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## Varied Definitions of Risk Related to Sensation Seeking Trait

### **Abstract**

[Excerpt] "Risk judgments seem related to which definitions of risk a person uses. Earlier studies suggest that people who use a "probability" definition of risk give different, and somewhat lower, subjective estimates of risk than those who instead prefer a "consequence" definition. In addition, an "optimistic bias" often can be found, and subjects usually evaluate personal risk systematically lower than risk for people in general."

### **Keywords**

risk-taking, decision-making, consequences

# Varied Definitions of Risk Related to Sensation Seeking Trait

Pål Ø.U. Dåstøl & Britt-Marie Drottz-Sjöberg\*

## Introduction

Risk judgments seem related to which definitions of risk a person uses.<sup>1</sup> Earlier studies suggest that people who use a "probability" definition of risk give different, and somewhat lower, subjective estimates of risk than those who instead prefer a "consequence" definition.<sup>2</sup> In addition, an "optimistic bias" often can be found, and subjects usually evaluate personal risk systematically lower than risk for people in general.<sup>3</sup> Drottz-Sjöberg's study used four definitions of risk: (1) the probability of an event; (2) the extent of the consequences of an event; (3) a combination of probability and consequences; and finally (4) the nature of the event.<sup>4</sup> The subjects were asked to indicate their normal use of the word "risk." The responses were subsequently related to ratings of various hazards, regarding personal

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<sup>1</sup> See Britt-Marie Drottz-Sjöberg, *Perception of Risk: Studies of Risk Attitudes, Perceptions and Definitions*, 1 Rhizikon: Studies of Risk and Hazard (1991).

<sup>2</sup> See *id.*

<sup>3</sup> See N.D. Weinstein, *Optimistic Bias in Public Perceptions of the Risk from Radon*, 78 *Am. J. Pub. Health* 796 (1986); N.D. Weinstein, *Unrealistic Optimism about Susceptibility to Health Problems: Conclusions from a Community-wide Sample*, 10 *J. Behav. Med.* 481 (1987); Britt-Marie Drottz-Sjöberg, *Risk Perceptions Related to Varied Frames of Reference*, in *Proceedings of the Third Conference of Society for Risk Analysis Europe* 55 (P. Hubert and M. Poumadere eds., 1991).

<sup>4</sup> See Drottz-Sjöberg, *supra* note 1.

risk as well as risk to others. There was a persistent tendency of higher ratings of risk among people who defined risk in terms of consequences, as compared to those who defined risk as the probability of an event. This study demonstrated that people rated personal risk lower than risk related to other frameworks.<sup>5</sup> Røysamb showed that ratings of negative and positive affect were related to risk behavior, e.g. driving behavior.<sup>6</sup> Subjects who reported negative low-aroused affect and negative aroused affect were often low speeders, while high speeders often reported positive aroused affect and positive low-aroused affect.<sup>7</sup> Could it be that definitions of risk related to consequences are associated with negative affect, and that probability definitions of risk are associated with less arousal or affectivity, or even positive affect?

Franken, Gibson, and Rowland used a danger assessment scale, reflecting subjects' perceived danger of activities, and found a high, negative correlation between danger estimation and sensation seeking ( $r = -0.60$  for female,  $r = -0.65$  for male subjects).<sup>8</sup> Low sensation seekers seemed to experience the described situations as more risky than did high sensation seekers, and thus were less willing to take these kinds of risks. Horvath and Zuckerman showed, using a General Risk Appraisal Scale (GRAS), that risk judgments were a consequence of risky behavior in high sensation seekers.<sup>9</sup> Harlow and Brown found that female subjects were more risk averse compared to male subjects regarding financial risk taking, and furthermore that risk aversion increased with age.<sup>10</sup> It was also pointed out that risk acceptance and risk aversion were connected to the Sensation Seeking Scale (SSS), i.e., high acceptance of risk was related to high SSS scores, and vice versa. A 1979 study by Stewart and Hemsley reported a positive correlation ( $r = 0.4$ ) between risk perception, measured as "expectancy of gain," and the

<sup>5</sup> See *id.*

<sup>6</sup> See Espen Røysamb, *Risk Behaviour: Towards a Model of Affectively Construed Action*, 22 *Person. & Ind. Diff.* 33 (1997).

<sup>7</sup> See *id.*

<sup>8</sup> See Robert E. Franken, Kevin J. Gibson, & G.L. Rowland, *Sensation Seeking and the Tendency to View the World as Threatening*, 13 *Person. & Ind. Diff.* 31 (1992).

