

Deciding to Help: Effects of Risk and Crisis Communication

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This study aimed to gain insight into the (combined) effects of risk and crisis communication on adequate behaviour during a crisis situation. In addition, it adds to the existing literature by examining the effects of risk and crisis communication on psychological factors that are involved in decision-making during a crisis. This study, utilizing a virtual environment, was a 3 (risk communication: risk information vs. risk information with course of action vs. control) × 2 (crisis communication: with recommended behaviours vs. without recommended behaviours) between subjects design. Both risk and crisis communication supported adequate behaviour in a crisis situation. In addition, through risk communication, participants had less affective reactions. Theoretical and practical implications are discussed.

I Deciding to help: effects of risk and crisis communication

Even though a lot is invested in highly sophisticated emergency and disaster management systems, ordinary citizens are usually the first responders when an emergency occurs. These citizens are already present at the scene, and it takes some time before emergency services arrive (Prati, Catufi & Pietrantonio, 2012; Whittaker, McLennan & Handmer, 2015). As they are at the scene, citizens can directly help victims and mitigate negative consequences of the situation at hand (Whittaker et al., 2015). However, not every individual may be able to provide help in an adequate way due to limited knowledge and skills, and actions may not always be optimal given the situation at hand (Fernandez, Barbera & van Dorp, 2006; Hur, 2012).

Citizen participation on emergency and disaster sites is inevitable, so governments and crisis management organizations should integrate the help of ordinary citizens in mitigation, adaptation, or emergency management and recovery plans (Hoss, Klima & Fischbeck, 2014). This is necessary to reduce the risk

that untrained and uncoordinated citizens provide help that is not adequate for the specific emergency (Whittaker et al., 2015). A way to guide adequate behaviour during crises is by risk and crisis communication (Vihalemm, Kiisel & Harro-Loit, 2012). While risk communication is mainly focused on increasing risk awareness before a crisis occurs, crisis communication is focused on communication during a crisis to prevent or reduce the negative consequences of a crisis (Coombs, 1999; Seeger, 2006). As noted by Sellnow, Lane, Littlefield, Sellnow, Wilson, Beauchamp and Venette (2015), effective communication to elicit appropriate actions both before and during a crisis should not be sender-focused, but receiver-focused. In order to adjust information to receiver needs, it is important to understand how citizens interpret and respond to these messages and how it relates to citizen behaviour during a crisis.

Although there is a lot of literature on risk and crisis communication as separate research lines, little is known about the interaction between the two types of communication (Reynolds & Seeger, 2005; Steelman & McCaffrey, 2013). Recently, scholars have argued

that effective communication needs to be an integrated process (Seeger, 2006), as communication during each phase of crisis management can affect behaviour and outcomes in another phase (Olsen & Shindler, 2010). So our overall research goal is to gain more insight into the (combined) effects of risk and crisis communication on adequate behaviour during a crisis situation. In addition, this study also adds to the existing literature by examining the effects of risk and crisis communication on psychological factors that are involved in decision-making during a crisis situation. Measuring these mediating psychological factors may provide insight into underlying causes of potential behavioural changes.

1.1 Crisis communication

During a crisis, potential helpers make several considerations before providing assistance to a person. First, an assessment of the situation is made: if a situation is perceived as serious and dangerous, people are more willing to help (Fischer, Greitemeyer, Pollozek & Frey, 2006; Fischer, Krueger, Greitemeyer, Vogrincic, Kastenmüller, Frey & Kainbacher, 2011). Second, people have to decide on how to help: first trade-offs need to be made of the costs and rewards of courses of action, followed by the best personal outcome for themselves (Penner, Dovidio, Piliavin & Schroeder, 2005).

Both processes (assessing the situation and selecting a course of action) can be supported by crisis communication, which generally aims to prevent or reduce the negative consequences of a crisis (Coombs, 1999; Seeger, 2006). However, people are generally not passive followers of crisis communication. Many citizens search for additional information and need to be convinced that the provided information is actually correct (Kievik & Gutteling, 2011; Lindell & Perry, 2012). In times of crisis, individuals seek out different media for additional crisis information. Austin, Fisher Liu and Jin (2012) found in their study that the most reported forms of searching for crisis communication were face-to-face communication, TV news, text messaging, phone calls and Facebook. Which media was used depended on the crisis and the way they had heard about this crisis.

