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Sensation seeking and risk-taking in the Norwegian population

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Abstract

The article is based on a comprehensive study of the relation between sensation seeking and various forms of risk-taking in a representative sample of the adult Norwegian population, aged 15 years and above (n=1000). The study included social, intellectual, financial, achievement-related, political, physical, ethical and existential risk-taking dimensions. There was an expected main effect for age as well as gender on total sensation seeking, but no main effect for social class. All sensation seeking scales correlated positively with all the risk dimensions, although moderately for most scales. Physical risk had the highest correlation scores. The study found that altogether 21, 2 percent of the general population had been involved in risky activities during their life and had elevated scores on sensation seeking. A relatively high percentage of the population would be willing to be involved in risky sports (35,7 percent), risky jobs (54,8 percent) or risky military operations (25,9 percent), provided they were in good shape and of the right age. Those who were willing had higher sensation seeking scores. Only 16,9 percent of the population thought basejumping or other risk sports should be prohibited. The prohibitionists had lower sensation seeking scores than the non-prohibitionists.

Key words

Sensation seeking, risk-taking, risk sports, risky jobs, military operations

Introduction

The article is based on a comprehensive study of the relation between sensation seeking and various forms of risk-taking in the adult Norwegian population. Our primary goal was to find out how sensation seeking is related to a broader array of risk-taking attitudes than those used in previous studies. We also wanted to find out how sensation seeking is related to socio-demographic background factors and is expressed in choice of work, leisure and risky activities. Since the study was based on a representative sample of the population aged 15

years and older, we have been able to identify a broad array of characteristics of sensation seeking and risk-taking that are valid for the general adult population.

Our study is based on Zuckerman's bio-social understanding of sensation seeking. According to Zuckerman's theory, "sensation seeking is a trait defined by the seeking of varied, novel, complex, and intense situations and experiences, and the willingness to take physical, social, and financial risks for the sake of such experience" (Zuckerman 1994, 27). One problem with this definition is that risk-taking is included within the definition of sensation seeking, which makes the connection tautological. However, Zuckerman underlines that sensation seekers do not seek risk for its own sake. It is not the riskiness per se that is important but the stimulation. Listening to rock music or partying is not risky, whereas other activities like fast driving or drug use involve risk of some type. It is therefore of great interest to find out the ways in which sensation seeking is related to various types and forms of risk and risk-taking.

The concept of risk itself is not unproblematic. In economy and risk management literature risk is typically understood as something negative, as the possibility of a loss of some kind (Yates & Stone 1992). Zuckerman accordingly defines risk as "the possibility of suffering harm or loss; danger" (Zuckerman 2007, 52). The loss can be of different kinds. Yates and Stone (1992) suggested financial loss (money), performance loss (for a product), physical loss (from discomfort to death), psychological loss (self-esteem), social loss (esteem of others) and time loss. When Horvath and Zuckerman (1993) factor analyzed items they found four major areas involved in voluntary activities: "crime risk (offenses serious enough to warrant arrest), minor violations risk (e.g. traffic offenses), financial risk (loss of money from gambling and business investment) and sports risk (injuries incurred in sporting activities)" (Zuckerman 2007, 42). We think that risks and risk-taking should therefore be differentiated in a proper way into different types or forms. Below we propose a new and wider model of risks and risk-taking from those which have previously been used.

One problem with the dominant conception of risk and risk-taking is that it mainly focuses on negative or adverse aspects of risk. First, risky decisions seem to be influenced by more than simply a loss. Yates and Stone (1992) defined three characteristics of risk in any activity: potential losses, significance of the losses and uncertainty of the losses. But secondly, decisions about risks depend not only upon possible losses, but also upon possible benefits. As shown in various types of decision theory actions may have a total expected utility that warrant risky decisions. And we would argue that it is not only the possible consequences and

outcomes, but the character of the activity itself that plays a role; something of which Zuckerman is aware. For high sensation seekers in particular risky activities may be experienced as positive in themselves, even if they are dangerous. Risk-taking, or rather risk-seeking, is identified in sports and other contexts as the positive experience of thrills or flow (Csikszentmihalyi 1990; Zuckerman 1994). The risk element adds value and content to the experience of the activity since one needs to master the activity in the face of danger. Risk, thus, contains negative as well as positive possibilities dependent upon person, situation, and context.