<sup>9</sup> See Paula Horvath & Marvin Zuckerman, *Sensation Seeking, Risk Appraisal, and Risky Behavior*, 14 *Person. & Ind. Diff.* 41 (1993).

<sup>10</sup> See W.V. Harlow & K.C. Brown, *The Role of Risk-tolerance in the Asset Allocation Process: A New Perspective* (1990).

“likelihood of action,” i.e., the probability of an involvement in risky behavior.<sup>11</sup> However, their 1984 study found no significant correlation between risk perception or risk taking and the sensation seeking personality trait. In the present study we investigated how psychology students normally used the word risk, based on three different response formats, and the relations of these risk definitions to responses on the facets of an adopted version of Zuckerman’s Sensation Seeking Scale.

## Method

### *Sample, Design and Questionnaire*

A group of first year psychology students (N=93) filled out a questionnaire during a psychology lecture. Three versions of the questionnaire were presented. The different versions varied only with respect to the response format regarding the subjects’ normal use of the word risk. The questionnaires were distributed in the order of A, B, C, A, B, C, etc. to students seated in consecutive rows in a large room. The total sample was thus divided into three sub-samples. The questionnaires first asked for background information (e.g., age and sex), then presented one of the three measurement formats of risk definitions. A third part presented the eighteen items and adopted a short version of Zuckerman’s SSS, version V.<sup>12</sup> The students’ average age was 23 years (68% between 20-25 years). The total sample included about 75% female and 25% male students.

### *Three Response Formats Regarding Personal Definition of “Risk”*

Sub-sample A (N=31) was presented with an open-ended format, with an instruction to provide the personal definition of risk. The sub-samples B (N=30) and C (N=32) were given the instruction:

We ask You to specify what You mean with the concept of risk. Is risk for You mainly a question of the probability of an event, or is risk mainly a question of the extent of the consequences of an event? It is also possible, that You understand the concept of risk as a combination of probability and consequences. Take a stand on the assertions beneath, about the meaning of risk.<sup>13</sup>

<sup>11</sup> See C.H.M. Stewart & D.R. Hemsley, *Personality Factors in the Taking of Criminal Risks*, 5 *Person. & Ind. Diff.* 119 (1984).

<sup>12</sup> See Willy Pedersen, *Mental Health, Sensation Seeking and Drug Use Patterns: A Longitudinal Study*, 86 *Brit. J. Addiction* 195 (1991).

Both sub-samples also had the possibility to indicate the response alternative "nature of events." For details of response formats, see Dåstøl and Drottz-Sjöberg.<sup>14</sup>

#### *Sub-sample A*

This group used the open-ended format in response to how they normally defined the word risk. The answers were categorized on three levels if several answers were given, i.e., the first given response was recorded as a level one answer, etc. The analysis focused on level one, since there was seldom more than one response.<sup>15</sup> Only categories including three or more subjects were used in the analysis, and four main categories resulted from this work: (1) danger, (2) chance, (3) outcome, and (4) other definitions.

#### *Sub-sample B*

Using a category response format, the answers "yes, absolutely" and "yes, maybe" relative to each respective item were categorized as "agree."<sup>16</sup> The answers "uncertain," "no, maybe not" and "no, absolutely not" were categorized as "disagree." The next step combined the responses to the first three items into a "consistent" response pattern (Table 1). Only answers consistent with the principles used in Table 1 were considered in the analyses. Since there was a remarkable tendency among subjects to agree with several or all risk definitions, this procedure meant a great loss of subjects. The fourth response alternative (i.e., "The meaning of the concept of risk is entirely based on the nature of the event") was treated separately. If a respondent agreed with this item, as well as with one or more of the other definitions, the response was considered inconsistent in the present context.

#### *Sub-sample C*

One single dimension was used as a response scale, i.e., a five-point scale with the extremes labeled "risk is mainly a question of the probability of an event" and "risk is mainly a question of the extent of

<sup>13</sup> See Drottz-Sjöberg, *supra* note 1.

<sup>14</sup> See Pål Ø.U. Dåstøl & Britt-Marie Drottz-Sjöberg, *Sensation Seeking Related to Varied Definitions of Risk*, Provisional Proceedings of the 1998 Annual Conference of SRA-Europe (Oct. 11-14, 1998).