The probability that an advice is followed is generally related to two psychological factors: self-efficacy and response efficacy (e.g., Bandura, 1997; Lindell et al., 2012; Seeger, 2006). Self-efficacy has been defined in several ways, but we follow Bandura's (1997) definition that refers to people's beliefs that they are able to conduct a specific task successfully. Response efficacy is defined as the extent to which people think that different suggested behaviours are effective in protecting oneself and others from

negative consequences of a risk (Kievik et al., 2011). Both processes together determine whether people will be motivated to control the danger and consequences of a risk. When people believe they are able to conduct an effective course of action against the risk, they are motivated to control the risk and consciously consider ways to reduce negative outcomes (Witte & Allen, 2000). Several studies show that perceived response efficacy and self-efficacy increase the likelihood of citizens to engage in self-reliant behaviour (Kievik et al., 2011; Rimal, 2001; Steelman et al., 2013). Lindell et al. (2012) also found that citizens are more likely to consider action when they are aware of appropriate protective actions. Therefore, we expect that crisis communication with useful, easy to execute courses of action will lead to higher levels of self-efficacy, response efficacy and more adequate behaviour in times of crisis, compared with crisis communication without these courses of action.

Moreover, crisis communication research highlighted the importance of honest, clear and accessible information during a crisis (Seeger, 2006). When citizens perceived crisis communication as up to date, valuable, reliable and understandable, they were more inclined to follow the courses of action (Reynolds et al., 2005). In line with this finding, we expect that participants will be more satisfied with crisis communication, when the messages contains easy to follow, up to date and complete information about the situation at hand.

1.2 Risk communication

As noted above, many citizens do not passively follow suggested courses of actions. Messages they receive are related to cues in the actual environment (e.g., whether there are people in need) and also to prior knowledge and experiences (Kusev, Schaik & Aldrovandi, 2012; Peters & Slovic, 2000). This implies that information that is provided before an actual crisis occurs, through risk communication, may also affect helping behaviour in an actual crisis situation (Stubbé, Emmerik & Kerstholt, 2015). Covello (1992) defines risk communication as 'the exchange of information among interested parties about the nature, magnitude, significance, or control of a risk' (p. 359). Risk communication is typically used to inform people about the severity and consequences of a hazardous situation as to increase risk awareness. Several studies show that when people read risk related information, the risk is appraised more as serious and relevant. In addition, participants are more aware of possible negative consequences (Kievik et al., 2011; Terpstra, 2011; Witte et al., 2000). This implies that risk communication about the severity and consequences of a risk increases risk awareness. In addition to the effects of

risk communication on risk awareness, risk communication may also influence affective reactions. Messages that provide knowledge on how to handle the risk presumably restore one's sense of control over a threatening situation (Seeger, 2006). With this information, people know better what to do during a crisis which may lead to less worries about the crisis situation. Therefore, we expect that risk communication that provides a clear course of action leads to less affective reactions.

1.3 Present study

Our overall research goal is to gain more insight into the (combined) effects of risk and crisis communication on adequate behaviour during a crisis situation. We defined adequate behaviour as behaviour that is in line with the given advice in risk and crisis communication. Most conclusions on the effect of crisis communication on human behaviour are based on interviews with affected citizens (e.g., Sellnow, Seeger & Ulmer, 2002; Steelman et al., 2013) and on studies that measured intentional behaviour (e.g., Verroen, Gutteling & de Vries, 2013). Different research methods have their own advantages and disadvantages. Data collected from actual crises provides insight into actual behaviour (albeit retrospectively), but it lacks the possibilities to systematically measure the effects of relevant factors such as the content of crisis messages. Laboratory studies, on the other hand, allow for controlled manipulations, but it mostly measures intentions to behave in a certain way instead of actual behaviour. In the present study, we used a virtual environment, which allows for both experimental control and the measurement of actual behaviour.

