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Differences in risk perception among different groups in society and the impact of basic values and experiences of vulnerability

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ABSTRACT

There are several groups in modern societies, such as immigrants, the disabled, the elderly, gays and lesbians, who do not experience their life and their life conditions as secure. This does not mean that structural variables such as age, social class, ethnicity, gender or disability alone can explain these differences. It is likely that individual life experiences such as hardship or discrimination also lead to variations in risk perception. This study sets out to find differences in perception in Sweden in order to investigate the social factors behind these differences and possible effects. The empirical analyses are based on a national survey (n=1540) about risk perceptions conducted in Sweden 2005/06. The results confirm differences in risk perceptions between minority groups and the majority population but the study also shows that earlier experiences and basic values explain some of these differences.

INTRODUCTION

The populations of Western societies are becoming increasingly heterogeneous due to e.g. international migration, individualization and more effective transportation and communication systems. As examples, in 2006 11% of the Swedish population was born in a foreign country and one fifth has at least one parent who was born abroad. This variety of experiences in combination with global pleasure travelling, mass media, the Internet etc. and growing individualization, challenge traditional sociological theories, level of investigation and explanatory concepts (cp. Beck, 2003; Therborn, 2000). One could say that the society has become more heterogeneous. There are also other changes. Global risks such as wars, climate change, risks to our national security such as possible terrorist attacks, and risks that face us in our daily lives such as car accidents, racial abuse, muggings, house-breaking or vandalism, depending on our circumstances and our locality. Hence, there are several groups in modern Western societies who do not experience their life and their life conditions as secure or feel respected by their fellow citizens or by wider society and therefore can be considered as vulnerable in relation to risk. These are particularly individuals from groups such as immigrants, the disabled, the elderly, homo- and bisexuals.

So far relatively few studies have systematically examined the way these kind of factors of heterogeneity influence risk perceptions and behaviour. Earlier studies have either focused on single factors such as ethnicity, often in combination with gender (Flynn, Slovic & Mertz, 1994; Palmer 2003), or on specific risk factors such as labour market participation, risk related health behaviour or environmental concern (Abbott et al., 2005; Adeola, 2004; Slimak & Dietz, 2006). Similar to risk perception studies in general, these studies seldom explain the differences in risk perceptions that exist between groups, (cf. Sjöberg, 2000): With a few exceptions (e.g. Kahan et al., in press; Tulloch & Lupton, 2003), these results are left without further clarification. Recently, researchers have tried to develop causal models of the relationship between sociostructural factors, personal values and risk perceptions and behaviour, explaining the latter with the former (e.g. Guagnano, Stern & Dietz, 1998; Stern et al., 1999; Slimak & Dietz, 2006). However, this research has almost exclusively examined environmental concern while population heterogeneity either have been ignored, statistically controlled for or defined as differences between nation states. Another ignored factor in the understanding of differences in risk perception between groups in society is the role of vulnerability, i.e. experience of social exclusion and exposure to risks.

In this paper we investigate risk perceptions and self stated behaviour among people with foreign background, the disabled and homo- and bisexuals in Sweden. Structural factors to be

taken into account are gender, age and economic resources. Further, individual basic values and vulnerability will be used as explanatory factors. More specifically, the study aims to answer the following research questions:

- How do people with foreign background, disability or homo- or bisexual orientation perceive different risks?
- To what extent do people with foreign background, disability or homo- or bisexual orientation expose themselves to risks?
- How does risk perception and behaviour among these groups interact with their basic values and vulnerability?

Swedish research has shown that problems tend to be amplified for individuals with multiple minority status. For instance, working-class women with immigrant backgrounds are more discriminated against than indigenous, middle-class males (de los Reyes & Martinsson 2005). Similarly, research in the UK has shown that employability is affected by cumulative disadvantage such as disability, age and ethnicity (Berthoud 2003). Rather than focusing on additive discrimination of multi-minority citizens, the present paper intends to dig below the surface of these structural factors and their manifestations and look at cultural and social factors, which may also influence the risk perceptions and behaviours of these groups. It is not membership of these different groups *per se* that explain why these individuals have different risk perceptions. It can be assumed that there are latent factors that are expressed through structural factors such as ethnicity, disability and sexuality, e.g. experiences of vulnerability, risk exposure, lack of power, sub-cultural allegiances and exclusion. Furthermore, individual values, based on cultural norms, can also be mediated through these heterogeneity factors and consequently, explain differences in risk perception and behaviour. In other words, new knowledge can be reached by introducing heterogeneity, basic values and vulnerability in the study of risk perception and behaviour. In doing this we are able to combine a sociological approach to risk with a more psychological, individual-realist, approach (cf. Taylor-Gooby & Zinn 2006).

