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# Promoting traffic safety among young male drivers by means of elaboration-based interventions

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## ABSTRACT

Previous research in social psychology has brought about significant changes in attitudes and behaviour by merely asking respondents to imagine, or reflect, on a phenomenon and arrive at their own conclusions. To test the potential of such interventions in the traffic safety area, an experiment comprising 353 young men 18–23 years old with a driver's licence was conducted. Two experimental groups were induced to imagine a severe accident scenario and to visualize their feelings and the consequences on their future lives. A control group was interviewed about neutral issues. Attitudes towards risk-taking were measured post-intervention and at follow-up. The experimental groups showed more “ideal” attitudes than the control group post-intervention. At follow-up the attitudes of the experimental group remained unchanged, whereas the control group had changed towards more “ideal” attitudes. Self-reported risk-taking behaviour was measured pre-intervention and at follow-up. At follow-up all groups reported significantly less risk-taking behaviour than at pre-intervention. It is suggested that answering the questionnaires increased mental elaboration concerning risky driving, and it is concluded that interventions that unobtrusively make drivers reflect on their driving should be explored further as a means to promote traffic safety.

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## 1. Problem description and introduction

Is it possible to persuade young male drivers to adopt a safer, more cautious driving style? Considering the fact that young drivers, particularly young male drivers, are significantly more likely to be involved in an accident than other drivers are and that traffic accidents comprise one of the most serious global threats to public health (Peden et al., 2004), surprisingly few published studies have attempted to tackle this question. Reasons behind young male drivers' overrepresentation in accidents are well known and well researched. Lack of experience in driving is an important factor, but so is a riskier driving style. The riskier driving style of young drivers, particularly young males, has been confirmed in many studies, regarding a wide range of risky behaviours (e.g., Boyce & Geller, 2002; Deery, 1999; Elander, West, & French, 1993; Evans & Wasielewski, 1983; Harré, Field, & Kirkwood, 1996; Iversen & Rundmo, 2004; Laapotti, Keskinen, & Rajalin, 2003; Leung & Starmer, 2005; McKnight & McKnight, 2003; Tränkle, Gelau, & Metker, 1990). A recent investigation of the antecedents of real road accidents (accident case reports as opposed to laboratory studies or self-reports) among young drivers (Clarke, Ward, & Truman, 2005) also found that a large percentage of young drivers' factual accidents resulted from voluntary risk-taking rather than lack of skill. The authors conclude that “a way to address the deliberate risk taking behaviours of a significant number of young drivers must also be found, if the greatest improvements are to be made” (p. 529).

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One crucial question is how to address young drivers regarding their deliberate risk taking behaviours. McKenna and Horswill (2006) point at the importance of understanding what aspects drive people to engage in risky driving behaviour as a basis for designing various health policies. Many different factors can influence behaviour, among them the individual's instrumental and affective beliefs about the behaviour in question, including its outcomes (Ajzen & Fishbein, 2005). In order to reach a deeper understanding of the beliefs underpinning young male drivers' excessive speeding behaviour an explorative qualitative study, comprising seven young male drivers who habitually and substantially exceeded speed limits, was carried out (Falk & Montgomery, 2007). The results indicated that speeding was experienced as a highly pleasurable activity that arouses feelings of being in control, which in turn had positive consequences for the participating drivers' self-esteem. Personal conceptions of speeding behaviour also did not reveal any conceptions of speeding as being a particularly risky activity. Participants viewed themselves as responsible and competent drivers, able to decide for themselves when and where it would be appropriate to speed. The participants also had a thorough awareness that accidents do happen and also of many physical and psychological risks that may lead to an accident, for instance the sudden appearance of a moose or the tendency to overestimate one's competence as a driver. Interestingly, however, mental representations of potential destructive outcomes of their own speeding behaviour did not seem to be salient and participants also reported that they had not considered possible serious consequences of accidents prior to the interview. When such representations were made salient during the interviews, especially when notions of the possibility of injuring or killing someone else were brought up, strong anticipatory negative feelings like anxiety; guilt, remorse and depression were evoked. These results led to the conclusion that an intervention built on imagining the personal emotional aftermath of being the perpetrator of a serious accident should be developed and tested as a method for diminishing risky driving among young men.

The foundations for this conclusion rest on two fields of previous research. One connects to what will henceforth be termed "self-persuasion" (Aronson, 1999). The phenomenon of self-persuasion can be encompassed within a scant number of studies and experiments in the realms of social psychology and social cognition that have explored the impact of reflection and imagining on attitude and behaviour change. What these studies have in common is the accomplishment of significant changes in beliefs, attitudes and sometimes behaviour by merely asking respondents to reflect on, or imagine a phenomenon and arrive at their own conclusions without giving any explicit messages on how they should behave or think. Such results have been discussed in relation to various theoretical constructs, e.g. script evocation, cognitive dissonance, (Sherman, 1980; Spangenberg, Sprott, Grohmann, & Smith, 2003) self-prophecy (Spangenberg & Greenwald, 1999) anticipated affect/anticipated regret (Richard & Van der Pligt, 1991; Richard, van der Pligt, & de Vries, 1996) and attitude accessibility (Fazio, 2001; Richard et al., 1996). This kind of "self-generated" attitude change also tends to persist longer than does change by means of passive exposure to a message (e.g., Elms, 1966).

