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Risk Perception Research: Literature and Data Review

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In this new discussion paper series, the Prague *SECONIMICS* team intends to allow the broader academic community taking part in an on-going discussion about risks and threats as well as trade-offs between them and security. This research focus stems from the fact that until now, social scientists have primarily studied threats and risks through the perspective of social psychology by conducting the so-called "risk assessment" analyses, especially looking at the concept of "risk perception". This research thus aims to probe these concepts in order to broaden our understanding of the multivariate study of risks and threats in social sciences by adding some context-dependent and temporal aspects.

Structure

Introduction

Although advanced modern societies are in many respects experiencing an unprecedented existential security compared to previous times, they are at the same time paradoxically concerned about security risks and safety threats (Beck 1992 and 2002, Giddens 1999, Inglehart 1997). Ulrich Beck (1992) has described this new phenomenon as a "Risk Society". Danger and insecurity have always been inherent to human life, especially in the form of natural disasters and the like. However, post-modern societies experience a new type of risks, such as nuclear radiation, global warming, genetic modification of food, financial crises and terrorist attacks (Beck 1992 and 2002). These types of risks are different from the previous ones, whereby they have such serious consequences that they constitute a predominant societal and political concern in post-modern societies.

In contrast to old types of risks stemming from natural causes, the new threats are mainly a product of human activity (Beck 1992, Giddens 1999). The repercussions of the new risks are also potentially much more severe than previously. They are not temporally, spatially and socially circumscribed. These risks do not respect boundaries of nation-states, generally have a long latency period and individual culprits are difficult to identify (Beck 2002). According to Beck (1992), the new risks and particularly environmental risks have become a central dynamic that characterizes contemporary societies. The new risks have led to a transformation of the whole society and social order. As Beck argues, the main societal conflict is no longer over the (re-)distribution of "goods", such as income and material property, but over distribution of "bads" that result from realizations of the new risks, such as nuclear fallout and genetically modified food (GMF).

Social theorists have identified security and safety risks as one of the most crucial issues that contemporary Western societies are currently facing. But how can we empirically study risks from a social science perspective? How do individual citizens perceive risk? What types of risks are people mostly concerned with? Why do some people worry more about some risks than others? Does concern about various risks have any impact on human behaviour and political decision-making?

The main goal of this paper is to review the existing social science literature assessing risks and risk perceptions that address these questions. This paper will first briefly review what disciplines within the social sciences focus on this area. Thereafter, the main concept of risk perception will be introduced. The subsequent section analyzes sources and consequences of risk perception. The final part of the paper reviews some relevant survey data on the topic of risk perceptions that are publicly available and will shortly outline possible directions for further research.

Research on Risk Perception in Various Disciplines

Threats and risks are primarily studied within the so-called "risk assessment" analysis. Such studies include a variety of approaches how to study risks; social science approach is only a part of that. In particular, social scientists focus on the concept of "risk perception", drawing on social psychology, another discipline that pays great attention to risk assessment. Originally, the research of risk perception appeared in the late 1960s. In essence, risk perception was considered the major cause people's antagonism to technological development such as nuclear power (Sjöberg, Moen and Rundmo 2004). As a consequence, researchers started to contend that perception of threats and risks is not only a matter of technical knowledge but also of subjective personal opinions and beliefs (Sjöberg 2000).

Political science has largely disregarded the study of risk perception. The only two fields that have devoted some attention to the topic are political psychology and public opinion research. However, as a direct consequence of the 9/11 terrorist attacks in New York, the study of risks and threats has entered into the political science discipline in relation to the study of terrorism. In addition, sociology, social policy and also political science have dedicated a special attention to the issue of perceived threats when studying specific groups of people and minorities such as ethnic groups, immigrants and homosexuals, that can to some represent a "threat".