EARLIER RESEARCH AND THEORETICAL MODELS

Studies of risk perception have repeatedly shown that personal risks are generally perceived as less dangerous than risks for people in general (Frewer et al., 1994; Sjöberg, 2000), that laypeople's evaluation of risks differ from experts' (e.g. Bier 1999; Slovic, Flynn & Lyman, 1991) and that risk perception differ between people of different ages, education, place of residence and political orientation (Dekker, Ester & Nas, 1997; Dietz, Stern & Guanganò, 1998; Dunlap & Jones, 2002). It has also been shown that men and women as well as people

of different ethnicities differ in risk perception. However, other groups, such as the disabled and people with different sexual orientations, have been more or less ignored (Abbot et al., 2005). Nevertheless, some earlier research has demonstrated the importance of ethnicity in combination with gender for people's risk perceptions and that, for example, women and minorities have lower risk tolerance than white males (Johnsson 2004; Renn 2000; Statterfield Mertz & Slovic, 2004; Weber & Hsee 1998). This is also known as the 'White Male Effect' (Flynn, Slovic & Mertz, 1994; Finuance et al., 2000). This means that men, mainly from the Western world, differ compared to other groups in these societies. Other studies have confirmed that there are differences in risk perception between groups with different cultural background (Fothergill, Maestas & Darlington, 1999; Johnson, 2004; Renn & Rohrman, 2000; Satterfield, Mertz & Slovic, 2004; Weber & Hsee, 1998). However, few studies have offered sufficient explanations other than discussions and rudimentary statistical analysis. The explanations discussed are lower levels of control and influence over both individual and societal issues among these groups as well as differences in basic values and 'risk cultures' (Finucane et al. 2000; Gutteling & Wiegman 1996; Mohai & Bryant 1998; Palmer 2003; Tulloch & Lupton, 2003).

Values, as a rather vague concept, date back to the early years of sociology and has since then been used in studies from social psychological phenomena to social structural processes (Durkheim, 1993 [1893]; Hilting & Piliavin, 2004; Parsons & Shils, 1962). Empirically, studies of e.g. ethnic groups with stable within-group homogeneity and between-group heterogeneity in values, are common (Kuhnen & Oysterman, 2002). There are also a growing number of researchers using a micro perspective on values where individual information processing and decision making is in focus. All in all, sociological work on values has been relatively sparse since the mid 1960's (Hiltin & Piliavin, 2004), and instead psychologists and social psychologists are dominating in the field (e.g. Rokeach, 1973; Schwartz, 1994; 2004). Hence, studies of values have often focused on individual/personality aspects of values (Hitlin & Piliavin, 2004), and sometimes on the cross-national level. The latter either to prove the existence of universal values (e.g. Schwartz, 1994, 2004) or universal value changes (e.g. Inglehart, 1997; Inglehart & Baker, 2000). This is confirmed by Hitlin and Piliavin (2004), who claim that research on values tends to focus on either the individual level or the national level and thereby on the homogeneity of values rather than variability within, e.g., groups, regions or countries.

There is, however, one important exception: In the 1980s, social and cultural perspectives become increasingly noticed in the field of risk research. Particularly Douglas and Wildavsky

