

Relationship between Traffic Violations and Risk-taking in Daily Life

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The aim of this paper was to test the relationship between traffic violations and risk-taking behavior in the context of the following aspects of daily life: traffic, financial, health, and so on. Two studies were conducted for this paper. In Study 1, 112 drivers reported their traffic violation experiences during the past 3 years and rated their tendency to take risks in daily life. In Study 2, we tested the relationship between risk-taking and traffic violation measured by objective reports of traffic violations. Three hundred and fifty-six bus drivers were evaluated regarding their engagement in non-occupational traffic violations after measuring their tendency to take risks. Results of both studies showed that traffic violations were predicted particularly well by the tendency to engage in risk-taking according to time and circumstance. Based on the findings of the relationship between violations and risk-taking, the prevention for accidents is discussed.

key words: risk-taking, violation, traffic

Introduction

Current status of transportation in Japan

In Japan, approximately ten million traffic violations occur every year (National Police Agency, 2015). The greatest number consisted of speeding (18.9%), followed by illegal parking (15.7%), and not wearing a seat belt (13.1%). However, the actual numbers of these violations must be greater, since the above figures depend on the violations that the National Police Agency records. Traffic violations include the possibility of penalty by breaking traffic rules but also the greater risk for traffic accidents. Previous studies have given some empirical support to the relationship between accidents and traffic violations (e.g., Parker, Reason, Manstead, & Stradling, 1995; Iversen & Rundmo, 2002). Therefore, in order to decrease traffic accidents, prevention of traffic violations should be considered.

The mechanism of violation and its relationship with risk-taking

Violation is defined as a behavior that involves deliberate deviation from the written rules (Lawton, 1998). According to Haga (2000), not knowing and understanding the rule or failing to comply with the rule are some of the reasons for breaking rules. However, rules have little effect encouraging people

to refrain from engaging in violations, especially with regards to safety rules (Lawton, 1998). Instead, the benefits of breaking rules have been suggested to influence violations (e.g., Dhimi, 2012; McKenna & Horswill, 2006). This coincides with the mechanism of risk-taking, which has been considered to involve risky behaviors as well as violations. Risk-taking is defined as risky behavior involving the implementation of options that could lead to negative consequences (Byrnes, Miller, & Schafer, 1999), regardless of the rules. Psychological factors such as perceived benefit and risk, which are one's subjective evaluations of reward or danger in taking risks, have been suggested to strongly influence risk-taking (e.g., Soane, Dewberry, & Narendran, 2010; Renge, 2000). Thus, risk-taking is a conceptually related violation behavior (Haga, 2007). Numerous previous studies about violations have focused on the mechanism of risk-taking (Moriizumi & Usui, 2012a), while not all kinds of risk-taking are necessarily related to violation (Haga, 2007). A person who takes risks in one situation (e.g., traffic) tends to do so in other situations (e.g., finance) (Moriizumi & Usui, 2012b; Weber, Blais, & Betz, 2002; Haga, Akatsuka, Kusakami, & Kon-no, 1994), since cognitions of gain and loss in taking risks are not situation-specific (Moriizumi & Usui, 2012b). Thus, even though risk-taking in

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other areas, such as gambling, has been suggested not to be related to traffic violations (Haga, 2007), the tendency to engage in such risk-taking may increase the tendency to violate traffic regulations. Few previous studies, however, have examined the relationship between traffic violations and several kinds of risk-taking in daily life. Establishing this relationship can lead to further theoretical understanding for prevention of traffic violations and accidents. For example, the mechanism of risk-taking in daily life could explain the occurrence of traffic accidents, due to the significant relationship between traffic violations and accidents (e.g., Parker et al., 1995; Iversen & Rundmo, 2002). Therefore, this paper focused on the relationship between traffic violations and everyday risk-taking in several domains, not only in traffic but also in health, finance, and so on.