Below we will give two examples of such studies. The examples are chosen to demonstrate the effects of conceptually similar types of interventions applied in different contexts. Gregory, Burroughs, and Ainslie (1985) found that respondents who were asked to imagine being involved in a minor automobile collision afterwards believed they were more likely to have an automobile accident and were also significantly more inclined to accept stricter traffic safety legislation than were members of a control group. The authors concluded that: "...imagined scenarios can influence attitudes in a context with minimal demand characteristics. The implications for the attitude change literature should be clear: persuasive communication may be masked as 'self-related stories' that persons are requested by a communicator to imagine or picture in their minds. Imagining stories seemingly unrelated to an attitudinal issue would serve to avoid generating reactance. But the imagination of such stories is nonetheless capable of producing attitude change" (p. 441). In the context of the present study it should be mentioned that the study by Gregory et al. (1985) did not relate to actual driving behaviour or attitudes. The second example is a study by Richard et al. (1996) where Dutch students were asked how they would feel after having had unprotected sex with a stranger, thus evoking anticipated affects like regret and guilt. These students reported less risk taking behaviour for a period of at least five months after the intervention, compared to students who had been asked how they felt about having unprotected sex with a stranger. The authors relate this result to attitude accessibility, i.e., that negative anticipated feelings were made salient by the seemingly innocent question.

The other field of research that serves as a foundation for the conclusion concerns the effects of personal negative experiences on precautionary actions. Perceived susceptibility has been found to be a factor behind the propensity to take precautions, but here as well one major problem to be overcome is how to get people to acknowledge susceptibility (McKenna & Horswill, 2006; van der Pligt, 1996; Weinstein, 1989, 2000; Weinstein, Sandman, & Roberts, 1991). It seems reasonable that involvement in a traffic accident would increase accessibility to beliefs about negative outcomes and heighten the sense of susceptibility to ghastly consequences of accidents. At least three studies (Kouabenan, 2002; McKenna & Albery, 2001; Rajalin & Summala, 1997) within traffic psychology point to effects on driving style and attitudes towards driving as a result of having been involved in an accident. In a study involving 553 West African drivers, Kouabenan (2002) found that those with accident experience were more careful and took less risk compared to drivers with no prior accident experience, but that their perceptions of risks did not differ. McKenna and Albery (2001) found that drivers who had suffered serious enough injury from an accident to be taken to hospital later estimated their skill and safety in driving more negatively than drivers who were accident-free. Those injured drivers also manifested less intention to speed in the future. Drivers who had been involved in a minor accident or an accident where someone else was hurt did not differ significantly from accident-free drivers. The authors suggested that if there is a causal link between negative experience and protective behaviour, ways to convey such experiences "second hand" – as a substitute for living through them – should be explored further. Rajalin and Summala (1997) found that drivers generally resumed their previous driving style a few months after the accident. Interest-

ingly, though, detailed interviews indicated that drivers who attributed the accident to their own behaviour reported a lasting change in driving style as an effect of the accident. These studies indicate that long-term change in driving style may not be a general outcome of involvement in an accident, but that driving style may change in a more cautious direction under certain conditions.

Taken together, the research briefly described above and the findings from the study by Falk and Montgomery (2007) indicate that imagining an accident scenario and its personal aftermath could increase accessibility to beliefs about negative consequences of risky driving and in turn affect attitudes and behaviour towards risk-taking in traffic.

The aim of the present study was thus to investigate whether an intervention based on imagining an accident scenario would diminish risk-taking attitudes and behaviour in driving among young males. To the best of our knowledge, such methods have hitherto never been tested in traffic safety contexts. It was hypothesized that after such an intervention, participants would show a decrease in risk-taking attitudes as well as in risk-taking behaviour compared to a control group. In order to gain more precise knowledge about the conditions in which such interventions could be efficient, two different but closely related interventions were used.

### 1.1. Development and design of interventions

The interventions used were developed based on the framework outlined above and on findings from the study by Falk and Montgomery (2007). On this basis an intervention that had the format of a personal in-depth interview, but with the concealed aim of guiding the participant into imagining an accident scenario and its personal negative consequences, was developed. In the following, these interviews are called intervention-interviews. The study by Falk and Montgomery (2007), however, indicated that the ability to imagine accident scenarios varies considerably. Some participants needed a great deal of guidance via directive follow-up questions in order to be able to imagine a scenario, whereas others did it easily and spontaneously once they understood the task. It was therefore decided to test two different but closely related methods of generating imagined scenarios. One was based purely on stimulating the participant himself to generate an accident scenario, designated the Self-generated Scenario method (SGS). The other, the Film-aided Scenario method (FAS), was based on using a short (80-s) video as a stimulus for imagining oneself in the portrayed accident scenario. Another reason for employing FAS was to investigate whether it would make the intervention interview less time-consuming but equally effective. The video was produced with the aid of University College of Film, Radio, Television and Theatre (Dramatiska Institutet) in Stockholm, and portrayed an accident in which a little girl was knocked down at a pedestrian crossing by a young male speeding driver. It was important to convey the accident as being caused solely by the driver, as the study by Falk and Montgomery (2007) indicated that attributing the accident to oneself has a detrimental effect on anticipated future mental well-being. Similarly, Rajalin and Summala (1997) found that drivers who attributed the cause of a fatal accident to themselves reported having changed their driving style permanently. The film ends with a sequence showing a slightly blurred picture of the girl lying on the road and the driver crouching in his seat.