Definition of Risk Perception

Risk in general can be defined as the "likelihood that an individual will experience the effect of danger" (Short 1984). Social scientists focus on the concept of "perceived risk/threat/hazard". Perceived risk can be understood as the subjective assessment of the probability of this danger and how much people are concerned about potential consequences (Sjöberg et al. 2004: 8). Risk perception includes three components: 1) subjective assessment that individual people make, 2) (un) certainty that is intrinsic to this assessment and 3) something that will have a negative outcome (Sjöberg et al. 2004: 8). A perceived risk is not studied as a general feeling or attitude when individuals are asked whether they generally feel threatened or in risk. Risk perception is studied as a targeted attitude to specific types of risks, such as terrorism, natural disaster, nuclear power, technological development, crime, etc. As sociological and political science studies show, perceived threat can also originate in the social world and not only in new technologies and nature. People can feel at risk of losing their cultural identity, economic and political privileges, and feel threatened by some policies and specific

groups of people, such as immigrants (Taylor 1998, Oliver and Mendelberg 2000, Cho and Gimbel 2006). Threat thus clearly has a raft of potential sources.

There are two basic types of risks: personal and collective/national/general (Huddy et al. 2002, Sjöberg 2005, 2000 and 2003). The personal risk represents a personal threat to the individual or the immediate family and is often related to feelings of personal insecurity and fear of physical harm (Huddy et al. 2002). This can be measured by questions such as: "How concerned are you personally about yourself or a family member being the victim of a future terrorist attack in the United States" (Huddy et al. 2002) or "How large do you think that the risk is for you personally of the following?" and the list including variety of possible risks is offered (e.g. Sjöberg 2003).

The general, national and collective threat is a threat understood as a risk for the country or society as a whole, and does not have to entail a personal physical risk to an individual. This can be studied through questions such as: "How concerned are you that there will be another major terrorist attack on U.S. soil in the near future?" (Huddy et al. 2002) or "How large do you think the risk is to people in Sweden of the following?", and the list including the same risk items as in the case of personal risk is offered (e.g. Sjöberg 2003). The above-noted two types of threat have also been presented by this factors analysis (Huddy et al. 2002). Similarly, they also differ in their consequences.

Sources of Perceived Risk

The risk literature has widely studied individual sources of threat perception. There are two main classical theories used for explanation of perceived risk: the psychometric paradigm and cultural theory (Sjöberg 2000, Sjöberg et al. 2004).

Psychometric paradigm

The psychometric explanation, drawing on cognitive psychology, was developed by Fischhoff and his colleagues in 1978. The basic assumption of this approach is that threats and risks are in reality interpreted or perceived by individuals. In other words, individual threats are considered to be stimuli to which individuals respond (Slovic 1987, Sjöberg 2000, Sjöberg et al. 2004). Based on this perspective, various characteristics of the possible threats and risks are considered to be the principal factors determining how much people feel threatened or at risk.

Originally, this research agenda was used to account for differences in the level of perceived risk among various types of threats and was intended to predict public acceptance of specific policies that involved some level of risk (Slovic 1987, Sjöberg 2000, Sjöberg et al. 2004). Specifically, the traditional risk perception literature was interested in the following question: Why are some risks perceived as more severe than others? This focus was motivated mainly by the fact that, surprisingly to risk assessment experts, some of the threats with a rather low actual probability of happening, such as radiation from nuclear power plant, were perceived as much greater risks than other threats that can potentially be more harmful, like X-rays (Slovic 1987). Similarly, authors were puzzled about the discovery that some quite serious accidents had much smaller negative social consequences than other accidents that did not inflict any physical or material harm but induced higher social concerns (Slovic 1987).

These studies conducted an aggregate level analysis explaining the diversity in average risk perception of specific threats (Slovic 1987, for summary see Sjöberg 2000 and 2002, Sjöberg et al. 2004). In particular, as shown for instance in the analysis of Slovic (1987), a long series of possible risks is used and individual risks

are treated as units of analysis. Individual cases (risks or threats) are measured on several variables derived as average evaluation of various risk characteristics. Respondents are asked to evaluate the stated individual risks on various scales implying their characteristics, such as how new and researched the risk is, how fatal it can be, whether it is voluntary, how dangerous for future generations it can be, etc. In the next step, factor analysis is used to analyze dimensionality of the evaluations of the individual risks. Usually two factors are derived: 1. Dread risk dimension that includes characteristics such as how catastrophic or fatal the consequences are and how controllable the risk is. 2. New-old dimension that includes items such as how well the risk is known to science, how generally new it is, how known it is to exposed people (Slovic 1987).

