



Negative or positive? The effect of emotion and mood on risky driving

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ABSTRACT

This research explored how two states of affect, emotion and mood, would influence driver's risky driving behavior through risk perception and risk attitude. An experiment and a survey were adopted to test the two paths. In this model, negative affect played an opposite and more powerful role compared to positive affect. Study 1 was an experimental study with four treatment groups. Participants watched one of four video clips (traffic-related negative, traffic-unrelated negative, positive and neutral) and different emotions were induced. Negative emotion significantly elevated drivers' risk perception but such perception failed to develop an appropriate attitude for drivers. A more favorable risk attitude resulted in increased reports of speeding. Turning from a "point" effect to a similar "period" effect, a survey was carried out in Study 2 to explore the effect of positive and negative mood instead of emotion. Mood states affected drivers' risky driving behavior through risk perception as well as risk attitude, which was in line with the results of Study 1. The "bad is stronger than good" effect and the two paths in the model were discussed.

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1. Introduction

With the growth of motor vehicle use in China, the amount of casualty and property loss is ever increasing. According to the annual statistical report of road traffic accidents in China, the number of traffic accidents, fatality, and injury have been declined since 2002–2011, with the number of recorded accidents reduced from 773.1 thousand in 2002 to 210.8 thousand in 2011, the number of fatality decreased from 109.4 thousand to 62.4 thousand. However, as the data revealed, the number of fatality and injury per accident was increasing. The traffic accident is still one of the main causes of people's deaths or disabilities (Bureau of Traffic Management, PRC, 2007, 2011). World Health Organization (2011) reported that traffic accident was one of the top 10 causes of death in middle-income countries in 2008. The traffic safety has also becoming a global issue of common concern. Hence, great concern and effort need to be put on road safety in China.

1.1. Positive and negative emotion

Among many factors that cause traffic accidents, human factor plays a more important role beyond other factors such as vehicle, road, etc. (Rumar, 1990; United States General Accounting Office, 2003; Wang, 1995). As a critical part of human being, emotion cannot be ignored when we are trying to reveal the nature of risky driving. Most work in this area was oriented towards road rage or aggressive driving in which emotion and behavior were intertwined (e.g., Dula & Ballard, 2003; Dula & Geller, 2003). An important work done by Mesken, Hagenzieker, Rothengatter, and de Waard (2007) revealed that specific emotions (i.e. anger, anxiety, and happiness) had different correlations to road events and speeding. However, there

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were some results in this study showing a closer relationship between the two negative emotions (Mesken et al., 2007). This was possible because the emotion or feeling people experience in daily life was usually complicated and mixed rather than specific. Embodied in a hurry city life, people could bring emotions, of any kind, and of any source, on road. There are often times (e.g., driving attentively in a busy traffic) when a person could hardly tell what the exact emotion he or she is expe-

Clore and Schnall (2005) argued that the affective influence on attitude comes from the key common ground that both affect and attitude are evaluative. Emotions serve as a cue in the evaluating process (Cohen et al., 2007). Positive (pleasant) and negative (unpleasant) emotion would lead to good or bad evaluation of an object. A study revealed that people did not accept genetically modified food because of the anxiety and fear about unknown events and dangers (Townsend, 2006). Thus emotion would affect people’s attitude toward risky driving through a mood-congruent manner. We predicted that people with positive emotion would consider faster or riskier driving as more favorable than people with negative emotion. This logic is similar and consistent with risk perception while driving. In the transportation field, researchers have tried to reduce people’s favorable attitude towards some high-risk driving behavior through the use of emotion and shock advertising campaigns (Guria & Leung, 2004).

As mentioned above, emotions would affect people’s tendencies toward approaching or avoiding things, both cognitively and behaviorally. People with positive emotion would be more tempted towards risky driving than with negative emotion. This direct path could exist because the effect of emotion on behavior is sometimes automatic (Strongman, 2003) and thus beyond the cognitive control. In addition, risky driving behavior was influenced by two cognitive antecedents, which are driving risk perception and driving risk attitude. Thus we predicted that positive emotion would increase the risky driving behavior through either lowered risk perception or heightened risk attitude and that negative emotion would have the reverse effect.

In summary as showed in Fig. 1, emotion would affect individual’s driving risk perception (a1), driving risk attitude (a2) and risky driving behavior (b) through direct paths, and the influence on risky driving behavior would also be through two cognitive indirect path (c1 and c2). Positive and negative emotion would exert an opposite effect, with positive emotion reducing driving risk perception and raising driving risk attitude and risky driving behavior, while negative emotion vice versa.