The first part of the intervention-interview was the same for both techniques. It was explained that the aim of the intervention-interview was “to learn more about how young persons themselves think and feel about things that can happen in traffic”. Two initial open questions were asked: “What is the very worst thing that could happen to you when driving?” “How could that happen to you – what could make something like that happen?” After this, the intervention-interviews differed according to the method used. In SGS, the participant was induced to generate an accident scenario by himself, guided by questions from the interviewer. Here we tried to unobtrusively steer towards scenarios in which the participant was responsible for the accident, but the participant’s own self-generated fantasies always set the frame. He was then asked to lean back, close his eyes, relax and imagine that the imagined accident scenario was actually happening to him. In FAS, the participant watched the video and was then asked to close his eyes, relax and imagine that he himself had been driving the car and was the person crouching in the driver’s seat. From then on, the two techniques followed the same format: inducing the participant to imagine how he would feel and what the consequences on his future life would be by asking guiding questions like “How does that make you feel...”, “What happens next...”, “What is it like, having to live with something like this on your mind...” etc. The interview was terminated when the interviewer judged that all consequences of the accident that the participant could imagine had been covered. The interview was rounded off by asking if the participant had previously thought in terms of the issues brought up in the interview. FAS interviews lasted between 10 and 25 min, SGS interviews from 20 to 50 min.

## 2. Method

### 2.1. Participants

Participants were 353 men between 18 and 23 years of age who volunteered to participate in the study. A majority (88%) was 18 or 19 years of age at the time of the study. All participants had a driver’s licence; 55% had had it for six months or less, 28% between seven and 17 months and 17% for at least 18 months. Two hundred thirty-three participants (66%) were recruited on the day they enrolled for compulsory military service at an office of the Swedish National Service Administration. One hundred twenty (34%) were conscripts, recruited at regiments while performing their military service. The reason for

this mix was that it would have been extremely time-consuming to recruit all participants at enrolment offices as only some 10–15% of this group had a driver's licence.

## 2.2. Procedure<sup>1</sup>

At the enrolment offices, brief information about the study was given by a research assistant during the general information meeting that initiated the enrolment process. (The first author of this article both supervised and took part in the fieldwork.) We then asked how many of the males were in possession of a driver's licence (in Sweden, females can volunteer for military service, but there were usually few, if any, females present) and invited them to volunteer for the study. Generally, all or most of those who claimed to have a licence chose to volunteer. Some informal checks of statistics from the enrolment offices also showed good correspondence between the number of participants and the actual number of enlistees with a licence on a particular day. In order to reach conscripts, we were aided by officers in charge who passed on brief information about the need for volunteers for the study to male conscripts who had a driver's licence. Those who volunteered were asked to report in groups of 6–10 at a certain time, when they were given further information by a research assistant.

All potential participants (volunteers) were informed about the study procedure, and the purpose of the study was described as “a project to find methods for reducing traffic accidents among young people” without mentioning that such methods were actually being tested. Confidentiality was assured and measures to secure this were explained. It was also explained that the task amounted to filling out a questionnaire and participating in an interview on the current day, and then filling out another questionnaire sent by mail some four weeks later. In return for completing and returning this questionnaire, the participants were offered two cinema tickets. They were also told that they had the right to terminate participation at any time. With very few exceptions, all who volunteered decided to participate in the study.

The study was conducted as an experiment with a pre-intervention/post-intervention/follow-up design, including two experimental groups (SGS and FAS) and one control group. For practical reasons and to minimize carry-over effects, all participants at a certain place on a certain day were assigned to the same condition, either control, FAS or SGS. Immediately after agreeing to participate in the study, participants completed the first part of the questionnaire (see “Measures” below). They were then summoned individually to a separate room for what was described as a personal interview. As the number of participants on a specific occasion could vary from one to 16, and only one or two research assistants conducted the fieldwork on a particular day, it was not always possible to perform all interviews in close connection to the completion of the questionnaire.

Experimental group participants were subjected to the intervention–interview, either SGS or FAS, as previously described. Control group participants were also interviewed, but about their reasons for acquiring a licence and favourite car. After the interview, the participant completed the second part of the questionnaire. At enlistment offices it was not possible for every participant to do this immediately after the interview, as some had to go straight to a phase in the enrolment process (physical examination, for example) and thus had to complete the questionnaire later during the day. However, this applied equally to the control group and the experimental groups.

As SGS interviews lasted somewhere between 20 and 50 min (FAS interviews lasted between 10 and 25 min, Control interviews approximately 10 min) it turned out to be very difficult to conduct SGS interviews at regiments, where participants had to be summoned in groups of 6–10 at intervals of an hour and a half. This led to a smaller number of participants in the SGS condition ( $n = 91$ ) relative to the FAS ( $n = 131$ ) and Control ( $n = 131$ ) conditions.

Some four weeks later, a follow-up questionnaire was sent by mail to the participant's home address (see “Measures” below). A participant was considered a dropout if he did not return this questionnaire after three reminders by telephone.