Based on the two dimensions a "map of hazards" is designed (Slovic 1987: 282). For example coal-mining accidents score high on the dread dimension and low on the new-old dimension, while chemical technologies display high values on the new-old dimension and low on the dread dimension. Threats related to nuclear power such as radioactive waste and nuclear reactor accidents score high on both dimensions – they are considered simultaneously as unknown and dreadful risks. On the other hand, risks such as alcohol or downhill skiing display low values on both dimensions. What is important is that scores of individual risks on the dread dimension are strongly related to how much people express the desire for strict regulation to reduce the risk (Slovic 1987: 283). People exhibit more proclivity towards greater risk regulation in areas that are difficult to influence and that can have fatal consequences such as nuclear accidents, usage of weapons and DNA technology, in contrast to less hazardous occurrences such as the use of medicaments or bicycles. Subsequently, the psychometric scholars argue that individual threats have a "signal potential" determined by the two main factors of risk characteristics and

not only by actual risk calculated by risk assessment experts (Slovic 1987). Specifically, risks such as nuclear power and other new technologies are very likely to have high signal potential that will bring a lot of public concerns, media attention and opposition because they score high on the two risk dimensions.

While the psychometric explanation performs well in explaining aggregate differences in perception among individual risks, it is criticized for being much less successful in explaining the individual level differences in risk perception (Sjöberg 2000 and 2002, Sjöberg et al. 2004). The question "why some people perceive a specific risk more dangerous than others" cannot be answered only by perceived attributes of individual threats, specifically the novelty and dread dimensions. Although the threat attributes show some effect on individual perception of a particular risk, they explain much less of the variance among individuals than it does in the cross-risk analysis (Sjöberg 2002).

Cultural theory

The second theory that belongs to the basic explanatory framework of risk perception is the so-called cultural theory. Unlike the psychometric paradigm that looks at characteristics of risks themselves, the cultural theory focuses on individual attitudes and values that can influence the levels of perceived risk (for summary see Sjöberg 2000, Peters and Slovic 1996). In other words, while psychometric analysts have pointed out that "risk debates are not merely about risk statistics" and are related to other characteristics of threats, authors relying on cultural theory have argued that "some of these debates may not even be about risk" but about the individuals themselves (Slovic: 1978: 285).

The cultural perspective was introduced into the risk perception literature by Douglas and Wildovsky (1982) and later elaborated upon by Dake (1991). According

to this perspective, the perception of risk is driven by more general attitudes towards the world around us (Dake 1991). Culturalists assume that people have specific worldviews that determine their interpretations of the surrounding world. In contrast to the psychometric theory, possible risks and hazards are not expected to influence individual attitudes directly but through interpretative schemata (Peters and Slovic 1996). Especially relevant to the explanatory potential in cross-individual research is that people naturally differ in their worldviews.

According to Dake (1991), two components are important in regards to an individual's general worldview: his/her relations to groups (individual/group-based perspective on beliefs of right and wrong, responsibility etc.) and characteristics of rules that are needed for society according to that particular individual (the number of rules and the level of acceptance of these rules across society). Combining these two dimensions Dake derives four basic worldviews: 1) hierarchist, 2) fatalist, 3) individualist, and 4) egalitarian. Based on those characteristics his study then shows what types of risks hierarchists, individualists and egalitarians are concerned with (Dake 1991, Sjöberg 2000). Hierarchists score high on both dimensions – they are group-oriented and require many and stratified rules to control people's behavior. Hierarchists worry about societal risks associated with people's civil disobedience and at the same time are not concerned about restrictions to civil liberties. Individualists are expected to require lower level of stratified prescription and are oriented towards the individual. They are concerned about civil disobedience of ordinary people and worry about risks associated with economic failures. Egalitarians want the same as individualists in terms of how society should be ruled, i.e. few rules to govern people's behavior, but they are more group oriented. Egalitarians worry primarily about technological and

environmental risks because a non-egalitarian society will probably exploit environment. They are also concerned about restrictions on civil liberties.