One important question is whether risk-taking is general or different across dimensions or domains. In a study by Franken, Gibson and Rowland (1992) sensation seeking was negatively correlated with the tendency to view the world as threatening and the tendency to expect negative outcomes resulting from interactions with the world. High sensation seekers are positive and optimistic. According to studies reported by Zuckerman (1979) high sensation seekers accept higher risks to reach their goals. They experience less anxiety or fear and more positive sensations in situations that are unfamiliar or risky. They have a lower appraisal of risk in situations involving physical, mental or punishment aspects. Zuckerman thus concludes: "Sensation seeking is related to risk-taking in all kinds of risk areas. This is true of children as well as adolescents and young adults. In fact, the sensation seeking trait may be the common factor that accounts for the relationships among different kinds of risk-taking" (Zuckerman 2007, 65). In our study, we wanted to see whether this general attitude can be identified among not only high sensation seekers but in the general population.

Since Zuckerman's theory and earlier findings have shown that sensation seeking differs with age and gender (Zuckerman 1994, 99-11) and educational and socioeconomic differences (Zuckerman 1994, 113-118), we wanted to identify these relations on a population basis. We furthermore wanted to see how sensation seeking is expressed in risky leisure behavior and willingness to engage in specific dangerous activities, selected from different areas, like work, the military and leisure.

Key variables and key questions

An overview of the key variables is presented in table 1.

Table 1. The key variables, their relationships and contents.

Socio-demographics	Personality	Attitudes towards basic risk dimensions	Risky behavior During leisure time	Attitudes towards specific risky activities
Sex Age Education Income Social class	Sensation seeking	Social Intellectual Financial Achievement Political Physical Ethical Existential	Actual participation in risk sports	Willingness to participate in: risk sports risky type of work risky military operations

Even if theories and earlier research could have resulted in a confirmatory approach we have chosen an exploratory. Instead of formulating specific hypotheses, we have chosen open-ended questions to guide our presentation. Our analysis of data was performed to answer the following key questions:

Q1. How is sensation seeking related to socio-demographic background factors?
Q2. What is the relation between sensation seeking and the different risk dimensions?
Q3. What is the relation between sensation seeking and participation in risk sports?
Q4. What is the relation between sensation seeking and attitudes towards risky activities connected with sport, work or military operations?

Material and methods

Data were collected by Ipsos research institute, a global company with ISO9001 and ISO 202252 certificates. Data were collected during 14 days in February 2015. The respondents were recruited from the company's own data base, which contains all registered telephone numbers in Norway, including cellphones. Numbers were selected on a lottery base and the interviewers asked for the person in the household, 15 years or older, who had birthday next. The size of the database makes it possible to draw representative samples related to sex, age, and residence. To reach 1000 complete interviews 22.355 persons were contacted with a total of 61916 calls. Of the persons contacted 9567 answered and 12788 did not. A total of 1000 respondents then completed the telephone interviews, which lasted approximately 18 minutes. The total response rate was 4,4%. In relation to those who answered the telephone call the

response rate was 10 %. The sample satisfied criteria for representativity for the selected variables. Especially representativity for age may be difficult to obtain. The final sample scored well. Age was collected in years. For age between 15-24 years the sample reached 82 % of the population goal, for 25-39 years 109%, for 40-49 years 90%, for 50-59 years 112%, for 60-69 years 110 %, and for 70 + years 94%.

An overview of the sample characteristics is presented in table 2. Structured interview guidelines were developed by the authors of this paper in cooperation with representatives from Ipsos MMI, the research company that conducted the telephone interviews. Descriptive data were gathered with respect to socio-demographics, participation in risk sports and attitudes towards eight dimensions of risk-taking.

Table 2. Sample characteristics. N=1000. Range 15-92 years of age.