## 2.3. Measures

In order to measure the effects of the interventions on risk-taking attitudes and behaviour, a questionnaire containing questions on attitudes as well as behaviour related to risky driving was constructed and used. The questionnaire was composed partly of previously validated scales, partly of scales constructed specifically for the present study.

As mentioned above, the first questionnaire was distributed to experimental as well as control participants in two parts, before and after the intervention-interview. The pre-intervention questionnaire contained items regarding demographics, personal driving and accident experience, and two scales intended to measure risky driving behaviour. On the first scale, Risky Driving Behaviour, the participant was asked to indicate how often (on a Likert-type response scale with terminal points 1 = never to 5 = very often) he committed 21 different violations of traffic rules. This scale was composed partly of items from the “violations” factor in the Swedish version of the Swedish Driving Behaviour Questionnaire (DBQ-SWE, Åberg & Rimmö, 1998), and partly of items developed and used in a study by Ulleberg and Rundmo (2002). Pre-intervention Cronbach's  $\alpha$  was .89; at follow-up,  $\alpha$  was .91. The second scale, Recent Risky Driving, contained nine questions about violations of rules, similar but not identical to questions in the Risky Driving Behaviour scale, but here we asked participants to indicate how often during the past four weeks they had performed the behaviour in question. The questions concerned speeding, drinking and driving, running yellow lights, ignoring stop signs, changing lanes frequently in order to get ahead, following closely and not

<sup>1</sup> The project was approved by The Regional Ethical Review Board in Stockholm.

Time 1. Day of the intervention (T1)		4 weeks	Time 2. Follow-up (T2)
<u>Pre-intervention questionnaire</u> - Demographics - Driving and accident exper. - Personality measures* - Risky driving behaviour scale - Recent risky driving	<b>Intervention-interview</b>		<u>Post-intervention questionnaire</u> 7 attitude scales : - Speeding - Traffic flow vs. rule obedience - Funride - Risk of accidents - Concern about hurting others - Injury reflection - Subjective accid. probability

Fig. 1. Phases and principal measures in the study. \*The personality measures were not analyzed in this study.

concentrating on driving. The pre-intervention questionnaire also contained personality measures that were not analyzed in the present study.

The second part of the questionnaire (post-intervention questionnaire) contained seven scales, intended to measure the effect on attitudes related to risk-taking in driving. Three of these scales measured attitudes towards risk-taking behaviour and were developed and validated by Ulleberg and Rundmo (2002): "Speeding" (5 items), "Funriding" (3 items), and "Traffic Flow vs. Rule Obedience" (9 items). In that study these scales had the highest correspondence with self-reported behaviour, predicting between 12% (Traffic Flow) and 18% (Speeding) of the respondents' variability in risk-taking behaviour, and had reliabilities exceeding Cronbach's  $\alpha = .75$ . In order to measure effects on attitudes related to accidents, another scale developed by Ulleberg and Rundmo (2002) "Risk of Accidents" (three items) was used and two more scales were constructed. A scale called "Injury Reflection" was constructed specifically for the present study and contained three items regarding reflection on possibilities of hurting oneself or others in traffic: "I often think about the possibility that I could cause injury to someone else in traffic", "I often think about the possibility that I myself might get hurt in traffic" and "I often think about how horrible it would be if I hurt someone else in traffic". The third scale measuring attitudes related to accidents consisted of another scale developed by Ulleberg and Rundmo (2002), "Concern about Hurting Others", to which two other items used in that same study were added. These items were: 'Taking a person's or an animal's life because of careless driving can never be excused', and 'I hope I'll never be involved in an accident of which I am the cause'; this scale thus consisted of five items. Items on the attitude scales were rated on a Likert-type five-point scale with the terminal points 1 = 'Completely disagree' and 5 = 'Totally agree'. The questionnaire ended with a five-item scale, "Subjective Accident Probability", regarding the subjective probability of accidents or mishaps in traffic during the next three years: a collision, oneself being injured, injuring someone else, one's friend/family being injured, and being caught speeding. These items were rated on a five-point scale with the terminal points 1 = 'Totally unlikely' and 5 = 'Very likely'.

We considered the possibility of distributing the attitude questions both before and after the intervention, but this would have encouraged demand characteristics as it would give a strong lead to the real aim of the intervention-interview. The baseline measures thus consisted of the Risky Driving Behaviour scale and the Recent Risky Driving scale, while the attitude scales served as post-intervention measures.

The follow-up questionnaire, distributed by mail to the participants' home address some four weeks later, contained the same behaviour and attitude scales as the first questionnaire did, together with questions about accident and driving experience during the past four weeks. An overview of the different phases and principal measures used in the study is displayed in Fig. 1.

#### 2.4. Pretesting

The procedure as a whole – the questionnaire as well as the intervention-interview – was pre-tested on twelve psychology students at Stockholm University. The questionnaire was tested by means of "think-aloud protocols" (Ericsson & Simon, 1980; Svenson, 1989), i.e., asking participants to vocalize their thoughts while completing it. Non-directive open questions were asked about how the purpose of the intervention-interview was perceived. None of the psychology students expressed any doubt as to the alleged purpose of the interview, "learning more about how people themselves think and feel about things that can happen in traffic"; it was regarded as relevant to use this (albeit somewhat unusual) type of personal interview as a complement to the questionnaire. On the basis of the pre-test, a couple of the items used in the Norwegian study were changed to better fit the Swedish traffic system. Also, one negatively worded item was changed to contain positive wording in order to avoid rating errors.