Some scholars criticize this explanatory approach for limited empirical evidence that would support this theory and for a low effect of the worldview types on risk perception (Sjöberg 2000). Implications of other more general types of values and attitudes, such as position on the left-right ideological scale, postmaterialism or responsibility on risk perception were also studied. However, according to critics, they fail to explain interpersonal variation in risk perception (Sjöberg 2000).

Searching for more powerful explanatory models, Sjöberg (2000) suggests including a specific attitude to the object of risk. Specifically, he includes into the analysis of risk perception of nuclear power the factor of an attitude towards nuclear power. So far, research has assumed that particular attitudes towards policies related to risks were the result of risk perceptions and not the other way round. However, Sjöberg (2000) reverses the causal direction and argues that it is attitudes that influence risk perceptions. Although this model performs much better in statistical terms than the other predictors, the question remains whether it offers a theoretical improvement in determining the causes of risk perception.

Regarding the explanatory potential of cross individual difference in risk perception, the approach could be criticized for a short distance between the two concepts. To put it bluntly, it is not surprising that people tend to picture worse scenarios for things that they dislike. Similarly, Sjöberg's inclusion of general risk sensitivity that is construed as mean risk perception of various objects (not counting the object that is analyzed as dependent variable) raises similar concerns. Undoubtedly, his findings are a relevant contribution to a more detailed understanding of the puzzle of risk perception. However, their potential for causal

explanation should not be evaluated only on the basis of how much of variance in risk perception they succeed to explain. Theoretical concerns of how far those concepts are in the line of causality should also be taken into account.

Other factors explaining risk perception have been used. Sjöberg (2005) in his risk perception analysis of terrorism uses various indicators, such as the perceived characteristics of a terrorist, general suspicious thoughts, and reasons for a "risky world". Although some of these factors are significant, they lack a developed theoretical explanation why and how they should determine the perceived risk of terrorism.

Socio-demographic factors

One of the stable findings of risk perception studies is the significant difference between men and women. Women tend to exhibit a higher level of apprehension of both threats - the perceived personal and national - than men, despite the fact that they are not more likely to be affected by the threat (Huddy et al. 2002).

Context

The vast majority of traditional risk perception scholars limit their analysis to individual characteristics of citizens. It is done either by psychometric modelling that includes risk into the analysis as "inherently subjective" that exist only in the minds of people and how they perceive it (Sjöberg 2004), or in cultural theory approach that treats culture as a set of individual values and attitudes. However, people are not isolated units perceiving risk regardless of their environment. Wider context should also be taken into account by risk perception analyses. Moreover, literature has demonstrated that contextual differences in risk perception exist. Mazur (2006) analyzes the differences in perceived threats of environmental damage across western democracies. He shows such differences through a temporal

prism and concludes that the level of people perceiving threat increased from 1993 to 2000. Similarly, several studies show quite a fast decrease of reactions that first soar in the immediate aftermath of an accident or event but soon quite quckly wane (Sjöberg 2005, Sjöberg and Drottz 1991, Silver et al 2002). For instance Silver and his colleagues (2002) provide evidence that there had been more than a ten-percent decline in occurrences of post-traumatic symptoms since the immediate aftermath of the 9/11 attacks when compared to two months thereafter.

First and foremost, the risk perception and related individual attitudes and behavioral patterns are undoubtedly related to actual risks and risky situations (Sjöberg 2000, Huddy et al.2002). One can hardly argue that the 9/11 events and the Chernobyl accident as such would not have had any social impact. Similarly, if there was no nuclear power, people could hardly be afraid of it. In this regard, longitudinal designs studying attitudes to risk and risk perception before and after major accidents seem to be very promising. For instance, Kam and Kinder (2007) analyze the levels of support for war on terrorism in their unique panel study conducted before and after 9/11. As the main explanatory variable they identified an increased ethnocentrism in 2002 compared to 2000. They claim that it is the context, specifically the events of 9/11 together with the reactions of political elites and media that activated a latent ethnocentrism of Americans, that subsequently led to the support of the war in Iraq.