<sup>15</sup> See Britt-Marie Drottz-Sjöberg, *Attitudes, Values and Environmentally Friendly Products*, 30 *Rhizikon* (1997).

<sup>16</sup> See Drottz-Sjöberg, *supra* note 1; Dåstøl & Drottz-Sjöberg, *supra* note 14.

Table 1  
Principles for the Categorization of the Responses into Consistent Answers,  
by a Two-Step Procedure of Grouping Responses into New Risk Definition Categories

<i>Step 1</i>	<i>Risk As Probability</i>	<i>Risk As Combination</i>	<i>Risk As Consequences</i>	<i>Step 2 Grouping</i>	<i>Name of Risk Group Definition Category</i>
A	Agree	Disagree	Disagree	1	Probability-only
B	Agree	Agree	Disagree	1	Probability & Combination
C	Disagree	Agree	Disagree	2	Combination-only
D	Disagree	Agree	Agree	3	Consequences & Combination
E	Disagree	Disagree	Agree	3	Consequences-only

the consequences of an event.” The mid-point was labelled “risk is a combination of probability and consequences.” Responses placed to the left of the scale (i.e., between 1 and 2.5 ) were categorized as “probability” answers. Answers found between 2.5 and 3.5 on the scale were considered a “combination” response, and those to the right (3.5 to 5) were categorized as corresponding to a definition of risk mainly based on the “consequences” of an event. A fourth response alternative, placed below the scale, was included to compare it with sub-sample B, i.e., “the meaning of the concept of risk is entirely based on the nature of the event” definition. If the subjects marked this response alternative in addition to a response on the dimension, the response was considered inconsistent.

### *The Sensation Seeking Scale*

The third part of the questionnaires presented a short, eighteen item version of Zuckerman’s Sensation Seeking Scale.<sup>17</sup> The responses were scored using the related scoring key.<sup>18</sup> A subject could achieve a score between 0 and 4 on the “Disinhibition” and “Boredom Susceptibility” facets respectively, and a score between 0 and 5 on the “Thrill and Adventure Seeking” and the “Experience Seeking” facets, respectively. The addition of these four sub-scores gave the total score, ranging from 0 to 18. Independent judges checked the responses twice. Only eight incorrect scores were found, i.e., a scoring failure before correction of less than 0.5%. According to Zuckerman, a high total score of SSS

<sup>17</sup> See Pedersen, *supra* note 11.

<sup>18</sup> See Marvin Zuckerman, *Behavioral Expressions and Biosocial Bases of Sensation Seeking* (1994).

indicates a “trait defined by the need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences.”<sup>19</sup> A high score on the “Boredom Susceptibility” facet indicates low tolerance for such things as repetitive tasks, and a high score on “Disinhibition” is suggested to reflect sensation seeking through various social activities. Similarly, high scores on “Experience Seeking” and “Thrill and Adventure Seeking” express the seeking of novelty through mental and sensory stimulation, and through sports and other physically risky activities, respectively.

#### *Handling of Missing Data*

If the subjects did not respond to one or more of the items in a sub-scale, or if they marked their response between two options or indicated several alternatives, the response to the specific item was classified as missing. In such cases, the mean value was used, based on the responses indicated correctly within the sub-scale, as an estimate of the summed sub-scale score. The statistical program SPSS for Windows version 8.0 was used in the data analyses.

## Results

### *Overall Responses*

There were some indications that the measurement format played a role in the subjects’ indications of how they normally defined risk. The subjects most often gave a “danger” definition of risk in the open-ended format used in sub-sample A. Subjects in sub-sample B most often indicated a variety of inconsistent combinations of the given risk definitions (more than half of the sub-sample). The most frequent response, among those considered consistent, was a normal use of the word risk as mainly the consequences of an event. There were no consistent “nature of event” responses in sub-sample B (Table 2). The results of sub-sample C also showed subjects’ preference for a “consequence” definition of risk, closely followed by a “combination” definition. There were markedly fewer “other,” or inconsistent, responses in this format. Note the infrequent normal use of a definition of risk as the “probability” of an event. It could certainly be discussed to what extent the open-ended responses of “chance,” “danger” and

<sup>19</sup> See *id.* at 26.

“outcome” could be interpreted as associated with a “probability” definition and a “consequence” definition of risk, respectively. The issue needs further investigation.