### 3. Results

Three hundred fifty-three participants completed the questionnaire administered on the day of the intervention, and 327 (93%) completed the follow-up questionnaire.

### 3.1. Preliminary analyses

As it was not possible to allocate participants randomly to the three conditions, one-way ANOVAs were performed in order to investigate and control for possible differences between participants in the three conditions. Significance level was set to .05 for all subsequent analyses. No significant differences regarding mileage driven, time with a licence, or accident experience were found. Nor were there any significant differences in Risky Driving Behaviour at baseline (pre-intervention). The only difference approaching significance was age ( $F(2,8)$ ;  $p > .062$ ), with SGS participants being somewhat younger than those in the FAS and control groups. This was to be expected, as a larger proportion of SGS participants were recruited during enrolment. Thus, on the whole it seems that the participants in the three conditions did not differ in terms of important background characteristics.

Reversed items were recoded so that a low score on any scale would indicate a more “ideal” attitude from a traffic safety point of view, i.e., less preference for risk-taking. Recoding was only applicable for items measuring attitudes towards accidents. Tests of scale reliabilities showed a reliability of  $\alpha = .54$  for the Risk of Accidents scale (3 items) and  $\alpha = .64$  for Concern about Hurting Others (5 items). As this was considered non-satisfactory, these two scales were excluded from further analyses. The reliability of another scale, Funriding (3 items,  $\alpha = .66$ ), was also seemingly low, but as reliability for scales with so few items rarely reaches high levels and as the average inter-item correlation was .48, reliability was judged to be satisfactory and we decided to keep it.

### 3.2. Immediate effects on attitudes

A one-way between-group multivariate analysis of variance (MANOVA) was performed to investigate post-intervention effects on attitudes for the 353 participants who completed the first questionnaire. The five remaining attitude scales of the post-intervention part of the questionnaire (Speeding, Traffic Flow vs. Rule Obedience, Funriding, Injury Reflection and Subjective Accident Probability) were used as dependent variables. The independent variable consisted of the three conditions control, FAS and SGS. Assumption checks regarding normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity were conducted, with no serious violations noted. There was a small but significant difference between the three conditions on the combined<sup>2</sup> attitude variable:  $F(10,626) = 2.44$ ,  $p = .007$ ; Wilks' Lambda = .93; partial  $\eta^2 = .035$ . To exclude the possibility that the effect was a result of pre-existing differences in driving style the Risky Driving Behaviour scale was used as a covariate, but the results persisted and the effect size became somewhat larger:  $F(10,620) = 2.65$ ,  $p = .004$ ; Wilks' Lambda = .92; partial  $\eta^2 = .041$ . Planned comparisons revealed that both experimental groups (SGS and FAS) differed significantly ( $p < .05$ ) from the control group on three independent attitude scales: Traffic Flow vs. Rule Obedience, Funriding and Speeding. Both experimental groups expressed attitudes that were more desirable on a traffic safety point of view than the control group did. The control group also differed significantly ( $p = .013$ ) from the SGS group, but not from the FAS group, on a fourth scale: Injury Reflection. Here, participants in the SGS group claimed to think less about possibilities of hurting oneself or others in traffic than did participants in the control group. This was a rather unexpected result, but can probably be explained by the fact that the intervention-interview was rounded off by asking the participant if he had ever thought in terms of hurting someone prior to the interview. Most experimental participants acknowledged that they had not, so an effect of the intervention-interview could have been that it made experimental participants aware they indeed had previously not given much thought to the possibility of injury. Regarding the Subjective Accident Probability scale, no significant differences between conditions were found. No significant differences between the two experimental groups were found on any of the scales either. Table 1 displays means and standard deviations for the three conditions on the five attitude scales.

### 3.3. Effects on attitudes at follow-up

In order to investigate whether the effects of the interventions persisted at follow-up (the mail questionnaire distributed four weeks after the intervention), a one-way between-group multivariate analysis of variance (MANOVA) was performed on the 327 participants who completed the follow-up questionnaire. The same five attitude scales (Speeding, Traffic Flow vs. Rule Obedience, Funriding, Injury Reflection and Subjective Accident Probability) were used as dependent variables. The independent variable was again comprised of the three conditions Control, FAS and SGS. MANOVA assumption checks revealed no serious violations. At follow-up there was no longer a significant difference between the three conditions on the combined attitude variable:  $F(10,624) = .809$ ,  $p = .621$ ; Wilks' Lambda = .975. In order to investigate the possible interaction between time (post-intervention and follow-up) and condition (SGS, FAS and Control), a doubly multivariate analysis of variance was conducted. This analysis indicated a significant interaction between condition and time:  $F(10,612) = 1.90$ ,  $p = .043$ ; Wilks' Lambda = .941. There was also a significant main effect of time:  $F(5,306) = 4.94$ ,  $p < .001$ ; Wilks' Lambda = .925. Separate  $t$ -tests revealed that the control group changed significantly ( $p < .05$ ) over time regarding three of the attitude scales. For two of these scales, Funriding and Traffic Flow vs. Rule Obedience, the change was towards more “ideal”

<sup>2</sup> Here, MANOVA is used to analyze whether the conditions differ along a linear combination of the five attitude scales (the combined attitude variable). The combined attitude variable can be regarded as a new dependent variable, created so as to maximize group differences. MANOVA also protects against Type I error as a result of doing separate ANOVAs on several dependent variables. See Tabachnick and Fidell (2001) for a full description of the varieties of MANOVA used in this study.