(1982), criticised the focus on individual explanations and tried to show how cultural norms inform individual moral decisions as well as individual cognitive and social processes in relation to risk judgements. Since then the cultural theory is an influential approach in studies of the influence of social and cultural factors on risk perception. Douglas and Wildavsky (1982) argue that risk perception and concern about risks and social issues are based in social and cultural factors. This means that the basic values permeating certain contexts shape the individual's risk perceptions. Individuals are, with other words, embedded in a social structure that shapes their values and worldviews as well as understanding and evaluation of risks. It is not individual cognitive processes such as the perception of different threats, but socially shared worldviews, so-called cultural biases, which determine the individual's perceptions (Wildavsky & Dake, 1990; Dake, 1992). Already in the 1970's Douglas (1970) developed her "grid-group" typology, which she further elaborated in the early 1980's together with Wildavsky (Douglas & Wildavsky, 1982). The grid-dimension represents 'social control' or the pervasiveness and significance of social differentiation norms, while the group-dimension represents 'social commitment' or how absorbed in and sustained by group membership the individual's life is. Using these two dimensions Douglas and Wildavsky (1982) developed four typical cultural categories; Egalitarianism, Hierarchy, Fatalism and Individualism, which all have a hypothetic risk perception (cf. Rippl, 2002): People with hierarchic worldviews accept risks as long as decisions about the risks are justified by authorities or experts, but they fear risks related to social order. Egalitarians oppose risks that mean irreversible dangers on many people or on future generations and risks that are forced on them by the decisions of experts or authorities. Fatalists try not worry about things that they believe they cannot influence. Individualists fear risks that can limit their freedom, but they can also perceive risk as an opportunity (cf. Rippl, 2002). In the beginning of the 1990's, Dake (1991) introduced the first quantitative measurement of the dimensions (a combination of earlier measurement of values and worldviews), an approach broadly used in quantitative studies on cultural theory and risk (Dake, 1991, 1992; Marris et al., 1996; Peters & Slovic, 1996). Rippl (2002) has further developed the measurement and tested the criticised poor validity. However, the problem of low explanatory power in risk perception studies till persists (cf. Sjöberg, 1996; 1998).

All these definitions of values, as well as other measurements, have been used in studies of risk perception (e.g. Inglehart's, 1977; Hwiid Nielsen, Jelsøe & Öhman, 2002; Schwartz, 1987), and some studies have tried to combine values with socioeconomic factors and create new ways of clustering public opinions (Bennulf, 1994; Olofsson & Öhman, 2006; Olsson,

1994; Pakulski and Tranter, 1998). Some of this research that links environmental concern to individual factors claims that basic values and attitudes are predictive of specific ones, and suggests that the predictors depend on the type of behaviour that is under study (Dietz, Stern & Guagnano, 1998). Values and beliefs have therefore been used in studies to explain *specific* behaviour in a successful way (e.g. Schwartz, 1987). The problem is, however, that beliefs in these cases often are more or less closely related to the target attitude or behaviour, environmental concern, and hence it is not surprising to find stable relationships (cf. the New Environmental Paradigm ‘NEP’). One way of avoiding measuring the same thing twice is to take the value concept one step further, i.e. to make it even broader. Engel & Plötschke (1998) show in their study of the ISSP survey on environmental concern in 1993 that general beliefs, not necessarily related to environmental issues, may have a substantial explanatory power for environmental behaviour. Their results indicate that people’s actions tend to be value consistent, that is, they act according to their general beliefs in specific issues (see also Rasinski, Smith & Zuckerbraun, 1994).

The value-belief-norm theory (VBN) (Stern et al. 1999) is an attempt to explain social movements in the environmental field by linking three different models of values and beliefs; the norm-activation theory (Schwartz 1977), the theory of personal values (Schwartz 2004; Dietz, Stern &, Guagnano 1998) and the new ecological paradigm (Dunlap & van Liere, 1978). In this way basic values are combined with more specific ones. Stern et al. (1999) argue that values are relatively stable over the life course and thereby act as filters or amplifiers with regard to information about risks to objects of value (cf. Rokeach, 1973; 1979; Silmak & Dietz, 2006). The VBN theory was developed to explain environmentally related behaviour by postulating a *causal* chain of five types of variables; personal values, general beliefs and worldviews, awareness of consequences ascription of responsibility and personal norms for proenvironmental action.

