



# The role of risk perception and other risk-related judgements in transportation mode use

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## ABSTRACT

**Aims:** The core aim of the present study was to examine the role of risk perception in use of private and public modes of transportation. An additional aim was to examine the relative importance of perception of transport risks with risk perception of non-transport factors and also to investigate differences in worry, perceived control of transportation modes, as well as trust in authorities' risk handling, safety motivation, and attitudes towards transport safety.

**Sample:** The results are based on a mailed self-completion questionnaire survey carried out among a representative sample of the Norwegian public aged from 18 to 65 years ( $n = 1864$ ). Data collection was carried out during October–December 2008.

**Results:** Perceived control related to private modes of transportation, knowledge about safety and trust in authorities were found to be significantly different among respondents who often used private modes of transportation compared to those who most often used public modes. It was no significant difference in severity of consequences due to which transport modes that the respondents used most frequently.

**Conclusion:** It may be that conclusions of previous research about the role of consequence judgement for precautionary action and demand for risk reduction are misleading when generalised to decisions about transport mode use.

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## 1. Introduction

Risk perception and other risk- and accident-related factors may be associated with transportation mode use including public as well as private transportation. This article aims at examining how such factors vary with use of public versus private transportation modes. In addition, non-accidental factors may also be relevant for which transportation modes to use. However, the present research does not aim at investigating non-accidental factors.

### 1.1. Risk perception

With the exception of aviation and rail, the severity of consequences related to the use of transportation modes is more chronic than catastrophic, especially when it comes to private transportation modes. This concerns whether a risk may kill people one at a time (chronic risk) or a risk that can kill a large number of people at once (catastrophic). Risk in public and private transportation is also something most people have learned to live with and can think about reasonably and calmly, not primarily a risk that people

have great dread for, i.e. which is related to fear and strong emotions or affectivity. Aviation is an exception from this. Knowledge about the risk experienced by persons who are exposed to the potentially hazardous risk sources as well as knowledge about the risks in science may also be better compared to many other risk sources, e.g. technological and environmental risks and hazards. When using private modes of transportation (i.e. own car, motorcycle, etc.) perceived control is often judged to be better compared to public transportation and many non-transport accidental risk sources. Drivers have been found to assess themselves as being more skilled than the average driver (Delhomme, 1991; Goszczyńska and Roslan, 1989; McCormick et al., 1986; Svenson, 1981). This means that drivers perceive to control the dangers when they are on the wheel themselves compared to when riding with another driver and when using public modes of transportation. Novelty or newness is another property of risk perception. Compared to technological risks most transport related risks are characterised of being old and familiar rather than new and unknown.

It is of course interesting to examine factors which may explain how people perceive risks. However, perception of risk is primarily interesting because it may influence health protection and risk-taking behaviour at an individual level (Rundmo, 1992, 1996,

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1999, 2000; Rundmo and Iversen, 2004; Ulleberg and Rundmo, 2003; Rundmo, 1999; Iversen and Rundmo, 2002; Rundmo, 1999) as well as demand for risk mitigation and policy decisions related to hazards (Brun, 1992; Kraus and Slovic, 1988; Rundmo, 2001; Sjöberg, 1999; Slovic and Monahan, 1995). Two factors have been found to be significant when it comes to investigating risk perception as an exogenous variable: The subjective assessment of the probability that a negative or unwanted event will take place and the judgement of severity of consequences if the event should happen (Sjöberg et al., 2004; Rundmo and Moen, 2006). Consequently, judgement of severity of consequences is a factor important for perceived risk (Fischhoff et al., 2000). However, the majority of research on risk perception has been carried out on risks of the type that have large consequences and are catastrophic when they happen (Sjöberg, 1999). Certainly, it is a problem to generalise the result of the importance of consequences for risk perception to areas where the severity of consequences are perceived to be moderate or small, which to a large extent may be the case for perceived risk in transport.

Sjöberg (1999) showed that perceived severity of consequences was a more significant predictor of demand for risk mitigation compared to perceived probability of harm. Sjöberg (1999) argued that severity of consequences primarily is related to risk perception and exert minimal influence on policy demands, while it is the severity of consequences which primarily is associated with such demands. Because it has been a debate about which component that is most important (Slovic, 1999; Palm, 1999; Sjöberg, 1999) probability assessment as well as judgement of severity of consequences should be taken into consideration when analysing the role of risk perception in behaviour and decisions.