Variable	Characteristic	Frequency	Percentage
Gender	Male	525	52.5
	Female	475	47.5
Age	15-24	130	13.0
	25-39	268	26.8
	40-59	331	33.1
	60+	271	27.1
Own education	Realschule	119	11.9
	High school	343	34.3
	College/University lower	319	31.9
	College/University higher	218	21.8
Mother's education	Realschule	371	37.1
	High school	216	21.6
	College/University lower	216	21.6
	College/University higher	77	7.7
	Do not know	120	12.0
Father's education	Realschule	295	29.5
	High school	245	24.5
	College/University lower	193	19.3
	College/University higher	149	14.9
	Do not know	118	11.8
Household income	Below 799 000 NOK	435	43.5
	800 000 NOK and above	407	40.7

	Do not know or do not want to answer	158	15.8

Socio-demographic background included own education, parents' education and household income. We decided to use these variables as a combined measure representing social class. There is no clear agreement about how social class shall be defined but definitions typically focus on a group's position within the social hierarchy based on power, prestige, and wealth. Since household income and education in combination signify power of some sort our aggregated variable can be interpreted as a pragmatic measure of social class. The combined social class variable was constructed in the following way: The income variable was dichotomized according to above or below mean income and the education variables according to whether one had higher education at college/university level or not. The lower levels were given value one and the higher levels value two and the aggregated variable, consisting of scores between four and eight was then divided into three levels; score value four representing the lower class, five, six and seven the medium and eight the higher class.

Sensation seeking was measured by a Norwegian version of an eight-item Likert scale developed by Hoyle, Stephenson, Palmgren, Lorch, & Donohew (2002). The scale contains two items for each of the four sub-scales: Thrill and adventure seeking (TAS), Experience seeking (ES), Disinhibition (Dis) and Boredom susceptibility (BS). The internal consistency (Cronbach's alpha coefficient) of the original eight-item scale was 0.76. In the Norwegian version internal consistency was 0.74. With only two items each the sub-scales had moderate to low Cronbach coefficients (TAS =0.69, ES = 0.47, Dis = 0.54, BS = 0.34). Risk-taking was measured on a new scale, based on the scale developed by Breivik (1997) and first used in a study of Everest climbers. Internal consistency of the original scale was 0.86 (Breivik 1997). Whereas the 1997 scale explored six risk dimensions, the scale used in the present study comprised eight different risk dimensions. We included ethical risk-taking which has been used in other population-based studies (Johnson, Wilke, & Weber 2004) and existential risk-taking which has been used in another Norwegian population-based study (Breivik 2017).The respondents were asked to rate themselves on a seven-point scale ranging from a very risk aversive to a very risk accepting attitude. The scale contained one question for each of the eight risk dimensions, outlining the two opposite alternatives. Short or single-item measurements have their benefits and are a valid measure with respect to subjective issues (e.g. Hoeppner, Kelly, Urbanoski, & Slaymaker 2011; Robins, Hendin, & Trzesniewski

2001). Internal consistency (Cronbach's alpha) of the new eight-dimensional scale was 0.70 the characteristics of the dimensions were defined in the following way:

Social risk-taking – willingness to be different and stand out in social contexts versus being a conformist and under no circumstances standing out.

Intellectual risk-taking – willingness to adopt new, not well-established ideas and solutions versus always holding on to well-established truths.

Financial risk-taking – willingness to invest in uncertain financial projects with a prospect of big returns versus always having money in the bank or in secure investments.

Achievement risk – willingness to set high goals for one's achievements and performances, whether in school, work or sport, versus setting goals that are so low that one almost always succeeds in reaching them.

Political risk – willingness to go for big and dramatic changes to create good societies versus making small adjustments and changes to reach secure and stable societies.

Physical risk – willingness to try activities like climbing and skydiving, where severe injuries and death may be the result if things go wrong, versus activities that are safe and secure.

Ethical risk – willingness to break ethical rules in various contexts to get what one wants versus always trying to do what is morally correct.

Existential risk – willingness to take big chances in one's life to get what one wants versus going for as much safety and control as possible.

Our new scale with eight dimensions plus a total scale encompass a wider set of dimensions than earlier scales. . The domain-specific scale (DOSPERT) developed by Weber, Blais and Betz (1992) assesses risk-taking in five content domains: financial decisions (investing versus gambling), health/safety, recreational, ethical, and social decisions. *Zuckerman's Situation Inventory Form III* (Zuckerman, 1978) measures the evaluation of physical risk, mental risk and risk of punishment or loss. Fromme, Katz, & Rivet (1997) developed a questionnaire that identifies six different types of behaviors: Illicit drug use, Aggressive and illegal behaviors, Risky sexual activities, Heavy drinking, High risk sports, Academic/work behaviors. The Evaluation of Risks (EVAR) Scale (Sicard, Jouve, Blin & Mathieu, 1999) and the Military Operational Risk-taking Scale (MORTS) by Momen, Taylor, Pietrobon, Gandhi, Markham,

Padilla, Sander (2010) are especially related to military situations and are of less relevance for the general population.