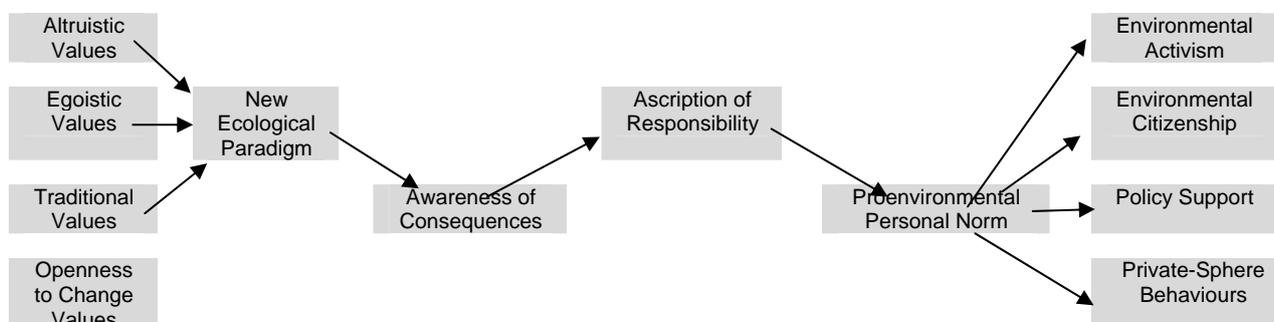


Figure 1. Stern et al.’s (1999: 84) schematic model of variables in the Value-Belief-Norm theory as applied to environmentalism, showing direct causal relationships between pairs of variables at adjacent causal levels.

The model has been tested, both the complete model as well as parts of it, and the results show that the relationship between environmentally friendly behaviour and general beliefs is stronger than other factors, although it is not (statistically) strong (Dietz, Fitzgerald & Shwom 2005; Kalof, Dietz, Gaugnano & Stern, 2002; Olofsson & Öhman 2006; Stern, 2000). Another recent study from the US of personal values, beliefs and environmental concern shows similar results (Silmak & Dietz, 2006). Silmak and Dietz (2006) use the VBN theory, and shows that it is the NEP-scale together with Schwartz's altruism that are the most consistent predictors of ecological risk perceptions. While values not as obviously related to ecological risk perceptions did not show as stable patterns. In their study ethnicity shows no effect, however, this might depend upon the fact that the vast majority of the respondents were Caucasians, and the non-Caucasian sample (about 100 people) was then divided into five different groups.

There is a clear focus on environmental concern and ecological risk perceptions in studies that link risk perceptions with values and belief, while few studies focus on other kind of risks often measured in risk perceptions studies such as; everyday-life risks, e.g. smoking or drinking alcohol; known risks, e.g. fires or traffic accidents, and technological risks; e.g. chemical accidents. Population heterogeneity is another aspect that just recently has become an issue in risk research studying the role of values. As we seen, ethnicity is used as a control variable in some studies, but few have studied the role of sexuality or a disability.

Kalof et al. (2002) combine race, gender and the VBN theory to show that white males have atypical values and beliefs compared to women and non-white groups in the US. Although they show this difference in a convincing way, they do not empirically test the interrelationship between race, gender, values and beliefs. Palmer (2003) in a similar study, uses basic values, i.e. cultural worldviews (i.e. Douglas & Wildarvsly, 1982) and not the VBN theory, in her study of the "White Male Effect". She shows that it is not only Caucasian men, but also Asians, or at least Taiwanese-Americans, who perceive risks as less serious than other groups. However, also she merely concludes that there are differences between ethnical groups as well as men and women without controlling for other factors, such as education or age, or investigating the interrelations between the different factors. Kahan et al. (in press) on the other hand, both uses cultural worldviews and investigate both confounding factors and the interrelationship between values, race, gender and risk perceptions. Furthermore, in this study environmental concern is only one out of three risks investigated (the other two are gun-risks and risks associated with abortion). The results show that worldviews, based on cultural

theory, moderate the impact of gender and ethnicity on risk perception. The study is however, only focused on the White Male Effect, while other vulnerable groups such as the disabled and homo- and bisexuals are not included.

These groups and their views of financial risks, such as unemployment, loss of employment and/or income, have however been studied by Abbot et al. (2005) in the UK. Their focus group interviews show that in many ways the studied groups have similar views and experiences of the labour market as other groups in society. However, disabled participants did experience employer inflexibility and discrimination, and homo- and bisexual participants reported experience of harassment in the workplace. Abbot et al. (2005) also find that the participants' way of understanding risks was influenced more by broad social trends and cultural norms than group membership, and they argue that theories of risk cultures (i.e. Tulloch & Lupton, 2003) are more helpful in explaining risk responses than e.g. the rational actor model.