Tendency to engage in risk in daily life

Although several scales that measure the tendency to take risks in daily life have been developed, not only in foreign countries (e.g., Weber et al., 2002; Reason, Manstead, Stradling, Baxter, & Campbell, 1990) but also in Japan (e.g., Oshio, 2001; Kusumi, 1994), each scale has critical problems, such as poor construct validity or general versatility (Moriizumi, Usui, & Nakai, 2010). Thus, Moriizumi et al. (2010) conducted a questionnaire survey with 374 participants from various backgrounds and developed the Risk Propensity Questionnaire (RPQ), which contains items related to risk-taking in daily life in Japan. The RPQ categorizes the tendency to take risks into the following four factors: Gambling behavior, Risk-taking according to time and circumstance, Risk-taking with individual values, and Risk-avoiding (constructed by reversed items). The higher the score for Gambling behavior, the more positive one's feelings are toward gambling and the more likely one is to engage in risk-taking gambling behavior. The higher the score for Risk-taking according to time and circumstance, the higher one's tendency to take risks according to the benefit or the cost of avoiding risks in a particular situation (e.g., illegally crossing an intersection against a red light when no cars are coming). The higher the score for Risk-taking with individual values, the higher one's tendency to take risks according to his/her personality, values, and beliefs, even if the risks are highly perceived. The higher the score for Risk-avoiding, the lower one's tendency to take risks without pay-

ing attention to safety and security. Risk-taking in daily life, including traffic, finance, health, and so on, therefore, can be categorized into these four factors.

Each factor has been suggested to have adequate reliability and validity as a measure of the tendency to take risks in daily life, both in terms of the relationships with other risk-taking scales (Moriizumi et al., 2010) and actual risk-taking as measured experimentally (Moriizumi & Usui, 2011). Furthermore, scores for Risk-taking according to time and circumstance correlated positively with traffic accident involvement (Moriizumi, Usui, & Nakai, 2012). As for violations, Moriizumi & Usui (2012b) tested the relationship between scores for the RPQ factors and the frequency of procedural violations (e.g., omitting the bounden save of data on the PC) in their experiment. Results showed that the score for Risk-taking according to time and circumstance was significantly related to frequently engaging in procedural violations; while the violation of manners, such as an unexcused absence from the experiment, was also significantly related to scores for Risk-taking with individual values. This means that the relationship between RPQ scores and risk-taking may depend on the types of violations. Although Yahashi & Taniguchi (2000) suggested that traffic violations are related to daily life behaviors, the underlying mechanism has not yet been made clear.

Aim of this paper

The aim of the current studies, therefore, was to test the relationship between traffic violations and risk-taking in daily life, as measured by the RPQ. As for traffic violations, we examined the relationship with risk-taking by means of a self-reported scale (Study 1), while objective reports of traffic violations were used in Study 2. Based on the findings, effective interventions for preventing traffic violations are discussed, and theoretical suggestions about the relationship between traffic violations and risk-taking are made.

Study 1

Method

Participants Questionnaire surveys were completed by 112 drivers (95 males and 17 females). All participants worked as public employees. Their mean age was 40.78 years ($SD=14.41$). Frequency of participants' driving was categorized into "nearly

every day" (28.6%), "3 or 4 times weekly" (8.9%), "1 or 2 times weekly" (23.2%), "1 or 2 times monthly" (8.9%), and "less often" (30.4%). Six drivers (5.3%) had experienced traffic accidents in the last 3 years.

Experience of traffic violation Participants were asked about whether or not they had been ticketed for traffic violations in the past 3 years and, if so, what the details of the event were.

Risk-taking in daily life To examine risk-taking in daily life, the RPQ (Moriizumi, Usui, & Nakai, 2010; Moriizumi & Usui, 2011) was used in this study. As described above, this scale categorizes the tendency to take risks in daily life into the factors of Gambling behavior (five items), Risk-taking according to time and circumstance (seven items), Risk-taking with individual values (three items), and Risk-avoiding (three items). Examples of RPQ items are: "I enjoy gambling" and "I can't enjoy anything without gambling" (Gambling behavior), "To ignore a red light as a pedestrian if cars are not coming" and "To cross a street without a traffic signal as a pedestrian" (Risk-taking according to time and circumstance), "To break important promises" and "To play sick frequently" (Risk-taking with individual values), and "To check carefully before leaving, to prevent fire or theft" and "To lock the door when leaving" (Risk-avoiding). All items are evaluated on a 5-point scale (1=totally disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=totally agree).