The main advantage of using a virtual environment is that it is quite 'immersive'. As has amply been shown in decision-making research, affective responses are a significant driver for behaviour (Loewenstein & Lerner, 2003; Slovic & Peters, 2006; Visschers, Wiedemann, Gutscher, Kurzenhäuser, Seidl, Jardine & Timmermans, 2012) and experiencing an accident in such a virtual environment is likely to increase more arousal than just imagining it. Another important advantage of using a virtual environment is that the scenario is completely scripted, allowing for measurement and comparison of several behaviours of citizens in a more controlled way. Even though it is still not completely realistic, several studies showed that when people are faced with events and situations in a virtual environment, they tend to respond and behave in a similar way as in the real world (Gillath, McCall, Shaver & Blascovich, 2008; Yee, Bailenson, Urbanek, Chang & Merget, 2007). As such, a virtual environment provides a good platform to study human behaviour during crises.

The virtual environment in this study is the same as was used by Stubbé et al. (2015). Participants were required to follow a specific route, but halfway through they witnessed a car accident. Our main research question was whether participants showed adequate behaviour as a function of two factors. The first factor concerned risk communication (before the accident), providing information on risks of traffic accidents either with or without information on the (negative) consequences of moving victims. The second factor concerned crisis communication (after the accident), providing a specific course of action (do not move the victims and talk to them) or not. In addition, we were interested in the influence of risk and crisis communication on the psychological factors risk awareness, affective response, self-efficacy and information satisfaction. We additionally measured these psychological factors as they may provide insight into underlying causes of potential changes at the behavioural level.

2 Method

2.1 Participants

A total of 120 students from the University of Twente participated in the experiment in exchange for course credit and some participated voluntarily. Data of eight participants were removed, as they failed to answer the questions of the manipulation check correctly. The study sample therefore comprised 112 students (mean age=21.7, SD=3.70, 67 females). A post hoc power analysis for variance analyses was conducted with power ($1-\beta$) set at 0.80, $\alpha=.05$, two tailed and $N=112$. An effect size of $f=.267$ was found which corresponds with a medium effect size, so the sample size is large enough to detect expected effects (Faul, Erdfelder, Lang & Buchner, 2007).

Participants indicated via self-report (seven-point Likert scale, 1 (not at all) – 7 (very much)) that they were in general able to empathize with the situation ($M=4.72$, $SD=1.40$) and that they had good computer skills ($M=5.76$, $SD=1.21$). There were no differences between the six conditions for either gender, $\chi^2(5)=3.04$, ns., age, $F(5, 106)=1.07$, ns., or nationality $\chi^2(5)=4.38$, ns. Please see Table 1 for the distribution of participants per condition, gender, age and nationality.

2.2 Design

The study was a 3 (risk communication) \times 2 (crisis communication) between subjects design. Risk communication consisted of three conditions: risk information, risk information with course of action and control condition. Crisis communication consisted of two conditions: no recommended behaviour and recommended behaviour.

Table 1. Number of Participants by Experimental Condition, Gender, Age and Nationality

Risk com. Crisis com.	Control condition		Risk information		Risk information with course of action		Total
	Without recommended behaviours	With recommended behaviours	Without recommended behaviours	With recommended behaviours	Without recommended behaviours	With recommended behaviours	
Participants (N)	21	15	21	17	16	22	112
Male (N)	8	5	6	7	8	11	45
Female (N)	13	10	15	10	8	11	67
Age (M)	21.48	20.27	21.81	21.71	21.06	22.95	21.64
Dutch (N)	17	11	13	15	13	16	85
German (N)	4	4	8	2	3	6	27

2.3 Procedure

Participants entered the experimental room were welcomed by the experimental leader and were seated behind a computer. They were told that all further instructions would be provided via the computer screen. As an overarching cover story, participants were asked to empathize with the following situation: participants had found a vacancy of the job of their dreams, and they had decided to apply for it. They had written an application letter and were subsequently invited for a first selection round.

2.4 Risk communication manipulation

The first task in the selection round was a memory task (actually the risk communication manipulation), and participants were asked to read a half page newspaper article carefully. The content of the article depended on the experimental condition of the risk communication, followed by a short manipulation check. In the risk information condition, participants read an article about traffic accidents with *no* course of action. In the risk information with course of action condition, they read the same article about traffic accidents, but now with information that victims should not be moved. In the control condition, participants read an article about Dutch people on holidays (see Appendix A).

2.5 Practice scenario

After reading the article with the risk communication manipulation, participants were introduced to the second task in which participants were entered into a virtual environment. In this virtual environment, they were asked to help a virtual person finding lost parcels. In fact, this was a practice scenario, to let participants familiarize themselves with the virtual environment of the third task, the experimental scenario. In the practice scenario, they received

instructions on how to control the virtual environment, a map of the virtual environment and a picture that showed the control actions on the keyboard (see Appendix B). The practice scenario lasted for about 10 minutes. After participants finished the practice scenario, they started with the experimental scenario.

