanche course. As part of the training, participants were asked to complete an SSS-V questionnaire. Participants' results were then used as a basis for discussion and reflection on their own risk-taking.

As the SSS test was formally used in the Swedish avalanche education system, an opportunity was available to collect relevant data. Therefore, in collaboration with Luleå Technical University and Sweden's largest provider of avalanche courses, Åre Lavincenter, test results from a total of 333 participants during the winters 2016/2017 and 2017/2018 were collected.

In addition to the recreational course SVELAV Freeride 1 (N = 239), the test was also used for comparative purposes on a professional three-day course called SVELAV Pro 1 (N = 94).

All avalanche instructors were also asked to note how the SSS test worked in practice for themselves and for the course participants.

3. RESULTS

3.1 Descriptive analyses

The total mean SSS-V score for all 333 respondents is 21.9 (SD 5.1); a mean that is in parity with measured values of high-risk sports practitioners in other studies.

The SSS-V score is influenced by age and gender (Zuckerman, 1978; Jack & Ronan, 1998). Therefore, in table 1 we show the total value for both females and males in different age groups.

Table 1: SSS-V total score depending on age and gender.

Age	Sex	Mean	N	Std. Deviation
0-19	Female	18.7	6	3.7
	Male	23.4	18	4.4
	Total	22.2	24	4.7
20-29	Female	22.1	62	5.2
	Male	23.3	89	4.6
	Total	22.8	151	4.9
30-39	Female	20.8	27	4.8
	Male	21.9	59	5.1
	Total	21.5	86	5.0
40-49	Female	18.2	11	7.3
	Male	21.0	32	5.2
	Total	20.3	43	5.8
50-59	Female	20.0	7	7.1
	Male	21.3	17	4.0
	Total	20.9	24	5.0
60-	Female	14.0	1	.
	Male	19.0	4	1.8
	Total	18.0	5	2.7
Total	Female	21.0	114	5.5
	Male	22.3	219	4.8
	Total	21.9	333	5.1

High values are found for males in the age groups 0-19 years 23.4 SD 4.4 (N = 18) and 20-29 years 23.3 SD 4.6 (N = 89); and for females in the age group 20-29 years 22.1 SD 5.2 (N = 62), see table 1.

Jack and Ronan (1998) reported a mean SSS-V score of 23.0 (SD 6.0) among high-risk sports participants (hang-gliders, mountaineers, sky-divers, automobile racers) and of 20.3 (SD 6.4) among

low-risk sports participants (golfers, swimmers, marathon runners, aerobics).

Kopp et al. (2016) have investigated the difference between different types of skiers and reported the following total values; snowboard 23.7 (SD 5.2), backcountry skiing 22.3 (SD 5.4) and alpine skiing 21.1 (SD 6.1).

No significant difference ($p = 0.8$) in the mean total value could be seen between the two different courses, see table 2.

Table 2: SSS-V total score depending on the type of course.

Course	Mean	N	Std. Deviation
Freeride_1	21.8	239	5.2
Pro_1	22.0	94	4.7
Total	21.9	333	5.1

In table 3 total scores for the two different courses are shown. High values are found for the recreational Freeride 1 course in the age groups 0-19 years 23.3 SD 4.5 (N = 18) and 20-29 years 22.5 SD 4.9 (N = 104).

Table 3: SSS-V total score depending on the type of course and age.

Course	Age	Mean	N	Std. Deviation
Freeride_1	0-19	23.3	18	4.5
	20-29	22.5	104	4.9
	30-39	21.5	61	5.4
	40-49	20.6	32	6.2
	50-59	21.3	20	5.3
	60-	17.5	4	2.9
	Total	21.8	239	5.2
Pro_1	0-19	18.8	6	3.6
	20-29	23.5	47	4.8
	30-39	21.6	25	4.0
	40-49	19.4	11	4.8
	50-59	19.3	4	3.2
	60-	20.0	1	.
	Total	22.0	94	4.7
Total	0-19	22.2	24	4.7
	20-29	22.8	151	4.9
	30-39	21.5	86	5.0
	40-49	20.3	43	5.8
	50-59	20.9	24	5.0
	60-	18.0	5	2.7
	Total	21.9	333	5.1

Most noteworthy is that the highest overall value is found in the age group 20-29 years 23.5 SD 4.8 (N = 47) attending the professional course Pro 1.

Note that this group consists of young professionals at the beginning of their avalanche careers, see table 3.

3.2 Qualitative analyses

Experiences from the avalanche instructors at Åre Lavincenter are predominantly positive. Both participants and instructors experience the test as an important and appreciated module. The test and subsequent discussion takes 45-60 minutes to complete and is considered well-invested time.

In order for the test to fill a function for the participants, it must be followed by a discussion about the subject. In the subsequent discussion, everyone can participate as everyone in the group has done the test and already have reflected on his or her risk-taking. The participants think that the test fills an important function in the course and that it becomes a live lesson where everyone is active instead of traditional lecture. In the course evaluations, participants think that the test is an important feature of the course.

The instructors experience the test as an easy way to create a dialogue about the subject. In connection with the test and discussion, the instructors have found that participants are sometimes actually surprised by their results. For example, some who think they are safety conscious in terms of skiing and avalanches instead got high scores. On the other hand, some who identify themselves as adventurers got low scores.

4. CONCLUSION

4.1 Research Question 1

Measured by psychometrics, how high is the preference for risk-taking of avalanche course participants in Sweden?

This risk-taking preference is relatively high with a total score of Sensation Seeking Score V of 21.9 (SD 5.3) for all 333 participants. The highest values are found among men 0-19 years (N = 18) 23.4 (SD 4.4), men 20-29 years (N = 89) 23.3 (SD 4.6) and women 20-29 years (N = 62) 22.1 SD 5.2.

Viewed in the light of other similar studies, these results clearly indicate that participants on Swedish avalanche courses in this regard are consid-

ered to be sensation seekers and thus also have a high-risk preference.

Similar studies conducted on established high-risk sports report SSS-V total values of approximately 22 to 23, suggesting that Swedish avalanche courses in this respect can be considered as a high-risk sport.

4.2 *Research Question 2*

Can such knowledge of personal risk preference be included as a course module and thereby helping the participants understand their own risk-taking?

Yes, the experience from Åre Lavincenter is that both course participants and instructors consider the SSS-V test to be an important feature on an avalanche course. The test works partly as self-reflection and partly as a basis for discussion about risk-taking.

5. DISCUSSION

There are pros and cons of using only the total SSS-V value (TOTAL) instead of building the analysis on the different sub-scales (TAS, ES, Dis, and BS). The advantage is that the total value has higher reliability and is easier to relate to risk-taking. The disadvantage is that the total value hides the distribution between the sub-scales. There may be a difference between different high-risk sports in how the distribution differs between the sub-scales.

The SSS-V test consists of 40 questions, some of which can be perceived as somewhat dated, making the test both timely and sometimes, unnecessary provocative. There are simplified instruments available and similar tools that might easier and faster achieve the same results both scientifically and pedagogically.

SSS-V is after all a psychological test and questions can be asked about which skills that are appropriate for instructors who conduct the test. It is also possible to discuss the ethics in conducting a psychological test on an avalanche course, but with recent years' focus on human factors, avalanche course participants are maybe ready for difficult questions about themselves.

The results undoubtedly raise questions about the difference between personal and professional risk-taking. The highest value measured was, surprisingly, found in the group of young professionals who have just started their avalanche careers. Does the industry attract those with high-risk preferences instead of those who put their own safety first?

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