Whereas several scales use “domain” we prefer “dimension” since our scale focuses on action alternatives inside different dimensions of life. The term “domain” signifies to a higher degree the geography of different social and environmental contexts.

Data analysis was performed using SPSS Statistics 21. Descriptive statistics and bivariate correlation tests were used to characterize the sample and correlations between sensation seeking scores and risk-taking scores. MANOVA and MANCOVA analysis was conducted with respect to the SS sub-scales, whereas ANOVA analyses were used to identify differences in sensation seeking scores and scores on participation and willingness to engage in risky activities. The results are presented according to our key questions.

Results

Q1. How is sensation seeking related to demographic background factors?

Table 3. Sensation seeking and socio-demographic factors. Representative sample of the Norwegian population 15 years and older. N=1000.

	TAS		ES		Dis		BS		Total SS	
	Mean	St.d	Mean	St.d	Mean	St.d	Mean	St.d	Mean	St.d
All	4.3	2.6	7.9	2.0	4.0	2.2	6.2	2.3	22.3	6.7
Males	4.7	2.7	8.1	1.9	4.4	2.4	6.4	2.3	23.6	6.8
Females	3.8	2.4	7.7	2.1	3.4	1.9	5.9	2.3	20.8	6.3
15-24	6.3	2.6	8.1	2.0	5.6	2.4	7.6	1.7	27.6	6.1
25-39	5.3	2.7	8.2	1.9	5.0	2.2	6.6	2.1	25.0	6.3
40-59	3.8	2.2	8.0	1.9	3.4	1.8	5.9	2.2	21.0	5.5
60+	2.9	1.8	7.5	2.3	2.8	1.7	5.4	2.4	18.6	5.9
Class 1	3.4	2.2	7.5	2.3	3.2	1.9	5.5	2.3	19.7	6.3
Class 2	4.7	2.7	8.1	1.9	4.3	2.2	6.5	2.2	23.6	6.3
Class 3	4.2	2.5	8.1	1.9	4.0	2.1	6.1	2.2	22.5	6.3

Note: TAS = Thrill and adventure seeking, ES = Experience seeking, Dis = Disinhibition, BS = Boredom susceptibility. Class 1 = Lower class, Class 2 = Medium class, Class 3 = Higher class.

Three initial MANOVAs were conducted with respectively gender, age, and social class as independent variables. Social class was revealed as nonsignificant for the four SS sub-scales and was hence excluded from further analyses. A two-way MANOVA with gender and age as independent variables revealed no interactional effect, however there were significant main effects for both gender ($F(8, 966) = 12.367$, $p \leq .01$; Wilk's $\Lambda = 0.951$, partial $\eta 2 = .049$) and age ($F(12, 2556) = 33.508$, $p \leq .01$; Wilk's $\Lambda = 0.679$, partial $\eta 2 = .121$). Males scored significantly higher than females on all scales.

In relation to age Tukey's post-hoc tests revealed significant differences ($p \leq 0.05$) between all age groups for TAS, DIS and BS, with lower scores for increasing age. With respect to ES no differences were revealed between the three youngest age groups, whereas the oldest age group scored significantly lower ($p \leq 0.05$) than their younger counterparts.

A two-way ANOVA with Total SS as dependent variable confirmed the findings of the MANOVA: men scored significantly higher than women ($F(1,969) = 33.876$, $p \leq .01$), but with modest effect explained (partial $\eta 2 = .034$). The significant differences in relation to age ($F(3,969) = 101.946$, $p \leq .01$) had strong effect (partial $\eta 2 = .24$).

Q2. What is the relation between sensation seeking and the different risk dimensions?