Rather than using the VBN theory, clearly related to environmental concern and similar issues, this study uses cultural worldviews to measure basic values (i.e. Douglas & Wildavsky, 1982), following Kahan et al.'s (in press) design. Unlike Kahan et al. a previous tested and validated scale measuring cultural worldviews is applied (Rippl, 2002), and values as an explanatory factor is combined with vulnerability. The latter is defined according to earlier research as earlier experiences of risks, exclusion and discrimination. Furthermore, the current study includes not only ethnical heterogeneity but also disability and sexuality.

METHOD AND MATERIAL

The analyses were made with data from a national survey (Society and Values) on risk perception, risk communication, risk behaviour, experiences and values. It was conducted as a postal questionnaire during the winter 2005/06. The dataset used in the analyses is composed of two representative samples of the Swedish population between the ages of 16 and 75. The two samples are: A national random sample (n=2000, response rate 59%), and a random sample of people living in three parishes in Stockholm, Gothenburg and Malmö (n=750, response rate 39%), all residential areas where there are a high proportion of people with foreign background lives. The second sample was conducted to increase the number of people with foreign background. Due to language problems and problems with accurate addresses the response rate was expected to be low. It would have been desirable to have subsamples of disabled people and homo- and biosexuals too, but it was not possible. This means that the

number of homo- and bisexuals respondents is rather low (n=48, 24 women and 24 men), as well as the number of disabled people (n=132, 66 women and 66 men) and people with foreign background (n=317/222, 114 women and 108 men)¹. The total number of respondents is 1 540. The survey contained in total 380 questions and it was based on earlier studies (e.g. Sjöberg, 2001) and a pre study with five focus group interviews (Olofsson, Öhman & Rashid, 2005). The empirical design is schematically shown in Table 1 and further described in the following sections.

Table 1. Schematic description of the empirical design. ‘Model’ referees to the four different regression models used to analyse the five different dependent variables.

Explanatory variables					Dependent variables	
Heterogeneity (Model 1)	Basic Values (Model 2)	Vulnerability (Model 2)	Control (Model 3)	Interaction effects (Model 4)	Risk perceptions	Risk behaviour
Foreign background	Fatalistic	Experience	Sex	For*Inc HoBi*Inc	Known risks	Traffic
Homo- bisexual	Egalitarian	Social inclusion	Age	Dis*Inc For*Exp	Controlled risks	Sex & violenc
Disabled	Hierarchy		Income	HoBi*Exp Dis*Exp	Dread risks	
	Individualism					

Independent variables

To measure *cultural worldviews* Rippl’s revised cultural theory scale (based on Dake, 1991), was translated and used. The scale has 18 worldview items that was expected to form four factors; Fatalism, Egalitarian, Hierarchy and Individualism. Using factor analysis (principal component, varimax rotation) this was confirmed and four new variables was created using factor scores. Similarly, to measure *vulnerability* factor analysis was used to create a ‘Social inclusion’ index. There were five statements about how accepted the respondents feel they are in the Swedish society. These five items created a one dimensional factor ranging from exclusion to inclusion. A second measurement of vulnerability was also used, ‘Exposure’ to risk. The respondents were asked if they had experienced any or several of six different risks (e.g. fire, serious illness, natural catastrophe, traffic accident). The answers were merged into an index ranging between 0-6. Descriptive statistics showed that people with foreign background, homo- and bisexuals and disabled people are overrepresented among

¹ A rather large group of people with foreign background is people originating from one of the neighbouring Nordic countries (n=70). It is known since earlier research (e.g. Olofsson & Öhman, 2006) that these countries do not differ in a significant way, neither when it comes to values nor risk perceptions. These respondents were therefore excluded. A small group of respondents (n=22) originating from one of the Western European countries were also excluded. Left is 224 people from around the world, but predominately from the Middle East and former Yugoslavia.

respondents scoring high on the two vulnerability measurements. Therefore new variables were created to capture the interaction effect of being both e.g. disabled and feeling excluded in society by multiplying the variable measuring disability (dichotomous 0/1) with the social inclusion index. The same was done with all heterogeneity variables and both vulnerability indexes.

Except for these variables other individual characteristics known to influence risk perceptions were used as control variables. These variables are: Sex, Age and income. Education is often used in risk perception studies, but since education is a rather unreliable measurement when comparing people from many different countries, income was used instead. Three income levels were used, low (0-15 000 SEK²), middle (15001-25 000 SEK) and high (>25 000 SEK).