Table 2  
Comparison of Consistent Answers in Sub-sample B and Sub-sample C, Consistent Responses

<i>Risk Definition</i>	<i>Sub-sample B</i>		<i>Sub-sample C</i>	
	<i>Percentage</i>	<i>N</i>	<i>Percentage</i>	<i>N</i>
Probability Related	21.4	3.0	11.5	3.0
Combination	14.3	2.0	38.5	10.0
Consequences Related	64.3	9.0	42.3	11.0
Nature	0.0	0.0	7.7	2.0
All Definitions	100.0	14.0	100.0	26.0

#### *Sub-sample A.*

The most typical spontaneous risk definitions were “danger” (48%) and “chance” (23%), with a few “outcome” (10%) answers. Among the more infrequent responses were:

- injury,
- accidents and problems,
- negativity,
- consequences,
- unknown,
- probability and consequences,
- challenges, loss, possibilities,
- success and failure,
- crossing boundaries, and
- something can go wrong.

Only one or two subjects, however, suggested any of the latter definitions, and these responses were therefore, if they were given as a first response, collapsed into an “other” category.

#### *Sub-sample B*

Perhaps the most interesting response pattern in this sample was the frequency of seemingly inconsistent responses, i.e., agreeing to more than one definition of risk. In this response format it seems obvious that the respondents used a multidimensional interpretation of the risk concept. There were only fourteen consistent answers fitting the

categorization scheme illustrated in Table 1 above. Table 2 shows that those subjects tended to use the “consequences” definition of risk (64%). No consistent responses were classified into the “nature of event” category.

### *Sub-sample C*

Table 2 also shows a slight dominance of the “consequence” definition (42%) over the “combination” alternative (38%) in this group. Less than 12% of the responses indicated “probability.”

### *Comparison Between Sub-samples B and C*

Table 2 shows that the category response format (B) disqualified more subjects than the single dimension response format (C), i.e., there remained 14 of 30 subjects (47%), and 24 of 32 (75%) subjects, respectively, after the deletion of inconsistent responses.

In sum, the open-ended response format primarily produced the answer “danger.” The response format using four risk definition categories suggested, first, that a majority agreed to several response alternatives, i.e., inconsistent responses, and secondly, that the consistent subjects normally used a definition of risk classified into the category “consequences & combination.” In comparison, using a single dimension scale, it was shown that most of the consistent responses belonged to the “consequences” definition of risk, closely followed by the “combination” response category. Few chose the “probability” alternative, or only marked that their definition depended on “the nature of the event.” Thus, the overall result indicates that a definition of risk as the “probability of an event” was not the dominant way to use or understand the word risk in this sample. Subjects associated risk with “danger,” and when given specified response alternatives, they emphasized the “consequences” aspects of an event.

## **Sensation Seeking Scores and Risk Definitions**

### *Total Sensation Seeking (Total SSS)*

Those who defined risk as “danger” in sub-sample A scored somewhat lower on the total SSS than others (Table 3). The most expressed difference was found between the “danger” definition and that of “outcome.” The “consistent” subjects in sub-sample B, who had indicated the “combination only” definition, scored highest on the total

SSS. Regarding sub-group C, the most expressed difference could be seen between the “probability” definition group and the “nature of the event” group, where the former scored the lowest on the total SSS. Note, however, the very small number of respondents in some of these groups, and therefore only the combined scores of sub-samples B and C are found in Table 3 below. For details of sub-sample B and C, see Dåstøl and Drottz-Sjöberg.<sup>20</sup>

Table 3  
Various Facet Scores Related to Different Risk Definitions

<i>Risk Definitions</i>		<i>Boredom Susceptibility</i>	<i>Disinhibition</i>	<i>Experience Seeking</i>	<i>Thrill and Adventure Seeking</i>	<i>Total Sensation Seeking Scores</i>	
<i>Total</i>	<i>N=93.00</i>	<i>Mean</i>	<i>2.25</i>	<i>2.78</i>	<i>3.58</i>	<i>3.18</i>	<i>11.79</i>
Chance A	N= 7.00	Mean	2.86	2.71	3.71	3.61	12.89
Danger A	N=15.00	Mean	2.22	2.67	3.47	2.60	10.96
Outcome A	N= 3.00	Mean	2.67	3.33	4.67	4.00	14.67
Other A	N= 6.00	Mean	2.00	3.22	4.00	4.00	13.22
Probability B & C	N= 6.00	Mean	1.17	2.11	3.17	3.83	10.28
Combination B & C	N=12.00	Mean	2.86	2.69	3.50	2.92	11.97
Consequences B & C	N=20.00	Mean	2.10	2.77	3.50	2.95	11.32

### *Boredom Susceptibility (BS)*

The highest scores in sub-sample A, were obtained by persons defining risk as “chance” and “outcome.” In sub-samples B and C, however, the subjects preferring the “combination” definition of risk got the highest scores on this facet, whereas those who chose a “probability” definition scored the lowest.