An analysis of the response patterns on the eight risk dimensions revealed that the proportion of "high risk" scorers was relatively small for most of the eight risk dimensions. The proportion scoring six or seven on the seven-point Likert scale was below ten percent for ethical risk (5.8%), existential risk (7.3%), financial risk (7.6%) and physical risk (7.7%). Achievement risk (17.5%) followed by intellectual risk (16.7%) were the dimensions with the highest share of "high risk" persons.

We also wanted to see how the how the different risk dimensions were inter-correlated.

Table 4. Correlation matrix for eight domains of risk and total risk. Representative sample of the Norwegian population 15 years and older. N=1000.

	Social	Intellectual	Financial	Perform	Political	Physical	Ethical	Existential
Social	1							
Intellectual	.352*	1						

Financial	.099*	.118*	1					
Performance	.259*	.282*	.107*	1				
Political	.262*	.368*	.162*	.236*	1			
Physical	.264*	.279*	.207*	.271*	.204*	1		
Ethical	.086*	.121*	.215*	.044	.145*	.154*	1	
Existential	.314*	.388*	.277*	.344*	.363*	.444*	.242*	1
Total risk	.248**	.338**	.764**	.231**	.324**	.343**	.695**	.438**

*p≤0.05, **p≤0.01

The correlation matrix for the eight domains of risk in Table 4 shows that there were significant (p≤0.01) positive correlations between all of the eight risk domains, except for ethical risk vs. performance risk (p>0.05). The highest correlation was between physical risk and existential risk (r=.44, p≤0.01). To risk serious injury or death is experienced as the ultimate way to put one's existence at risk. The correlation matrix shows that the correlation coefficients were small or moderate. The findings indicate that risk-taking attitudes are inter-correlated but multifaceted and differ between dimensions.

To identify the specific relation between sensation seeking and risk-taking we performed a bivariate correlation analysis. The results are presented in table 5.

Table 5. Correlations between the sensation seeking scales and risk dimensions. Representative sample of the Norwegian population 15 years and older. N=1000.

	Social	Intellect	Financial	Perform	Political	Physical	Ethical	Existential	Total risk
TAS	.212**	.221**	.224**	.188**	.165**	.569**	.189**	.367**	.340**
ES	.175**	.229**	.069*	.100**	.147**	.278**	.107**	.226**	.161**
Dis	.180**	.173**	.252**	.149**	.136**	.407**	.315**	.353**	.404**
BS	.145**	.143**	.098**	.127**	.144**	.249**	.152**	.206**	.205**
Total SS	.246**	.262**	.226**	.197**	.204**	.527**	.263**	.400**	.388**

*p≤0.05, **p≤0.01

There is a significant positive correlation between all the sensation seeking scales and all the risk dimensions. TAS has highest correlation with physical risk (r=.569, p≤0.01) followed by existential and total risk. ES has highest correlation with physical risk (r=.278, p≤0.01)

followed by intellectual risk and existential risk. Dis has highest correlation with physical risk (r=.407, p≤0.01) followed by total risk, existential risk and ethical risk. BS has highest correlation with physical risk (r=.249, p≤0.01) followed by existential risk and total risk. The SS total scale has highest correlation with physical risk (r=.527, p≤0.01) followed by existential risk and total risk.

The results reveal that physical risk has the highest correlation, not only with TAS but also the other sub-scales and the total scale, and is thus a key risk dimension. This is an interesting finding since there is some similarity in content between the TAS sub-scale and the risk taking measure, but not between risk-taking and the other sub-scales. Existential risk and total risk, which in different ways measure a general attitude towards risk, also showed high correlations with all the sensation seeking scales.

Q3. What is the relation between sensation seeking and participation in risk sports?

We asked the respondents whether they had been active in sports or activities with a risk of seriously injury or death. We found that in total 21, 2 percent of the population had been involved in such activities: 26,3 percent of the males and 15,5 percent of the females (p≤ 0.01). We also looked at age differences. A higher percentage of those aged 15-39 had been involved compared with those aged 40 and above (p≤ 0.01). This is probably due to the increasing number of risk sports and risk arenas that have being made available since the 1980s. The overall results are presented in table 6.

Table 6. "Have you ever been active in an activity or sport where there is a risk of serious injury or death, such as climbing, skydiving, steep downhill skiing or similar activities?" Representative sample of the Norwegian population 15 years and older. N=1000.