Dependent variables

The paper investigates two kinds of risk factors: *Risk perceptions* and *risk behaviour*. The former was measured in the survey by 16 risk items, consisting of statements to which the respondents indicated to which degree they found the risk in question a threat to them personally (based on Sjöberg, 1998). This risk scale was intended to form four factors; Known risks, Unknown risks, Controlled risks and Dread risks. In our data, using factor analysis, the items formed three factors; Known risks, Controlled risks and Dread risks. The difference compared to earlier studies (e.g. Slovic et al. 1977) is that ‘Unknown risks’ and ‘Dread risks’ has merged into one factor.

The second dependent variable was self stated risk behaviour. Two kinds of risk (or security) behaviour were asked about in the questionnaire; questions about traffic (using helmet when bicycling, safety belt when driving etc.) and about sex and violence (walking home alone late at night, having unprotected sex with occasional partners), in total six items. These were factor analysed confirming two indexes, one measuring risk behaviour in traffic, the other risk behaviour related to sex and violence.

RESULTS

Four different regression models were used to analyse the three factors of risk perceptions and the two different types of risk behaviour, traffic and sex and violence risk behaviour (for a schematic description, see Table 1). The first model only contains the determinants of the groups, foreign background (born or at least one parent born outside of Europe or not), sexual

² 100 SEK = 10.64 EUR

orientation (homo- or bisexual or not), and disability (disabled or not). In the second regression model we extended the first model by adding basic values; fatalism, egalitarianism, hierarchy and individualism, and vulnerability; social inclusion and earlier exposure to different risks. In the third regression model we added control variables such as sex (control group; women), age and income (control group; low income). The fourth model contains additional variables in terms of interaction effects between group belonging and the two measurement of vulnerability, social inclusion and earlier exposure to different risks.

In Table 2 the four different regression models are estimated for the three factors of risk perception, Known risks, Controlled risks and Dread risks.

Table 2. Regression models on risk perceptions. The sign indicates the direction of the correlation. (Only results significant on $p \leq 0.05$ or $p \leq 0.1$ for group and interaction effects.)

	Known risks				Controlled risks				Dread risks			
	1	2*	3	4	1	2*	3	4	1	2*	3	4
Heterogeneity variables												
Foreign background					+	+	+	+	+	+	+	+
Homo- or bisexual					-		-	-				
Disabled	+	+	+	+	-	-						
Worldviews												
Fatalism						+	+	+				
Egalitarianism		-	-	-		+				+		
Hierarchy										+		
Individualism						+	+	+				
Vulnerability												
Inclusion										-	-	
Exposure		+	+			+	+				+	
Control variables												
Sex (cp. women)											-	-
Age			-	-			+	+			+	+
Income, middle (cp. low)			+	+								
Income, high (cp. low)							-	-				
Interaction effects												
For*Inclusion				-								+
HoBi*Inclusion												
Funk*Inclusion												
For*Exposure												
HoBi*Exposure								+				-
Dis*Exposure												
Adjusted R ²	.004	.029	.029	.030	.04	.069	.078	.079	.058	.072	.091	.094

*Sex, age, income not included

If we examine the results step by step focusing on one risk at the time, it is clear that the identified groups differ in perceptions of risks. Looking at *Known risks* (e.g. personal risks of cancer and traffic accidents), people who have categorised themselves as disabled are more

inclined to perceive these risks as higher for themselves. This effect only disappears when interaction effects with social inclusion and exposure to risks are taken into account. People with foreign background perceive these kind of risks as lower when interaction effects with social inclusion is added, an effect that is also negative. That is, the less included in society the higher the risk is perceived.

If we turn to basic values, the results show that egalitarianism lowers the risk perception and this effect is stable even if other variables are added. Fatalism is also related in the same way, but the effects of these values diminish when the control variables, sex, age and income are added to the model. Hierarchical values on the other hand, is related to higher risk perception when sex, age, income and interaction effects are taken into account. The two indicators of vulnerability, social inclusion and exposure, are significant until interaction effects of heterogeneity are added. Low level of inclusion in society and higher levels of exposure to risks earlier in life gives a higher risk perception.