Similarly, analyses across countries, regions and neighbourhoods measuring the actual level of threat could render some important results. For instance, research on ethnocentrism and racial attitudes has paid a lot of attention to these approaches (Oliver and Mendelberg 2000). Most of these studies consider as one of the main explanatory variable of white people's anti-black attitudes the "power-

threat" theory. In general, the theory specifies that whites see their economic, political, and status privileges threatened by the increasing percent of blacks in their community (Taylor 1998, cf. Oliver and Mendelberg 2000).

In addition to actual risks and threats, political and social environment is very likely to play an important role in shaping individuals perceptions of risks. Public opinion research has paid a lot of attention to how political elites influence public opinion (Dalton, Beck and Huckfeldt 1998, Zaller 1992). There is no reason why this effect should not be found also in the case of attitudes towards and perceptions of risks. Mazur (2006) shows that the change in the level of perception of environmental risks in a particular country is related to changes in the coverage of these risks in the national media. Mazur compares environmental risk perception in ten countries between 1993 and 2000. In countries, such as Spain and Japan, where media coverage of environmental issues had increased, the level of perceived environmental danger soared as well. Also in countries where media paid less attention to environmental dangers than in the past, such as Germany and Bulgaria, a decrease in perceived environmental risks was observed. However, Mazur's study remains rather sole standing. Risk assessment research in general has not paid very much attention to contextual determinants of risk perception.

Also, micro-contexts of individuals such as their social networks are very likely to influence their attitudes and behavior related to risks. Social networks present quite stable links between individuals and a wider political environment (Knoke 1990). Generally, people involved in those networks are more likely to get information about political and social issues and about the wider environment. For example, when analyzing effect of policy threat to Arab Americans that appeared with the acceptation of the Patriotic Act, Cho and Gimbel (2006) found support for

the importance of information and socio-economic status in transmitting the effect of the actual threat. They show that it was people with a better access to information who identified a potential policy threat to them and were able to action accordingly - oppose it. Because of the necessary transmission process, it was paradoxically Arab Americans with English knowledge and high status, who had felt more threatened by the introduction of the Patriot Act. Yet they were less likely to be threatened by it than disadvantaged Arab Americans.

Consequences of Perceived Risk

Various consequences of threat perception have been widely documented in the literature. Huddy et al. (2002: 486) summarize observed outcomes of threat perception in general: higher risk perception increases political intolerance, ethnocentrism, xenophobia, and prejudices. Threat perception also reduces cognitive abilities, leads to closed-mindedness and intolerance to challenging opinions. For example, Brade, Valentino and Suhay (2008) show that journalistic portrayal of immigrants as a threat in the media increases individual anti-immigrant protest behavior. In addition to anxiety, both perceived personal and national harm caused by immigration, are shown as mechanisms through which this influence takes place.

Risk perception also supports individuals' willingness to forego basic civil rights and liberties (Huddy et al. 2002: 486). Viscuci and Zeckhauser (2003) analyze how people are willing to sacrifice civil liberties to reduce the risk of terrorism on the case of airport checks of passengers, i.e. whether they should be random and standardized or targeted according to race, gender, nationality, etc. Their analysis supports opinions that the discussion about liberties and terrorism is not about extreme views, i.e. sacrifice all liberties or none of them in the effort to lower the

terrorism risk. On the contrary, the attitudes individuals have seem to be rather conciliatory and a result of a series of tradeoffs. Specifically, they show that only 45 percent of respondents were in support of targeted checks based on demographic data such as race, gender and nationality if the alternative was random checks causing 10 minutes delays at the airport for everyone. However, if the general delays caused by random checks should increase to 60 minutes, then 74 percent of people were in support of targeted checks. Interestingly, the assessment of the general risk of terrorist attack did not show any effects on the willingness to introduce targeted air checks.