### *Disinhibition (DIS)*

Those in sub-sample A who gave a “danger” definition scored the lowest on this facet, and those who gave an “outcome” definition scored the highest. The highest mean score in sub-sample B was related to the “combination-only” definition group (M=3.5). Results based on sub-sample C indicated that the “probability” definition users scored the lowest (M=1.7). The “consequences” definition group scored among the highest.

<sup>20</sup> See Dåstøl & Drottz-Sjöberg, *supra* note 13.

### *Experience Seeking (ES)*

Those using a “danger” definition in sub-sample A also scored lower than others. In sub-sample B the “consequences” group scored the highest. Subjects of sub-sample C with a “probability” definition of risk achieved a relatively low ( $M=2.3$ ) score as compared to others.

### *Thrill and Adventure Seeking (TAS)*

Those who reported a “danger” definition again scored the lowest, and those giving an “outcome” definition the highest. Regarding sub-samples B and C, both of the probability related risk definition groups scored the highest on this facet.

Comparing facets in sub-sample A indicates the “chance” definition of risk scored the highest on “Boredom Susceptibility” and among the lowest on the “Disinhibition” facet relative to other risk definition groups. Subjects in the “danger” definition group scored the lowest on all four facets. Those who had indicated an “outcome” definition of risk, on the other hand, scored higher than others on “Disinhibition,” “Experience Seeking,” and “Thrill and Adventure Seeking.” In sub-sample B, those adhering to “the probability of an event” definition distinguished themselves by a very low score on “Boredom Susceptibility” and the highest score on “Thrill and Adventure Seeking.” The same pattern can be seen for this definition group in sub-sample C. Subjects of the sub-samples B and C who indicated a “combination” definition of risk scored the highest on the “Boredom Susceptibility” facet as well as among the highest on the total SSS.

## Discussion

It must be noted that the sample consisted of psychology students, and that persons with different educational or otherwise differently oriented interests have been shown to prefer different uses of the word risk.<sup>21</sup> Thus, it is possible that the emphasis on the “danger” and “consequence” definitions of risk in this study can be explained by the type of sample. Similarly, the results of Zuckerman’s facets, and the emphasis on “Experience Seeking,” could reflect responses from young people, as well as people with an interest in psychology. The sample

<sup>21</sup> See Drottz-Sjöberg, *supra* note 1; Britt-Marie Drottz-Sjöberg & Lennart Sjöberg, *Adolescents’ Attitudes to Nuclear Power and Radioactive Wastes*, 21 *J. Applied Social Psych.* 2007 (1991).

limitations strongly suggest that other studies should be conducted before any general conclusions are suggested.

Subjects in the category format group more often gave a "probability" definition than the respondents using the single response dimension (Table 2). Furthermore, those who used the single dimension seemed more prone to place their response in the middle of the scale, indicating a "combination-only" response as compared to those responding to the categories. Note, however, that these comparisons depended on the categorizations made, including what was regarded as consistent responses, and the scale-ranges that were used to delineate the responses on the single dimension. Such methodological comparisons also call for further investigations. The "consequences" definition was the most frequently used response alternative in sub-sample B and C, and the "danger" definition the most frequent spontaneous answer in sub-sample A. Could it be that the "consequences" definitions and the "danger" definition of risk reflect the same understanding of the risk concept? Further, could the "chance" answer in sub-sample A correspond to the "probability" related definitions in sub-samples B and C? The related SSS scores of this study do not support these assumptions. The data seem to support, however, the result of Franken et al. regarding a negative relationship between perception of danger and SSS.<sup>22</sup> And the results presented by Røysamb may be of relevance in interpreting our results, as could the result by Sjöberg which indicates that demand for risk reduction is driven by the severity of the consequences, not the probability.<sup>23</sup>



<sup>22</sup> See Franken et al., *supra* note 7.

<sup>23</sup> See Røysamb, *supra* note 5; Lennart Sjöberg, *Why Do People Demand Risk Reduction?*, 2 *Safety & Reliability* 751 (1998).