	TAS		ES		Dis		BS		Total SS	
	Mean	St.d	Mean	St.d	Mean	St.d	Mean	St.d	Mean	St.d
Yes (n=212)	6.2	2.75	8.6	2.09	5.2	2.20	6.9	2.18	26.9	6.12
No (n=788)	3.7	2.29	7.7	2.09	3.6	2.12	6.0	2.29	21.1	6.28

A one-way MANCOVA analysis with gender and age as covariates revealed a significant main effect for participation in risk sports ($F(4, 970) = 30.631$, $p \leq .01$; Wilk's $\Lambda = 0.888$, partial $\eta 2 = .112$) in relation to the SS sub-scales. Those who had participated in risk sports scored significantly higher than their counterparts on all four SS sub-scales when controlling

for gender and age. Significant main effects were revealed for both gender ($F(4, 970) = 12.760$, $p \leq .01$; Wilk's $\Lambda = 0.950$, partial $\eta 2 = .050$) and age ($F(4, 970) = 86.079$, $p \leq .01$; Wilk's $\Lambda = 0.738$, partial $\eta 2 = .262$). Accordingly, a one-way ANCOVA with total SS as dependent variable revealed that those who had participated in risk sports scored significantly higher than those who had not participated on total SS ($F(1,973) = 84.930$, $p \leq .01$, partial $\eta 2 = .080$).

Q4. What is the relation between sensation seeking and attitudes towards dangerous activities?

We asked the respondents whether they could imagine: 1) "being active in risk sports or extreme sports that involved danger"; 2) "having a job that that included dangerous missions, such as being a member of special groups in firefighting, police or rescue operations"; and 3) "taking part in dangerous military operations abroad". All three questions included the precondition "if you were in good shape and of the right age". The three risk areas were selected to look at similarities and differences in attitudes across different risky arenas, such as prosocial work, hedonistic leisure and patriotic military service.

Table 7. Percent who could imagine being active or not in risk sports, risky jobs and risky military operations. Representative sample of the Norwegian population 15 years and older. N=1000.

	Risk Sport		Risky Job		Risky military operation	
	Yes	No	Yes	No	Yes	No
In all	36.4	63.6	56.1	43.9	25.6	74.4
Males	43.8	56.2	65.8	34.2	37.3	62.7
Females	28.1	71.9	45.5	54.5	12.9	87.1
15-24	69.0	31.0	70.9	29.1	35.5	64.5
25-39	45.6	54.4	61.2	38.8	28.0	72.0
40-59	31.1	68.9	56.3	43.7	24.6	75.4
60+	18.3	81.7	44.0	56.0	19.9	80.1

Three one-way MANCOVAs were conducted with the SS sub-scales as dependent variables, gender and age as covariates, and respectively "risk sport", "risk job" and "military operation" as independent variables. Willingness to participate in risk sports showed a strong main effect

(F (4, 952) = 95.596, p ≤ .01; Wilk's Λ = 0.713, partial η2 = .287) when controlling for gender and age. Significant between subjects effects were revealed for all four sub-scales with those willing to participate in risk sports scoring higher than their counterparts. Significant main effects were also found for willingness to take risk jobs (F (4, 948) = 12.915, p ≤ .01; Wilk's Λ = 0.948, partial η2 = .052) and military operations (F (4, 942) = 14.879, p ≤ .01; Wilk's Λ = 0.941, partial η2 = .059). Significant between subjects effects were found for ES, TAS, and DIS for both willingness to take risk jobs and participation in military operations, whereas no differences were revealed for BS when controlling for gender and age. As expected, significant main effects were revealed for both covariates. The effect sizes of gender were small throughout; sport (partial η2 = .041), take risk jobs (partial η2 = .048), and participation in military operations (partial η2 = .048). With respect to age, strong effect sizes were revealed in all three cases with partial η2 = .219, .284, and .302 for respectively sport, take risk jobs, and participation in military operations.