2.6 Experimental scenario

2.6.1 The scenario

The overall task for participants was to follow a route in order to go to a job interview. On this route, participants had to cross a bridge and when they approached the bridge, a truck drove past them, and shortly thereafter, the sound of a claxon and the sound of colliding cars could be heard. During the collision, the screen moved and turned to white for a short period of time. The moment the screen returned to normal, a car was on its side and the truck blocked the bridge. Both drivers were thrown out of their cars and moaned with pain. One victim was visible and was lying in front of the car. The other victim was not visible and was lying behind the tilted car. There were three (virtual) bystanders, and they did not take any actions themselves but could respond to specific behaviours of the participants. The participants all had (virtual) mobile phones for communication, and they had the possibility to check their phone for information about what actions to take. In the first minute after the accident, there was time for 'spontaneous' behaviour, and then, the crisis communication manipulation was given via a text message on participants' mobile phone. In the condition without recommended behaviour, participants received only a text message on the virtual mobile phone that there was an accident on the bridge and that emergency services were on their way. In the recommended behaviour condition, participants received the same message, but this message included two recommended behaviours: participants were told that they had to talk to the victims and that they should not move them.

2.6.2 Initial reactions participants

Directly after the incident, participants could react in several ways. Participants had the possibility to communicate with bystanders and victims, were able to move a victim, and they had a (virtual) mobile phone. Depending on the reaction of the participants, there would be a pre-programmed reaction from the virtual environment.

2.6.3 Bystanders

Bystanders could not take any action by themselves, but they were able to react on the behaviour and remarks of the participants. For instance, when participants asked bystanders to call the emergency services, the bystanders told them that they could not call, because they did not have a phone.

2.6.4 Victims

Participants could also talk with the victims, only the first victim was able to say that he was in pain. Besides, both victims moaned of pain.

2.6.5 Mobile phone

The participants all had a (virtual) mobile phone with the possibility to send tweets and to check a risk information app. When participants clicked on the application, risk information about traffic accidents (e.g., about the severity and consequences) was opened. The risk information was exactly the same as in the risk communication condition with course of action (see Appendix A).

2.6.6 Ending

The scenario ended when the ambulance arrived, three minutes after the accident.

2.7 Questionnaire

Finally, when participants completed the main scenario, they were told to fill out a questionnaire that consisted of a measurement of their risk awareness, affective response, self-efficacy, response efficacy, information satisfaction, perceived computer skills, ability to empathize with the situation and their sex, age and nationality. The experiment ended with a debriefing.

2.8 Measures

2.8.1 Actual behaviour

All actions participants took were logged during the experimental scenario. We registered whether people called the emergency service, talked to victims, talked to bystanders, sent a tweet, checked the information app, moved a victim or walked away. For talking to victims and bystanders, we noted also how often participants spoke with them. In addition, we were

interested in participants' first action after the accident had occurred.

2.8.2 Psychological factors

Psychological factors were all measured after the experimental scenario, and all responses to the questions were measured on seven-point Likert type scales.

2.8.3 Risk awareness

Risk assessment measures were based on Slovic (1987) and Wiegman and Gutteling (1995). Participants reported how they in general judged the risk of a traffic accident. Exploratory factor analysis (see Table 2) resulted in two distinct factors of the risk awareness scale. One item that was intended to measure the seriousness of traffic accidents showed low inter-item correlations with the other measures in the scale and was consequently deleted. A new factor analysis resulted in two factors, together explaining 73% of the variance: seriousness of traffic accidents (two items; $r=.51$, $p<.01$) and the severity of potential consequences (three items; Cronbach's $\alpha=.79$).

2.8.4 Affective response

Participants reported their affective reaction with respect to the experimental scenario in terms of feeling tense, anxious, nervous and concerned (scale: not at all – very much; Cronbach's $\alpha=.90$). Participants, who scored high on affective response, were more worried about the crisis situation.