1.4. Current study

In the current study, we focused mainly on the effect of incidental affect, which was usually resulted from the situation of judgment and decision-making. Mood and emotion are both considered as two different kinds of affective states. Through content analysis, Beedie, Terry, and Lane (2005) offered some major points in discriminating the two states. Emotion arises with clear reasons or causes while mood is only a kind of general affective background. Furthermore, the duration of emotion is usually short and the whole process of an emotion from arising to fading could be easily traced. Mood is a tender and long-term state. These two kinds of states reflect two perspectives for discussing the effect of emotion and it was necessary to test the hypothesized model from these two perspectives. Actually, we could abstract the effects of the two states as a “point” effect for emotion vs. a “period” effect for mood.

Thus we conducted two studies with corresponding methods to verify the proposed model. In Study 1, the emotion induction was employed to examine the “point” effect of positive and negative emotion on risk perception and risk attitude. It is predicted that, in line with the cognitive theory, compared with the control group, the positive-emotion group should have a lower risk perception and a more favorable risk attitude, resulting in a more risky driving behavior, while the negative-emotion group should show opposite effects. While Study 1 was a lab study with strict experimental control, a survey was conducted to explore the relationships among mood, driving risk perception, driving risk attitude, and risky driving behavior during a period of time. It is hypothesized that the proposed model in Fig. 1 would be verified both from these two perspectives.

2. Study 1

In Study 1 we used video clips to induce emotion (Forgas & Moylan, 1987; Yuen & Lee, 2003). Three traffic-unrelated video clips were used to induce positive, negative, and neutral emotion. Moreover, since advertisements with traffic accidents were widely used in traffic safety education, two negative-emotion groups were adopted, induced by a traffic-unrelated and a traffic-related video respectively. We expected that these two negative emotion groups would display similar effect on driver’s risk perception, risk attitude and risky driving behavior.

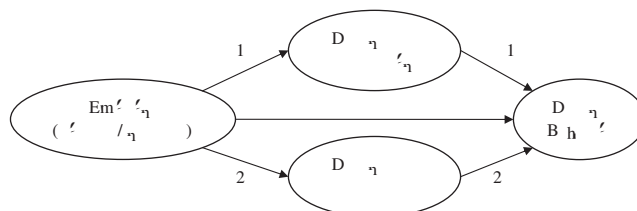


Fig. 1. A basic model of the study.

2.1.3.4. Risky driving behavior. After seeing the video clip, the participants were showed three pictures of the road on TV after the video clips and were asked to report the speed they would like to drive on these three kinds of roads. The participants were told that there was no speed limit in these roads and were asked to report a speed as they wish to drive on each road (see Fig. 2 for an example of the pictures.).

2.1.4. Procedure

Participants took the experiments in groups, which consist of about 25 participants in each group. Participants were asked to sit in a classroom and take the pre-test of emotion first. Then the video clip was played to induce emotion. Soon after that, participants were asked to take the post-test of emotion and the measure of driving risk perception, driving risk attitude, and risky driving behavior. For the two negative emotion groups, the video clip for positive emotion induction was played at the end of the experiments to relieve the participants' negative emotion.

2.2. Result

2.2.1. Emotion induction

Repeated measures showed that the interaction between groups and induction was significant ($F(3, 211) = 51.26, p < .001, \eta^2$

that driving risk perception positively affected driving risk attitude only in the two negative emotion groups (for traffic-related negative group, $t(69) = 1.941$, $p = .056$, $\eta^2 = .05$; for traffic-unrelated negative group, $t(54) = 2.270$, $p = .027$, $\eta^2 = .09$) (see Fig. 5).

Emotion failed to exert effect on participants' self-reports of speed. However, regression analysis revealed a significant effect of risk attitude on reported speed, after the demographic variables were controlled in the first step (see Table 1).