We also asked the respondents to indicate their attitudes to the ethical status of dangerous activities. To the question *"Some activities lead to ethical or moral dilemmas. Do you think that activities where one puts one's own life in danger, like basejumping and other risk sports, should be prohibited?"*, 16,9 percent thought that risk sports should be prohibited, whereas 78,3 said no and 4,8 percent said impossible to answer. Significantly (≤ .01) more men (71.8%) than women (52.8%) answered no. Correspondingly, differences were also revealed with respect to age: 50.9% (15-24 years), 74.1% (25-39 years), 63.1% (40-59 years) and 57.6% (≥60 years). A one-way MANCOVA revealed no significant main effect on the four SS sub-scales with respect to the ethical status of activities when controlling for age and gender.

Discussion

The potential uniqueness of this study is related to two factors in particular. Firstly it is based on a representative sample of the adult population. Secondly it uses a more nuanced instrument and a broader array of questions than other studies to identify the risk profile of the population and the relation between sensation seeking and risk-taking. This new instrument is here used for the first time and we need further studies to confirm its reliability, validity and usefulness. We will discuss our findings in relation to the key research questions we asked.

Q1. How is sensation seeking related to demographic background factors?

It is difficult to know how Norwegian scores compare with other countries. Zuckerman concludes that studies of differences between nations have used different scales and samples that are not representative for the whole population – typically samples of university students (Zuckerman 1994, 103-104). Some findings indicate lower scores among Asian groups, Spanish groups and catholic groups compared to English-speaking, American or British, groups (Zuckerman 1994, 103-104). In general, differences between females from different countries are greater than between males. In a study by Breivik (1999) a sample of Norwegian undergraduates had similar total scores to undergraduates from the United States, England and Scotland. The differences between females were greater, with the groups from Norway and Scotland scoring higher than the group from the United States and low scores in the English group.

Our study found that males scored significantly higher than females on all the sensation seeking sub-scales and the Total SS scale. The biggest differences were on TAS and Dis. These findings agree with Zuckerman's conclusion: "Men score higher than women on all sub-scales, except ES, and this is generally the finding in many different cultures" (Zuckerman 2007, 14). Although Norway is a social-democratic welfare society that for several decades has put great weight on gender equality we find the same pattern here as in other societies, even with a difference between sexes on ES. Also, in relation to age the differences between groups were significant with the younger scoring higher than the older, especially on TAS and Dis, which is in accordance with most studies (Zuckerman 2007, 14). We found, however, no differences in sensation seeking scores between men and women in the youngest age group. This finding should be followed up in new studies as it may indicate or be a result of changes in gender roles.

We found no clear differences in relation to social class. This may be interpreted as indicating that sensation seeking is evenly distributed across social classes. But it may also be that our aggregated social class variable was too simple and did not include such relevant variables as type of occupation and work characteristics (Zuckerman's (1994, 166-175). As found in a study by Nicholson et al. (2007), risk propensity differs markedly in its distribution across job types and business sectors.

Q2. What is the relation between sensation seeking and the different risk dimensions?
We found that the risk dimensions were positively correlated, except financial versus ethical risk. This is in accordance with Zuckerman who summarizes research that indicates: "Risk

appraisals in different areas of risk are intercorrelated, as are risky behaviors across different kinds of risk. There is a general factor of risk sensitivity and risk taking that includes most forms of risk taking, particularly smoking, drinking, drugs, sex, reckless driving, and minor criminal behavior" (Zuckerman 2007, 65). Whereas the focus in Zuckerman's summary was on 'negative' forms of risk-taking, our study, with a focus on more positive forms of risk-taking, found a similar correlation between different dimensions of risk-taking. Since the correlations in general were moderate it means that risk-taking is sensitive to dimensional differences.

As expected we found a significant positive correlation between sensation seeking and risk-taking. In fact, all the sensation seeking scales correlated positively with all the risk dimensions. Even sensation seeking scales that are not related to physical dimensions, like Dis and BS, are positively related to physical risk-taking. And conversely TAS correlates positively with social, intellectual and financial risk-taking even if the content of the TAS sub-scale has nothing to do with these dimensions. It means that there is some generality in the personality dimension called 'sensation seeking' and conversely a generality in risk-taking across different dimensions. From Zuckerman's bio-social theory this can be explained with reference to the biological basis of sensation seeking, which results in a general attitude towards the environing world. "Three behavioral mechanisms are assumed to underlie sensation seeking. High sensation seeking is a function of a strong approach and weak inhibition and arousal systems. These are interactive, as are the neurotransmitters underlying them" (Zuckerman 2007, 27). In consequence, sensation seeking is associated with strong dopaminergic reactivity and weak serotonergic and noradrenergic reactivities. High sensation seekers are augmenters to intense stimuli, more active, exploratory and optimistic than others. They have a strong nervous system and a preference for higher levels of stimulation in general. They feel less fear and more well-being (flow) in dangerous environments and situations. They recover fast after stress or trauma and return more quickly to normal function (Zuckerman 1999; 1994, Breivik 2000).