2.8.5 Self-efficacy

The self-efficacy scale was based on previous studies conducted by Lindell and Perry (1992) and Terpstra (2009). Participants reported whether they felt able to deal with the traffic accident. A three-item scale was used: 'I felt able to respond adequately to the

Table 2. Factor Loadings Risk Awareness

	Factor loadings	
	1	2
Seriousness of traffic accidents ($r=.51^{**}$)		
I am aware that traffic accidents occur frequently. ¹	.29	.82
The probability of a traffic accident in my district is... ²	.18	.85
Severity of potential consequences ($\alpha=.79$)		
A traffic accident has serious consequences. ¹	.78	-.07
I am aware that a traffic accident might lead to a lot of damage. ¹	.85	-.18
I am aware that a traffic accident might lead to personal injuries. ¹	.85	-.21
Variance explained	44%	30%

All items were measured on a seven-point scale (¹scale: strongly disagree – strongly agree, ²scale: very small – very high).^{**} significant at $p<.01$. Loadings in bold are higher than .75.

accident', 'When the accident occurred, I was able to help' and 'I knew what I had to do, when the accident occurred' (scale: strongly disagree – strongly agree; Cronbach's alpha=0.74).

2.8.6 Response efficacy

Cronbach's alpha of this scale was low ($\alpha=.51$). Therefore, in the analysis, we present we decided to leave out this scale.

2.8.7 Information satisfaction

After the experiment, participants reported their satisfaction with all the given information they received during the entire experiment (i.e., the newspaper article and the text message on their virtual mobile phone). They could indicate their satisfaction by rating at on four items: understandable, complete, reliable and clear. This scale was newly developed (scale: not at all – very much; Cronbach's alpha=0.78).

2.8.8 General questions and demographics

Participants reported how well they were able to empathize with the situation (scale: not at all – very much) and their perceived computer skills (scale: not at all – very much). Both questions were measured on seven-point Likert type scales. In addition, participants reported their gender (male=0, female=1), age (in years) and nationality (Dutch=0, German=1).

2.9 Analysis

Separate logistic regression analyses were conducted for moving victims, calling emergency services, sending tweets and checking the information app to evaluate the extent to which behaviour was influenced by risk and crisis communication. Risk communication was coded as a dummy variable, and the control group

was chosen as the reference variable. To test whether number of contacts with victims and bystanders, a counting variable, was influenced by risk and crisis communication, analysis of variance was used. To address the effect of risk and crisis communication on seriousness of risk, severity of the consequences, self-efficacy and information satisfaction, we performed separate variance analyses.

3 Results

3.1 Descriptive statistics

3.1.1 First action

Of all 112 participants, 80 participants (71%) first contacted the victim that was visible after the accident had occurred. A total of 26 participants (24%) immediately called the emergency services, five participants (4%) contacted a bystander, and one participant (1%) directly moved a victim.

3.1.2 Actual behaviour

Throughout the whole experimental scenario, 111 participants (99%) talked at least once with one of the victims. With respect to moving victims, 40 participants (36%) moved one of the victims. Of all participants, 91 participants (81%) talked at least once with the bystanders. Ninety-five participants (85%) called the emergency services. Only six participants (5%) sent a tweet during the experiment and 27 participants (24%) checked the information app.

3.2 Correlations

Table 3 presents the Pearson correlation coefficients for the dependent variables in this study. For actual behaviour, it can be seen that participants who moved

Table 3. Pearson Correlations

		1	2	3	4	5	6	7	8	9	10	11
Actual behaviour	1. Move victims ^a	1										
	2. # Contacts victims ^b	-.10	1									
	3. # Contacts bystanders ^b	-.11	-.07	1								
	4. Call emergencies ^a	-.31**	.06	.06	1							
	5. Check info app ^a	-.33**	.00	.20*	.23*	1						
Psych. factors	6. Send tweet ^a	-.01	.03	-.07	.10	.18*	1					
	7. Seriousness risk ^c	-.01	.06	.02	-.04	.01	.04	1				
	8. Severity consequences ^c	.21*	-.13	.06	-.21*	-.22*	.07	.10	1			
	9. Affective response ^c	.22*	.04	.03	-.23*	-.10	-.12	.22*	.31**	1		
	10. Self-efficacy ^c	-.28**	.16	-.04	.28**	.06	.07	-.20*	-.08	-.29**	1	
	11. Info satisfaction ^c	-.31**	.14	.00	.21*	.03	.05	-.23*	-.14	-.37**	.44**	1

Significance levels: * $p<.05$, ** $p<.01$, $N=112$.