**Table 1**

Cronbach's alpha values for the five attitude scales and means and standard deviations for the three conditions post-intervention

Scale	Control group (n = 131)			FAS group (n = 131)		SGS group (n = 91)	
	$\alpha$	M	S.D.	M	S.D.	M	SD
Speeding (5 items)	.86	2.83 <sup>a</sup>	0.94	2.54 <sup>b</sup>	0.94	2.55 <sup>b</sup>	0.94
Traffic flow vs. rule obedience (9)	.84	2.82 <sup>a</sup>	0.69	2.58 <sup>b</sup>	0.73	2.47 <sup>b</sup>	0.75
Funriding (3)	.66	2.79 <sup>a</sup>	0.74	2.51 <sup>b</sup>	0.81	2.43 <sup>b</sup>	0.820
Injury reflection (3)	.76	3.04 <sup>a</sup>	1.04	3.21	0.91	3.33 <sup>b</sup>	0.95
Subj. Acc. Prob (5)	.80	2.64	0.65	2.55	0.72	2.51	0.77

<sup>a,b</sup> Means with different postscripts differ significantly ( $p < .05$ ) from each other. Note that on the injury reflection scale a high score indicates little reflection.

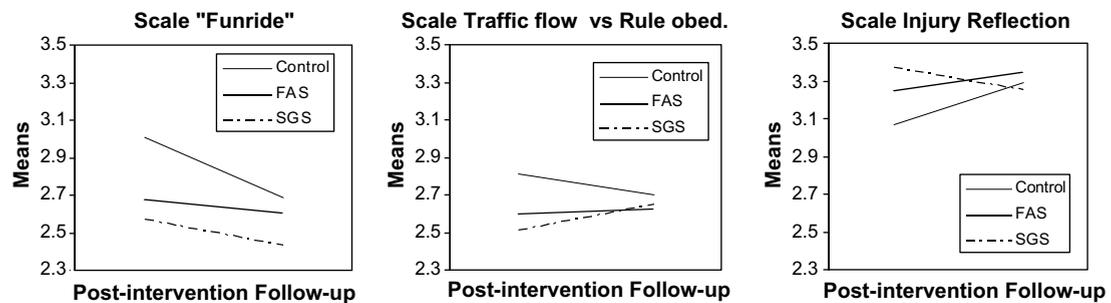


Fig. 2. Means on three attitude scales for the three conditions at post-intervention and at follow-up.

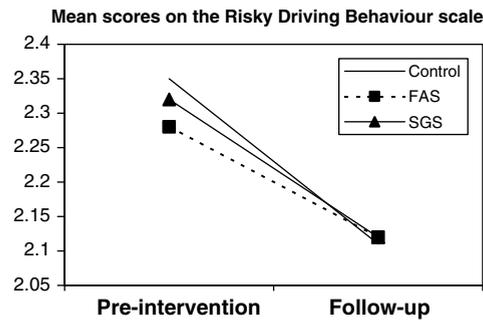
attitudes. For the third scale, Injury Reflection, the change was in the direction of thinking less about the possibility of hurting oneself or someone else in traffic, i.e., approaching the attitudes of the experimental groups. Neither the SGS nor the FAS group showed any significant changes in attitude over time on any of the scales. The diagrams in Fig. 2 show the tendency of the control group to change significantly on the three scales, whereas the experimental groups either remained at the same level or changed non-significantly.

### 3.4. Effects on self-reported risky driving behaviour

In order to test the behavioural effect of the interventions a factorial 2 (time: pre-intervention, follow-up)  $\times$  3 (condition: Control, FAS, SGS) repeated measures ANOVA was conducted. The Risky Driving Behaviour scale, measured pre-intervention (that is, at baseline) and at follow-up, was the dependent variable. There were no significant differences between the three conditions either pre-intervention or at follow-up; nor was there any significant interaction between condition and time. The interventions thus had no effect on self-reported risky driving behaviour, as illustrated in Fig. 3. There was, however, a rather large (partial  $\eta^2 = .18$ ) main effect of time ( $F(1, 316) = 69.77, p < .001$ ). In other words; all three groups reported significantly less risky driving behaviour at follow-up than they did pre-intervention.

We also tested the effect on self-reported risky driving behaviour during the prior four weeks by means of a factorial 2 (time: pre-intervention, follow-up)  $\times$  3 (condition: Control, FAS, SGS) repeated measures ANOVA with the Recent Risky Driving scale as the dependent variable. The results were similar to those mentioned above, with no effect of condition but a significant effect of time ( $F(1, 315) = 42.24, p < .001$ ), but with a somewhat lower effect size, partial  $\eta^2 = .12$ . That is, participants reported significantly less risky driving behaviour during the four weeks prior to answering the follow-up questionnaire compared to the four weeks prior to answering the first questionnaire.