Contrary to crashes and material damages in transport, the probability of a serious accident is low. It is only a very few people who have experienced to be seriously victimised in such accidents despite the frequent use of transportation in everyday life. When the probability of an accident is judged to be low people will perhaps not lay weight on the severity, and therefore, such judgements will only moderately influence on which transportation mode that is used. If low subjective probability assessments are associated with mode use this may indicate, contrary to other conclusions (e.g. Sjöberg, 1999), that judgement of severity of consequences is of relatively low importance for transportation mode use.

If an aviation accident takes place the consequences are most often severe. However, it may be hypothesised that people do not lay much weight on these consequences, e.g. when it comes to decisions about using air transportation or other transportation, even if the consequences would be severe because the probability for such an accident is low. Furthermore, if the probability assessment influences the use, even if the probability is perceived to be low, this would facilitate the use of modes with such properties, e.g. travel by airplane and other public modes of transportation. The severity of consequences will not be seen as relevant due to low probability of an accident.

The probability of accidents by use of most other transportation modes, are higher compared to plane, e.g. when riding a car. When it comes to ordinary accidents it can be hypothesised that assessments of probability will influence on the use of such transportation modes. Because the probability is perceived to be large enough the probability assessment will be significantly associated with decision to use, e.g. own car. If the probability of an accident is perceived to be high this will inhibit the use of such a transportation mode even if the severity of consequences is perceived to be minor or moderate. The consequences will not to a large extent influence on decisions to use such transportation modes.

## 1.2. Other risk-related variables associated with transportation mode use

In addition to perceived risk several other factors may influence decisions about use of transportation modes. It is well known from numerous of risk perception studies that there are significant differences in perceived risk due to gender, age and education (Boholm, 1998; Byrnes et al., 1999; Matthews and Morgan, 1986; Davidson and Freudenburg, 1996; DeJoy, 1992; Flynn et al., 1994; Glendon et al., 1996). There are also studies showing differences in driver risk-taking behaviour due to gender and age (Iversen, 2004; Oltedal and Rundmo, 2006). Other risk-related factors that may influence perceived risk as well as risk behaviour are worry, perceived control of transportation modes, non-transport accidental risk perception, trust in authorities' risk handling, safety motivation and attitudes towards safety in transport. Because it is an association between these factors and perceived risk, and because perceived risk is associated with individual risk decisions, the present study hypothesizes that these variables are related to transportation mode use, either directly or indirectly through perceived risk.

To clarify the relationship between risk perception and worry, 'risk as feelings' should be distinguished from 'risk as analysis'. 'Risk as feelings' refers to our fast, instinctive and intuitive reactions to danger while 'risk as analysis' adds logic, reasoning and reflection into the handling of risk (Slovic et al. (2001). The risk-as-feeling perspective (Loewenstein et al., 2001) hypothesised that responses to hazards and risky situations result in part from direct emotional influences that are not cortically mediated. This includes worry, fear, dread, and anxiety. This is in accordance with Zajonc (1980) who argued that emotions may be primary to and also precede cognition. Thus, not cortically mediated emotions may influence cognitive evaluations (see e.g. Rundmo and Sjöberg, 1996). Subjective probability assessments as well as anticipated outcomes (including anticipated emotions) can also exert influence on cognitive evaluations. The evaluation is based largely on probability assessments and it is assumed that such cognitive or rational judgements may cause affective consequences and feelings (e.g. anticipatory worry), which exert a reciprocal influence on the cognitive evaluation. Several studies have found models where probability assessment and rational evaluations of risk at a cognitive level predicts feelings, i.e. worry, to be well fitted to the data (Rundmo, 2001; Tennfjord and Rundmo, 2007). According to Sjöberg (1999), judgements of severity of consequences are more important for demands for risk mitigation. This is because such consequences are associated with worry and worry is a more significant predictor of demand for risk mitigation compared to judgement of severity of consequences (Rundmo and Moen, 2006). Rundmo and Moen (2006) showed that probability assessment was insignificantly associated with demand for risk mitigation. Accordingly, the present study also expects the same to be true when it comes to explaining use of private versus public transportation modes. The present study aims at examining worry as a hypothesised consequence of rational judgement of transportation mode risks and hazards.

Fischhoff et al. (2000) showed that it was a negative association between *perceived control* over the risk source and perceived risk. Delhomme (2001) also found an association between induced perceived control and risk judgements in a study with 466 adult participants. Windsor et al. (2008) also showed that perceived control of driving was associated with reduced risk avoidance in a study carried out among 304 older drivers. In the theory of planned behaviour perceived behavioural control is also hypothesised to be an important predictor variable of behavioural intentions (Ajzen, 1988). Thus, it is expected that perceived control also may influence use of public versus private modes of transportation.

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