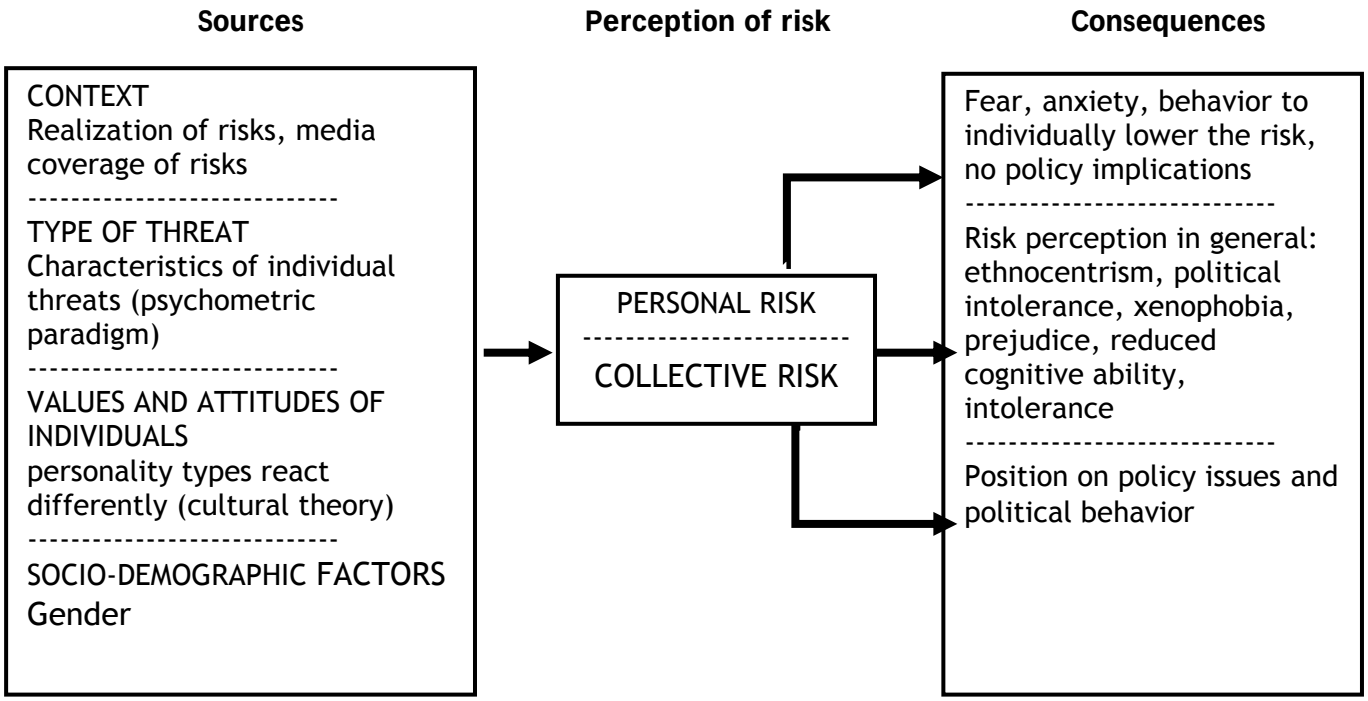
It should also be stressed that there is a difference between the implications of personal and collective risk perception. Personal threats educe higher feeling of fear and anxiety than the national one (Huddy et al. 2002). They also lead individuals to alter their personal behavior in order to avoid a risky situation. For example, Huddy et al. (2002) show that people who felt more at risk of being personally affected by a terrorist attack were more cautious in handling their mail, tried to spend more time with their family, and happened to change their air travel plans.

The main difference between personal vs. national/societal threat should be in how they influence attitudes towards policies. Huddy et al. (2002) argue that the level of perceived personal threat does not influence the attitudes towards national policy issues because individuals follow the distinction between private and political arenas in their evaluation of general societal process and policy issues in particular. In fact, they show that perceived collective threat of terrorist attacks affected the evaluation of national consequences of terrorism, while the level of perceived personal threat of being hurt by a terrorist attack did not render any

effect whatsoever. Similarly Kam and Kinder (2007) show that greater fear of a higher national threat of terrorism increases the support for the war on terrorism such as increase spending on security, defense, border control, and support for military action in Iraq.