Age and income is also contributing to the understanding of risk perception of known risks: Older people have lower risk perception of known risks and people in the middle of the income distribution have a higher risk perception. Overall, the explanatory power of the regression models are low, since the adjusted R^2 is only 0.035 for the full model.

If we turn to *Controlled risks* (for instance the personal risks with smoking and drinking) the pattern is slightly different. If only the heterogeneity factors are taken into account, all three of them contribute to the model; foreign background, sexual orientation and disability. If we introduce basic values and vulnerability, the effect of foreign background (higher risk perception of controlled risks) and disability (lower risk perception of controlled risks) remain, but not of sexual orientation.

Egalitarianism, fatalism and individualism also contribute to a higher risk perception but it is only the last two kind of values that remains when sex, age, income and interaction effects are introduced. Also exposure to risks earlier in life is related to a higher risk perception. Adding basic values and vulnerability increases the explanatory power considerably, even though the overall power of the model is low.

Older people have a higher risk perception regarding controlled risks than younger have, and high income earners have a lower risk perception compared to low income earners. Both these effects remain when interaction effects are controlled for. One interaction effect between sexual orientation and exposure is significant in a positive direction. The overall

explanatory power is better than known risks, but they are still modest given that R^2 is 0.079 for the full model.

Turning to *Dread risks* (e.g. the personal risks with climate change and terrorism) foreign background contribute in all four models. This group of people tend to rate these risks as higher for them personally than native Swedes. Egalitarian and hierarchical values also contribute to higher risk perceptions, but this effect disappear when sex and age is introduced.

Women state higher risk perceptions than men, and older people higher than younger. Also vulnerability has a significant effect; the less included and the more exposure the higher the risk is perceived. This effect disappears when interaction effects are introduced. Foreign background and social inclusion is positively related to risk perceptions, i.e. immigrants who feel more accepted in society, perceive higher risks. On the other hand, the opposite is true for homo- and bisexuals with earlier experiences of risks, which is rather unexpected. Overall the explanatory power of the full regression model is 0.094 (adjusted R^2).

Table 3. Regression models on risk behaviour. The sign indicates the direction of the correlation. (Only results significant on $p \leq 0.05$ or $p \leq 0.1$ for group and interaction effects.)

	Traffic				Sex & violence			
	1	2*	3	4	1	2	3	4
Heterogeneity variables								
Immigrant background	-	-	-		-			
Homo- or bisexual					+	+	+	+
Disabled						-		
Worldviews								
Fatalism		-	-	-				
Egalitarianism		+						
Hierarchy						+	+	+
Individualism		-	-	-		-	-	-
Vulnerability								
Inclusion		+	+			+	+	+
Exposure						-	-	
Control variables								
Sex (cp. women)			-	-			-	-
Age			+	+			+	+
Income, middle (cp. low)								
Income, high (cp. low)								
Interaction effects								
Immi*Inclusion								
HoBi*Inclusion								
Funk*Inclusion								-
Immi*Exposure								
HoBi*Exposure								-
Dis*Exposure								
Adjusted R^2	.013	.060	.096	.099	.019	.091	.186	.192

*Sex, age, income not included

In Table 3 the four different regression models are applied on the two different risk behaviours, traffic and sex and violence risk behaviour. If we examine the results using the different regression models it is clear that the different identified groups differ in risk behaviour in relation to sex and violence but not in traffic risk behaviour. Looking at *traffic risks* (e.g. using biking helmet or driving slow because of risks for accidents), it is only people with foreign background that do this to a lesser extent. However, this effect disappears when other factors are taken into account.

If we turn to basic values, individualists and fatalists engage in traffic safety behaviour in a lesser extent than others. One indicator of experience, social inclusion is significant until sex, age and income are added. High level of inclusion gives higher safety behaviour. Sex and age is also contributing to the understanding of traffic risk behaviour, women and older people have higher traffic safety behaviour than others. Overall the explanatory power of the full regression model is 0.089 (adjusted R^2).

If we look at *behaviour related to sex and exposure to violence* (e.g. not walking home alone late at night and not having unprotected sexual intercourse) the pattern is different. The risk awareness among homo- and bisexuals is higher: They do not have unprotected sexual intercourse and do not walk home alone during night time in the same extent than others do. Note that this effect remains when values, experience, control variables and interaction effects are controlled for. People with foreign background, on the other hand, show a riskier behaviour related to sex and exposure to violence than native people, but this effect disappears when other factors are taken into account.