To investigate whether increased driving experience, defined by time in possession of a driver's licence, could account for the effect we selected participants who had had their licence for three months or less ( $n = 86$ ) and participants who had had their licence for twelve months or more ( $n = 94$ ). A factorial 2 (time: post-intervention and follow-up)  $\times$  2 (licence: new or old) repeated measures ANOVA showed significant main effects of time with a licence ( $F(1, 176) = 7.52, p = .007$ ) and of time ( $F(1, 176) = 38.94, p < .001$ ), but no interaction effect. Both groups reported less risky driving behaviour at follow-up, but participants who had had their licence for more than twelve months reported significantly more risky driving behaviour than did those who had had it for three months or less, both pre-intervention and at follow-up. This clearly contradicts the hypothesis that increased experience in driving could explain the decrease in risky driving behaviour at follow-up. To control for possible effects of self-reported accident experiences and amount of driving during the weeks between the first questionnaire and the follow-up, we selected the quartile of respondents whose self-reported risky driving behaviour had changed most negatively (negative change) and the quartile who had changed most positively (positive change). *T* tests revealed no significant differences between these two extreme groups regarding amount of driving or accident experience.



**Fig. 3.** Means of scores on the Risky Driving Behaviour scale at pre-intervention and at follow-up for the experimental and control conditions. High scores indicate risky driving behaviour.

Finally, in order to examine whether there was a change in attitudes corresponding to the change in self-reported risky driving behaviour, a one-way between-group multivariate analysis of variance (MANOVA) was performed. The five attitude scales (Speeding, Traffic Flow vs. Rule Obedience, Funriding, Injury Reflection and Subjective Accident Probability) were used as dependent variables and the independent variable was Change in Self-reported Risky Driving Behaviour (negative change or positive change), with the groups defined as above. There was a significant difference between the two groups on the combined attitude variable:  $F(5, 157) = 2.44, p = .001$ ; Wilks' Lambda = .871; partial  $\eta^2 = .129$ , with the positive change group also showing a change in the direction of more "ideal" attitudes from a traffic safety point of view.

#### 4. Discussion

The aim of the study was to explore whether interventions, based on imagining personal involvement in a serious accident, could lead to a decrease in risk-taking attitudes as well as in risk-taking behaviour among young male drivers. The results show some effects on attitudes from the interventions used; the two experimental groups did show slightly more "ideal" attitudes immediately after the interventions compared to the control group. However, at follow-up some four weeks later attitudes of the control group had changed in a similar direction, while those of the experimental groups remained on approximately the same level as immediately after the intervention.

Over time there was also a rather large change in self-reported driving behaviour among the participants; all three groups, control as well as experimental, reported significantly less risk-taking behaviour at follow-up than they did at baseline, before the intervention-interview.<sup>3</sup> Thus, as was the case for risk-taking attitudes, no specific long-term effect of the interventions could be found.

The remainder of the present discussion will proceed along two different lines. The first line concerns possible reasons why the interventions did not accomplish the hypothesized effects, a more lasting decrease in risk-taking behaviour and risk-taking attitudes. The second line deals with possible interpretations of the finding that all participants, regardless of condition, not only expressed attitudes on approximately the same level as the experimental groups did immediately after the intervention, but also reported less risky traffic behaviour some five weeks after responding to the first questionnaire.

The failure of our intervention to accomplish the hypothesized effects is compatible with previous research findings – it is certainly no easy matter to change the attitudes and behaviour of young men in a safer direction, even through a theoretically and empirically founded intervention like the one we designed (e.g., Harré, Foster, & O'Neill, 2005; Ulleberg, 2001). The difficulty in achieving lasting attitude change on the basis of a single intervention is acknowledged among practitioners and has also been documented (Cook & Flay, 1978), and might be the primary reason behind our somewhat disappointing results. Another explanation could be that the interventions were simply too anxiety-provoking and thus evoked denial rather than changes in beliefs (Witte & Allen, 2000). Yet another reason for the failure of the intervention to accomplish the hypothesized effect could be that it was difficult for many of the participants to truly imagine and visualize personal involvement in a serious accident. This explanation is supported by findings from the study by Falk and Montgomery (2007), in which the ability to imagine accident scenarios varied considerably between participants. Sherman, Cialdini, Schwartzman, and Reynolds (2002) have shown that the effect of imagining hypothetical events is dependent on how easy or difficult it is for a participant to evoke the image. Similarly, Elms (1966) found that fantasy ability was positively related to attitude change resulting from role-play. In the present study, such effects could possibly have been traced if the participants had been asked how credible they experienced the visualized scenario as being, as well as how easy it was for them to imagine that it was actually happening to them, but this was not done. A fourth explanation, that the intervention failed because it evoked reactance, we find very unlikely. According to Brehm (1966), reactance is initiated only when an influence attempt is clearly perceived by the target and is experienced as threatening his freedom of choice. Pre-testing the procedure on psychology students did not

<sup>3</sup> This decline in self-reported risk-taking behaviour has been replicated in a forthcoming study.

give any indications that the intervention was perceived as an influence attempt. The research assistants' personal experiences of participants' reactions and comments during the intervention–interviews did not point in any such direction either.