Figure 1 displays a summary of above reviewed studies. The figure outlines the fundamental questions and findings the empirical studies have been concerned with.

Figure 1: Sources and Consequences of Risk Perception – Summary



Available Data

Analyses of risk perception mostly rely on individual surveys conducted in a particular country or city. Regarding cross-national surveys, modules of International Social Survey Program (ISSP) focused on the environment, covering question about perceived environmental threats. The ISSP studied the role of government in 2006 and included the question on how much a government should be allowed to reduce peoples' rights and liberties in situations where a terrorist attack might be imminent. The World Value Survey (WVS) asks respondents about helpfulness or harms of scientific advances in the long run. The first wave of the WVS included questions on individuals' assessment of the likelihood of their country being at war in five years. The second wave of the WVS asked how people liked potentially "threatening" groups (various nationalities, political groups, minorities etc.). The third and fourth wave of the European Social Survey (ESS) included questions about the frequency of worries about becoming a victim of crime and being physically assaulted or mugged. It also covered questions on the likelihood of a terrorist attack in Europe and the respondent's country.

The perception of risks is quite substantially covered by the Eurobarometer surveys. Table 1 displays a summary of risk items included in each Eurobarometer survey. Some of other Eurobarometers that are not displayed in the Table 1 are focused on more specific risks, such as what can increase the likelihood of cancer, risks at the workplace, risks of poverty, risks related to information technologies, consumer risks related to various consumer products such as hair colorants or toothpastes.

Table 1: Risk Perception Items in Eurobarometers (EBs):

RISK PERCEPTION ITEM	EB-No.-Year
Personal risks – crime, diseases and transportation	
Risk of being a victim of crime, environmental pollution, economic crisis, injury in a car accident, serious illness and a raft of risks related to food.	EB 73.5 2010 EB 64.1 2005
Risk of having AIDS, being a victim of crime, and having a car accident etc.	EB 44.3 1996
Risk of accidents for various means of transportation and risks related to specific research topics	EB 35.1 1991
Risks of technologies and nuclear power	
Risk of pollution by various energy resources	EB 35.0 1991 EB 39.1 1993 EB 75.1 2011 EB 31A 1989 EB 37.0 1992 EB 43.1 1995
Risk of technological incidents (electricity blackout, gas cut-off and raising energy prices)	EB 65.3 2006
Risk of nuclear energy and radioactivity	EB 66.2 2006 EB 43.1 1995 EB 63.2 2005 EB 56.2 2001
Risks associated with new technologies	EB 64.3 2005 EB 46.1 1996 EB 52.1 1999 EB 58.0 2002
Risks related to industrial development	EB 51.1 1999
Cultural risks and societal consequences	
Items that should be or should not sacrificed during the war on terror	EB 60.0 2003
Risk caused by immigrants threatening our way of life	EB 60.1 2003
Risk of globalization for European culture	EB 67.1 2007
Risk of losing cultural diversity	EB 55.1 2001 EB 47.2 1997 EB 47.2 1997 EB 48.0 1997

Pathways of research

As shown above, the risk perception research abundantly draws on psychological perspectives and mainly focuses on individuals (their perceptions and attitudes and values). It diverts our attention from societal and contextual aspects that play a role in perception of various threats and other related issues. The WP4 can contribute to risk perception research with a contextual analysis of the broader environment. The following aspects can be explored:

1. The role of the micro-environment. Specifically, the effect of social networks, attention to (political) news, political interest in risk perception and in support for specific risk policies can be studied. Some of the available surveys cover questions on characteristics of the respondents' micro-environment and their linkages to a broader environment (such as social group membership, political discussion, attention to media, etc.)

2. National and contextual differences as well as the temporal aspect in risk perception. The classical risk perception literature has insufficiently dealt with cross-country and temporal differences. However, cross-national surveys are available. Some of them are also longitudinal. Multilevel analyses including individuals nested within countries can be used for simultaneous analyses of individual-level variables and country level factors. (For example two modules of ISSP Environment include 16 countries in two years. In addition to the environmental risk perception, the survey also includes possible consequences of this risk such as environmental protest.)

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