Procedure The questionnaire survey period lasted from March to August 2010. All participants voluntarily took part in this study under conditions of anonymity. Questionnaires of some participants (33.9%) were distributed and collected on site during lectures about safety and health. Others (66.1%) were collected by mail-in survey. The collection rate of the distributed questionnaires was 100%. The

questionnaire took approximately 10 min to complete. All procedures were approved by the Ethical Committee of Behavioral Sciences at the Graduate School of Human Sciences of Osaka University.

Statistical analysis Score averages for the RPQ items were computed for each factor after some items were reverse coded. Thus, the higher these scores, the more risks participants took in daily life. Whether or not participants had been ticketed for traffic violations in the past 3 years was the indicator of traffic violations. Thus, a *t* test was conducted with traffic violations as the independent variable and RPQ scores as the dependent variable.

Results

Of the 112 participants, four had missing data about their experiences of violations or the rating of items. Thus, data from 108 participants were analyzed in this study. Significant correlation coefficients for risk factors of the RPQ ranged from $r=.20$ (Gambling behavior and Risk-taking according to time and circumstance, $p<.05$) to $r=.21$ (Risk-taking according to time and circumstance and Risk-avoiding, $p<.05$). Table 1 indicates the mean score and standard deviation for each factor of the RPQ and whether participants had been ticketed for traffic violations. There were 21 drivers who had experienced violations (19.4%). In order to examine the relationship between traffic violation and tendency to take risks in daily life, a *t* test was conducted. Results showed that drivers who had experienced traffic violations, compared to those who had not, had significantly higher scores for the RPQ factor of Risk-taking according to time and circumstance ($t(106)=2.68, p<.01, d=0.71$), in addition to not engaging in risk avoiding ($t(106)=2.81, p<.01, d=0.65$). As for the scores of Gambling behavior and Risk-taking with individual values, there were no significant differences between those with ($t(106)=1.79, p=.07, d=0.43$) and without ($t(106)=.40,$

Table 1 Average scores for RPQ factors of participants with and without experience of traffic violations

Risk factors	Experience of traffic violations in the past 3 years		<i>t</i> test	Cohen's <i>d</i>
	With (19.4%)	Without (80.6%)		
Gambling behavior ($\alpha=.82$)	2.79 (0.89)	2.41 (0.86)	<i>n.s.</i>	0.43
Risk-taking according to time and circumstance ($\alpha=.65$)	3.13 (0.57)	2.67 (0.72)	**	0.71
Risk-taking with individual values ($\alpha=.47$)	2.01 (0.51)	2.05 (0.48)	<i>n.s.</i>	0.10
Risk-avoiding ($\alpha=.60$)	2.54 (0.99)	1.95 (0.84)	**	0.65

Note 1. The higher the scores for the four factors, the more risky participants' behavior. ** $p<.01$.

$p = .69, d = 0.10$) traffic violation experience.

Discussion

The aim of Study 1 was to test the relationship between the experience of traffic violations in the past 3 years and risk-taking in daily life in terms of traffic, financial, health, and so on. Results showed that previous traffic violations were significantly related to the tendency to engage in risk-taking in daily life, such as risk-taking according to time and circumstance and risk avoiding (health-related behavior), as measured by the RPQ (Moriizumi et al., 2010). Self-reports of traffic violations, however, have been suggested to be influenced by reporting or recall biases (Mallia, Lazuras, Violani, & Lucidi, 2015). Therefore, in Study 2, the relationship between traffic violations based on objective violation reports and the tendency to take risks in daily life was re-tested for commercial drivers whose violations had been recorded by the company they work for. In addition, there may be an objection to our findings that participants who experienced traffic violation evaluated the items of the RPQ more highly because of their experiences. The methodology of Study 1 cannot preclude this possibility. Thus, in Study 2, the engagement in future traffic violations after measuring participants' tendency to engage in risk-taking in daily life was used as the indicator.

Study 2

Aim

The aim of Study 2 was to re-examine the relationship between engaging in traffic violations and risk-taking in daily life found in Study 1. In the second study, the survey was conducted with occupational drivers to address the limitation of Study 1.