Q3. What is the relation between sensation seeking and participation in risk sports?

We found a very clear relation between sensation seeking and taking part in risky sports like climbing, skydiving or downhill skiing. It was a surprise that as many as 21,2 percent of the population had been involved in such sports, males more than females. This shows that one out of five during their life time is attracted to risky activities. This stands in contrast to the ideas of safety, security and control that are basic in welfare societies like Norway.

High sensation seekers prefer risk sports since such sports give intense, varied and novel stimulation. Earlier studies have found that high sensation seekers typically get involved in many sports, take up new sports when they appear and dominate sports with challenges and risks (Breivik 2000, Zuckerman 2007).

Q4. What is the relation between sensation seeking and attitudes towards dangerous activities?

Whereas 21,2 percent of the population had taken part in risky activities as many as 35,7 percent would be willing to take part in dangerous sporting activities, given that one was of the right age and in good shape. This means that some people did not satisfy their wishes when they had the chance or never got the chance. In relation to willingness to take part in pro-social activities like firefighting, police or rescue operations more than half of the population was willing, given right age and good shape. Lowest willingness was in relation to dangerous military operations abroad with only one in four willing to take part. In all three types of activities those who were willing to take part scored significantly higher than the others on sensation seeking. The differences were biggest on the TAS sub-scale and on the Total SS scale. This shows that sensation seeking is a very relevant marker to identifying people who are willing to take risks and engage in potentially dangerous situations across different activity areas, whether it is 'egoistic' sporting activities like climbing or pro-social activities like policing or firefighting. Those who actually engage in these types of activities unsurprisingly also have high sensation seeking scores, as evidenced in the summary of relevant research by Zuckerman (2007, 87-106).

Some people think that basejumping and other risk sports – where one puts one's life in danger – should be prohibited. In fact, basejumping is still prohibited in specific mountain areas in Norway. And there is a general skeptical attitude towards basejumping in the normative elite. We found it therefore a bit surprising that the great majority of Norwegians, 78,3 percent, said no to prohibition. It is of interest that the prohibitionist attitude was related to a personality trait. Those who wanted prohibition scored significantly lower on all the sensation seeking sub-scales, especially on TAS and Dis.

Conclusion

Our study has shown on a population basis that sensation seeking is an important personality factor when it comes to understanding the broader set of questions concerning risk-taking. We were able to confirm earlier findings in relation to socio-demographic factors like sex and age

while differences in relation to social class were negligible. We found that sensation seeking is a key personality factor in relation to a broader set of risk-taking dimensions than used in earlier studies. Even if sensation seeking has sub-factors it is a general trait. Similarly, risk-taking has some generality as an attitude but consists of specific inter-related dimensions. This is in line with Zuckerman's theory and findings as summarized by Zuckerman (2007).

We were able to show that sensation seeking predicts actual participation in risk sports as well as willingness to take part in risky activities connected with sport, work and the military. A surprisingly high proportion of the population is obviously willing to take part in risky activities sometime during their lives and there is weak support for prohibiting risky activities like basejumping. Even if self-reported attitudes should be interpreted with some cautiousness we may conclude that the rational and prudent risk-avoiding person is not an ideal for all people, or even most people. The economist Keynes maintained that it may not be a good idea to make people into risk-processing machines. We are not prisoners of an inevitable future since "Uncertainty makes us free" (Bernstein 1996, 229). Similarly Adams states, "Only if there is uncertainty is there scope for responsibility and conscience. Without it we are mere predetermined automata" (Adams 1995, 18).

Ethical guidelines

The project was carried out in accordance with research ethical guidelines and approved by Norwegian Centre for Research Data

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