The failure of the intervention to bring about lasting effects can also be related to research on effects of involvement in an actual traffic accident. Both McKenna and Albery (2001) and Rajalin and Summala (1997) found that a large majority of drivers returned to their previous driving style some time after the accident, and it could be that the effects of our intervention followed the same pattern. But as Rajalin and Summala (1997) also found that drivers who attributed a fatal accident to their own driving reported having changed their driving style permanently, we tried to design the intervention to imply that the imagined accident was caused by the driver/participant. Despite this, it does not seem that the suggestion of McKenna and Albery (2001) – that living through negative experiences “second hand” could be used as a means to increase protective behaviour – is a viable strategy.

We will now consider our other finding: the fact that at follow-up all three groups, control as well as experimental, showed a fairly uniform pattern in their responses. That is, when compared to the initial attitudes of the control group and to the self-reported behaviour of all groups at baseline, all three groups at follow-up reported behaviour as well as attitudes indicative of less risk-taking. In the following we will discuss the possibility that there is a common mechanism behind this pattern of results.

It should be noted that the short-term effects on risk-taking attitudes in the experimental groups are excluded from this discussion. It seems plausible that these effects result from reflective processes elicited by the experimental interventions. It cannot be excluded, however, that the attitudes of the experimental groups at follow-up to an unknown extent also reflect elaborative processes brought forward by the experimental interventions. On the other hand, the fact that the attitudes (as well as the self-reported behaviour) of all three groups were on approximately the same level at follow-up makes it probable that there should be a common mechanism behind this result.

There are naturally habitual explanations for the changes in participants' attitudes and behaviour at follow-up, such as social desirability or response bias. But there is also an alternative interpretation: That the drop resulted from what has recently been called the “question-behaviour effect” (Spratt et al., 2006), that is, that questioning people about a behaviour influences their subsequent performance of the behaviour. One theoretical underpinning of this effect is that answering a question raises the accessibility of attitudes related to the question, and this in turn may result in behavioural change (Morwitz & Fitzsimons, 2004). That the accessibility of attitudes is important for the attitude-behaviour link has been pointed out by Fazio and Roskos-Ewoldsen (2005). It has also been shown that highly accessible attitudes exert a stronger influence on behaviour (Erber, Hodges, & Wilson, 1995). Most of the scant studies that touch on the field of imagining as a tool for persuasion have also used rather “minimal” interventions. An example is the study by Richard et al. (1996) who simply asked their participants to indicate, by selecting ten affect terms from a list of 40, what their feelings would be after having had unprotected sex with a stranger. Through this simple manoeuvre they managed to obtain changes in both attitudes and behaviour five months afterward. Could it be that items in our questionnaire served as “mind-openers” and initiated an elaborative process that made attitudes related to personal driving style, traffic accidents and risky driving more accessible than they previously were? Such an explanation could account for the finding that the attitudes had changed in the control group but were unchanged in the experimental groups at follow-up. It is also in line with the finding that participants reporting the most “positive” change in driving behaviour also showed a change in the direction of more “ideal” attitudes from a traffic safety point of view. Spontaneous comments in the questionnaires also indicate that such an elaborative process could have occurred among at least some of our participants: “It's good that you do things like this! It makes one think of what actually might happen.”; “I discovered there's a certain distance between what I believe and how I act.” Further studies are needed, however, to illuminate whether such elaborative processes regarding personal driving behaviour and attitudes could explain the improvement in self-reported risky driving, as well as the type of questions that could be used as stimuli for elaboration.

Major strengths and weaknesses of the present study deserve discussion. A major weakness is the use of self-reports to measure risky driving. However, the task of observing real-life driving habits of our respondents was not conceivable, due to the number of participants in the study. Register studies of accident involvement, on the other hand, would have required a much larger sample in order to reach a desirable level of statistical power. Thus none of these options was feasible, due to the enormous associated costs. Also, previous studies (e.g., Hatakka, 1998; Lajunen & Summala, 2003; West, French, Kemp, & Elander, 1993) indicate that self-reports of driving constitute reasonably valid measures, and this should be weighed against the cost of the other methods mentioned. A major strength of the study, on the other hand, is that it involved a fairly representative sample of young male drivers and not only students. In Sweden at the time of data collection, some 90–95% of young men underwent the enrolment procedure, and we have good reason to believe that on any particular day of fieldwork most enlistees with a driver's licence volunteered for the study. To secure this statistically was not possible, though, as we did not have access to classified information regarding individual enlistees.

In conclusion the present study unfortunately does not offer any unequivocal directions for how interventions aimed at increasing reflection and imagination in the context of traffic safety should be designed. However, one of its results (the decrease in self-reported risky driving) does indicate that such methods present a potential for reducing risky driving. Interventions that unobtrusively stimulate people to elaborate on, and anticipate, negative consequences of their risky driving behaviour need to be explored further as a means to increase traffic safety. The need for such research is supported by Crawford, McConnell, Lewis, and Sherman (2002) who found that people do not automatically consider future regret in advance of their decisions and actions today. The potential of questions as a starting mechanism for elaborative processes and subsequent changes in driving behaviour – the so-called question-behaviour effect – especially deserves to be investigated.

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