Method

Participants Participants were 356 bus drivers (354 males and 2 females) who worked for a particular company (the A Company) in Japan. Their average age was 42.65 years ($SD = 8.65$). Their mean length of service was 9.28 years ($SD = 8.41$). Ninety-eight drivers (27.5%) had experienced traffic accidents during the period of Study 2 (2 years).

Risk-taking in daily life The RPQ (Moriizumi et al., 2010) was used to measure the tendency to engage in risk-taking in daily life in this study, as it was done in Study 1.

Experience of traffic violation The A Company is a major bus company in Japan that has 18 busi-

ness offices, 786 buses, and 1,174 bus drivers. Employees in this company must report traffic violations for which they were ticketed even if the violation occurred outside of their work hours. Penalty points received for violations may lead to the driver's license being suspended or revoked; thus, drivers are truthful in reporting traffic violations they have experienced. For this study, 261 objective traffic violation reports from June 2010 to May 2013 were provided by the A Company that were used for measuring participants' traffic violations after they had completed the RPQ. In this study, types of violations (e.g., speeding, ignoring red lights, using a cell phone while driving) were used as the indicators of participants' traffic violations among the various pieces of information included in the violation report. Of the 261 reports, 222 drivers had been ticketed for traffic violations. The mean number of violations per driver was 1.18 ($SD = 0.45$). The most common violation reported by drivers was speeding (32.6%). Of the 261 reports, 238 non-occupational and 23 occupational violations were reported, mainly in the form of traffic accidents. Therefore, 238 non-occupational violation reports were used for the analysis.

Procedure A questionnaire survey was conducted from June 2010 to May 2013 during scheduled training for safe driving in the office where the participants worked. The questionnaire took approximately 5 min to complete, and was distributed and collected on site. Participants did not need to personalize the questionnaire and were instructed about protection of their anonymity. With regards to traffic violations, the first and third authors of this paper created a database of the paper-based traffic violation reports that had been recorded only for the company's internal use. After inputting the data, traffic violations during the 2 years after responding to the RPQ were calculated by cross-checking the date and year of employment in the report with those shown on the questionnaires. All procedures were approved by the Ethical Committee of Behavioral Sciences at the Graduate School of Human Sciences of Osaka University, and by the safety management committee of the A Company.

Statistical analysis The processing and analysis of data were based on the method of Study 1 in order to test the relationship between traffic violation and tendency to take risks in daily life.

Table 2 Average scores for RPQ factors of participants with and without experience of traffic violation

Risk factors	Traffic violations during 2 years after measuring the RPQ		<i>t</i> test	Cohen's <i>d</i>
	With (7.3%)	Without (92.6%)		
Gambling behavior ($\alpha = .79$)	2.35 (0.88)	2.49 (0.89)	<i>n.s.</i>	0.16
Risk-taking according to time and circumstance ($\alpha = .71$)	2.66 (0.87)	2.29 (0.71)	*	0.47
Risk-taking with individual values ($\alpha = .62$)	1.24 (0.46)	1.35 (0.57)	<i>n.s.</i>	0.21
Risk-avoiding ($\alpha = .46$)	1.85 (0.77)	1.88 (0.79)	<i>n.s.</i>	0.04

Note 1. The higher the scores for the four factors, the more risky the participants' behavior. * $p < .05$

Results

Twelve drivers had missing data about their traffic violations or the rating of items. Thus, data from 344 participants were analyzed. Significant correlation coefficients between risk factors of the RPQ ranged from $r = .13$ (Risk-taking according to time and circumstance and Risk-avoiding, $p < .05$) to $r = .24$ (Risk-taking according to time and circumstance and Risk-taking with individual values, $p < .001$). Of all participants, 25 (7.3%) had been ticketed for traffic violations within the 2 years after completing the RPQ as an indicator of their tendency to take risks in daily life. Twenty-one drivers had experienced only one traffic violation, while four had experienced two. Table 2 shows the mean score and standard deviation for each factor in the RPQ and whether or not the participants had been ticketed for traffic violations. An independent samples *t* test revealed that only the factor of Risk-taking according to time and circumstance showed a significant difference between the scores of drivers with and without traffic violation in the 2 years after responding to the RPQ ($t(342) = 2.43$, $p < .05$, $d = 0.47$). With respect to Gambling behavior ($t(342) = -0.75$, $p = .45$), Risk-taking with individual values ($t(342) = -0.90$, $p = .37$), and Risk-avoiding ($t(342) = -0.16$, $p = .88$), the *t* tests did not show significant differences.