2.3. Discussion

The three traffic-unrelated groups differ at the worry sub-scale of risk perception. Participants in the negative group were more worried about getting involved in a traffic accident than those in the control group and the positive emotion group. This partly supported our hypothesis for negative emotion exerted more influence than positive emotion. Furthermore, emotion moderated the effect of driving risk perception on driving risk attitude. When in negative emotion, individual's high risk

3.1. Method

3.1.1. Sample

With the help of four motor vehicle offices in Beijing, surveys were delivered to 700 drivers, with 570 returned (81.4%) and 500 valid (71.4%). In the remaining 500-driver sample, 430 (86.0%) were male and 61 (12.2%) were female. Nine drivers (1.8%) did not indicate their gender. The average age of the drivers were 37.86 (± 9.85) years old, ranging from 20 to 73 years old. Among the 500 drivers, 74 had driven for less than 2 years, while 186 drivers had an experience of driving over 10 years. As for the profession, 191 (38.2%) of all the participants were professional drivers.

3.1.2. Measures

3.1.2.1. Mood. Participants' moods in the recent two weeks were measured by the Profile of Mood States (POMS) (Chinese version) (Zhu, 1995). This scale consists of six subscales, with 65 items including seven distracters that were not used in this study. Participants rated 58 items in all on 5-point scales (1 – “not at all”, 5 – “quite a lot”). Exploratory factors analysis with principal axis factoring and promax rotation revealed three factors and 28 items remained. The three factors named as “dejection”, “anger”, and “vigor”, with the Cronbach's α s .94, .86, .82, respectively, explained 51.76% of the variance in all. The factor scores were used in data analysis.

3.1.2.2. Driving risk perception and driving risk attitude. Identical with Study 1.

3.1.2.3. Driving behavior. Participants' driving behavior in the recent one month was measured by the revised Driving Behavior Questionnaire (DBQ) (developed by Reason, Manstead, Stradling, Baxter, and Campbell (1990); translated and validated by Zhuang, Bai, and Xie (2008)). This 21-item scale consists of four factors (dangerous mistake, non-specific violation, harmless mistake, and aggressive violation).

3.1.3. Procedure

Participants were asked to answer the paper survey containing the measures listed above.

3.2. Result and discussion

The correlation matrix of the variables was showed in Table 2. The two negative mood states were significantly related to nearly all variables under examination, while vigor, the positive component of mood, did not relate to any except one variable. Regression analysis found that mood remained a significant predictor on drivers' behavior, after controlling for the idiographic variables (see Table 3). In detail, dejection and anger were significant predictors, showing that worse moods were related to more dangerous driving behavior. Dejection was also a significant positive predictor of attitude toward risky driving (see Table 4). The mediation effect of driving risk attitude and driving behavior was then tested according to Baron286

Table 3
Regression analysis on risky driving behavior (Study 2).

Independent variables	Step 1 Standardized coefficients (β)	Step 2 Standardized coefficients (β)
Age	-.063	.000
Gender	.020	-.005
Driving age	-.111*	-.059
Profession	.164**	.118**
Mood-dejection		.448**
Mood-anger		.163*
Mood-vigor		.015
F	6.230**	68.877**
Adjusted R square	.050	.374

* p < .05.

** p < .01.

Table 4
Regression analysis on driving risk attitude (Study 2).

Independent variables	Step 1 Standardized coefficients (β)	Step 2 Standardized coefficients (β)
Age	-.059	-.033
Gender	.100	.090
Driving age	.028	.051
Profession	.127*	.110*
Mood-dejection		.218*
Mood-anger		.037
Mood-vigor		.001
F	2.135	8.355**
Adjusted R square	.011	.064

* p < .05.

** p < .01.

Table 5
Mediation analysis with risky driving behavior as dependent variable (Study 2).

Secondly, the coefficient between mood and risk perception was negative, which meant that more negative moods would lead to higher risk perception. This was also similar to the results in Study 1. The perception of traffic risk may be shadowed by the cognitive nature of affective state. An odd result in the final model was that risk perception was positively related to risky driving behavior. It seemed unreasonable that those who were aware of the danger would still approach it. The reason behind that may be that Study 2 was a cross-sectional design and causal relationship could hardly be determined. People may first remember the dangerous behavior in driving and then raise the perception of traffic risk.

4. General discussion

Through two different kinds of methods, we tried to give a comprehensive picture about how two affective states (emotion and mood) influence drivers' traffic-related cognition and behavior. In Study 1, we found that drivers with negative

emotion showed a raised perception of traffic risk compared with those with positive emotion or neutral emotion. However,

relationship, however, was insufficiently proved in Study 2. Longitudinal research is needed to offer more solid conclusions about these results and the two pathways (instant and long-term) of the effect of emotion could be tested. Another limitation is that the emotion was induced in lab-setting. The effect of emotion might fade in a short period of time, which prevented us

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