People with individualistic values are more inclined to engage in risky behaviour in relation to sex and exposure to violence. People with hierarchical values, on the other hand, do the opposite. This effect remains when sex, age, income and interaction effects are controlled for. Earlier exposure to risks is negatively related to safety behaviour while social inclusion is positively related, i.e. people with the feeling of belonging in society are more inclined to protect themselves and people that have experienced things like accidents are not.

Age and gender is also factors that influence risk behaviour in all applicable models, in the sense that older people and women have a lower degree of risk behaviour related to sex and exposure to violence, than men and younger people. Interaction effects are also contributing to the understanding of this kind of risk behaviour; there is an interaction effect between disabled and inclusion lowering the level of safety behaviour, the same is true for homo- and bisexuals and exposure while the effect is the opposite for the interaction effect between

foreign background and exposure. Overall the explanatory power of the regression models are sufficient, the adjusted R^2 is 0.191 for the full model.

DISCUSSION

The results show that the heterogeneity factors, foreign background, sexual orientation and disability do play a role in understanding risk perception and self reported behaviour and that different group perceive and act differently depending on the kind of risk explored. These findings support the assumption that heterogeneity in society is important for the understanding of risk perception and behaviour. People with foreign background perceive controlled (e.g. smoking and drinking) and dread risks (e.g. climate change and terrorism), as higher than others. Homo- and bisexual people perceive controlled risks as lower and engage in a more secure behaviour in regard to sex and exposure to violence (e.g. not walking home alone late at night and not having unprotected sexual intercourse). People with self reported disabilities perceive known risks (e.g. cancer and traffic accidents) as higher than others. All these effects persist even though values, vulnerability, control variables and interaction effects are taken into account. These findings illustrate the need to take heterogeneity in society into account when studying risk perceptions and behaviours. If heterogeneity is not included in the understanding of risk perception and risk behaviour important variations within the public is not detected.

The use of basic values, in this study measured by cultural worldviews, and vulnerability, here measured by social inclusion and exposure to risk, to better understand risk perceptions and behaviours increases the explanatory power of the analyses. Fatalism, Egalitarian, Hierarchy and Individualism values all influence risk perception and behaviour and adds to the explanation of these risk factors, although the power is relatively weak. Similarly, vulnerability in terms of social inclusion and exposure to risk also plays a role, social inclusion and a higher safety behaviour and exposure and higher risk perception is related. This support earlier research on values and risk perception (e.g. Palmer et al. 2001; Palmer, 2003, Kahan et al., in press) but also shows the importance of introducing earlier experiences and social inclusion as measurements of vulnerability into the analyses of risk perceptions and behaviours. This extension of the focus, to also incorporate heterogeneity and vulnerability, we argue, adds to the understanding of risk research by partly shifting focus to social differentiation and its role in examining risk perception and behaviour.

People with foreign background, the disabled and homo- and bisexuals in Sweden do in some aspects of risk perceptions and behaviours differ from the general public. This is knowledge that is important for instance in the communication of risks or in the policy

implementation process. For instance if health authorities focuses on the gay community in their effort of informing about the importance of safe sex, and the group in society that is most endangered is young heterosexual males, then the effect of this campaign is limited. On the other hand perhaps the hazards of drinking should be communicated to homo- and bisexuals instead.

Except for the factors of heterogeneity, basic values and vulnerability, other individual characteristics known to influence risk perceptions, i.e. sex, age and income, were also in this study of importance. For instance women and older people have higher safety behaviour than men and younger people and these effects were all in the expected directions.

The main conclusions to be drawn from this study of risk perception and risk behaviour are at least twofold: Firstly, heterogeneity in society, in terms of ethnicity, sexuality and disability, influence both risk perceptions and risk behaviours. Secondly, there are interactions between these factors of heterogeneity, vulnerability and basic values, which give a more refined picture and enrich the understanding of public risk perception and behaviour. Additionally, the findings also confirm the importance of sociocultural factors in the understanding of individual risk perception and behaviour, and therewith synthesising sociological and psychological risk research.

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