Discussion

The results of Study 2 indicated that risk-taking in daily life, especially risk-taking according to time and circumstance, was related to having committed a traffic violation after completing the RPQ, which supports the results of Study 1 and previous studies (Moriizumi & Usui, 2012a). This suggests that the relationship between traffic violations and risk-taking according to time and circumstance is robust. In the light of the relationship between traffic violations and accidents (e.g., Parker et al., 1995; Iversen

& Rundmo, 2002), a decrease in traffic accidents, not just traffic violations, could also be expected after completing safety education focused on the tendency to engage in risk-taking in daily life, especially risk-taking according to time and circumstance. However, the relationship between traffic violations and risk avoiding as shown in Study 1 was not replicated. In the following section, the relationship between traffic violations and risk-taking in daily life is theoretically discussed with respect to the findings of this paper.

General discussion

The findings of the two studies in this paper consistently indicated that engagement in risk-taking according to time and circumstance in daily life predicted traffic violations. It may be argued that this suggestion is not relevant since the risk factor was constructed by items related to traffic behaviors (e.g., to ignore a red light as a pedestrian if cars are not coming, to send E-mail by cell phone while walking) derived from the RPQ (Risk-taking according to time and circumstance). However, Moriizumi & Usui (2012a) examined the relationship between the RPQ factors and violation of procedure unrelated to traffic behavior in an experimental context, and showed that this factor (Risk-taking according to time and circumstance) was significantly related to the violation, similar to the current study. In addition, the same factor was related to individual (e.g., smoking) and social (e.g., arriving late for class or a waiting time) risk-taking measured by other questionnaires (Moriizumi et al., 2010). Thus, it seems reasonable to state that traffic violations can be predicted by risk-taking according to time and circumstance.

The Gambling behavior and Risk-taking with individual values factors of the RPQ were not related to traffic violations. These factors have been suggest-

ed to be individual values and connected to personality, and thus represent constant traits of the individual (Moriizumi & Usui, 2012a). Thus, such stable factors may have little effect on traffic violations. This is also supported by the Crime Opportunity Theory (Clarke, 2012), which emphasizes the importance of opportunity when criminals perpetrate crimes rather than their personality. Although the interaction between personality and situation should be considered, situational factors of violations (e.g., perceived risk, perceived benefit) need to be focused on to decrease traffic violations.

The results of the Risk-avoiding factor of the RPQ differed between the two studies. The relationship with traffic violation was only shown in Study 1. This factor consisted of items related to risk-avoiding behaviors, such as crime prevention and safety behaviors, so it is not surprising that this factor was consistently related to traffic violation in this study. However, the reliability of the factor in Study 2 was low ($\alpha = .46$), as was the case in the study of Moriizumi and Usui (2012a). Therefore, the nature of the relationship between this factor and traffic violation experiences cannot be determined solely from these findings.

The discordant findings between Study 1 and Study 2 could have been due to the differences in demographic variables, such as whether participants were normal drivers (Study 1) or bus drivers (Study 2). As shown in Table 1 and Table 2, the scores of the RPQ factors in Study 2 were overall lower than those in Study 1. Additionally, the surveys in this paper were conducted during the lectures about safety and health (Study 1) and training for safe driving in the office (Study 2). Therefore, further study should control for such confounding variables.

Although this paper discussed the relationship between traffic violations and risk-taking in daily life, both studies only focused on whether drivers were ticketed for traffic violations during the study period. This means that the indicator of violation did not include infractions related to penalty points or the number of violations, which could change the relationship with risk-taking that was shown in this study. Although risk-taking is closely related with violation (Haga, 2007), not all violations can be explained by risk-taking. For example, violations that are committed by people who do not know or understand the rules cannot be regarded as risk-taking

(Haga, 2000). Therefore, further studies are needed to examine such problems in order to understand the mechanism of traffic violations more deeply.

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