^a Binary variable.

^b Counting variable.

^c Scale 1–7.

victims, called the emergency services less often ($r=-.31$) and checked the information app less often ($r=-.33$). Participants who talked with bystanders checked the information app more often ($r=.20$). Also, participants that called the emergency services checked the information app more often ($r=.23$). Finally, participants who checked the information app sent tweets more often ($r=.18$).

3.3 Actual behaviour

After the accident happened, participants could do several things: move a victim, contact one of the victims, contact a bystander, call the emergency services, send a tweet and check the information app. Table 4 displayed the mean scores or percentages on these various types of behaviour for the three risk communication conditions and the two crisis communication conditions.

3.3.1 Move victims

For crisis communication, we found a significant main effect on moving victims, $\chi^2(1)=8.51$, $p<.01$. Moving victims occurred less often when participants received the text message with the suggested course of action ($e^b=.27$, 95% CI: .12–.65). For risk communication, we found a difference between the condition where people read risk information and a course of action compared with the control condition, $\chi^2(1)=6.55$, $p<.05$. Participants moved victims less often when they had read the newspaper article with the information that injuries can occur or become more severe when victims are moved ($e^b=.23$, 95% CI: .07–.71) (see Table 5).

3.3.2 Contact victims

There was a marginal significant main effect of crisis communication, $F(1, 106)=3.37$, $p=.07$, partial $\eta^2=.03$. Victims were contacted more often in the condition where participants received a crisis communication message ($M=8.74$, $SD=8.49$) than in the condition where they did not receive a message ($M=6.22$, $SD=7.04$).

We did not find any effects of risk and crisis communication on contacting bystanders, calling the emergency services and checking the information app. In addition, we found no effect of sending a tweet, probably due the low number of participants in the cells ($N=6$).

3.4 Psychological factors

Table 6 presents the mean scores on the psychological factors for the three risk communication conditions and the two crisis communication conditions.

3.4.1 Affective response

A marginal significant main effect was found of risk communication, $F(2, 106)=2.91$, $p=.06$, partial $\eta^2=.05$ on affective responses. Planned contrasts revealed that participants in the control condition were more worried by the situation than participants in the two other conditions, $t(112)=-2.29$, $p=.02$. Participants in the control condition scored higher on affective response ($M=4.85$, $SD=1.43$) compared with participants in the two other conditions (risk awareness: $M=4.20$, $SD=1.22$, risk awareness with course of action: $M=4.28$, $SD=1.29$).

Table 4. Means, Standard Deviations and Percentages of Actual Behaviour

	Risk communication			Crisis communication		Across conditions
	Control condition	Risk information	Risk information with course of action	Without recommended behaviours	With recommended behaviours	
Move victims ^a N (%)	17 (47.2)	17 (44.7)	6 (15.8)	29 (50)	11 (20.4)	40 (36)
# contacts victims ^b M (SD)	9.33 (10.89)	6.13 (4.28)	6.95 (6.96)	6.22 (7.04)	8.74 (8.49)	7.44 (7.84)
# contacts bystand. ^b M (SD)	3.89 (3.08)	4.53 (3.94)	5.18 (4.01)	4.93 (3.88)	4.13 (3.51)	4.54 (3.72)
Call emergency services ^a N (%)	29 (80.6)	34 (89.5)	32 (84.2)	49 (84.5)	46 (85.2)	95 (85)
Check info app ^a N (%)	8 (22.2)	9 (23.7)	10 (35.7)	14 (24.1)	13 (24.1)	27 (24)
Send tweet ^a N (%)	0 (0)	3 (7.9)	3 (7.9)	2 (3.4)	4 (7.4)	6 (5)
N*	36	38	38	58	54	112

^a Binary variable; no=0, yes=1.

^b Counting variable.

* Total number of participants in the condition.

Table 5. Logistic Regression Moving Victims

Predictor	β	SE β	Wald's			e^{β}
			χ^2	df	p	
Constant	1.71	.49	5.83	1	.016	5.51
Risk information	-0.07	.58	0.02	1	.889	.93
Risk information with course of action	-1.47	.44	6.55	1	.011	.23
Crisis communication	-1.30	.71	8.51	1	.004	.27
Test			χ^2	df	p	
Omnibus test of model coefficients			19.89	3	.000	
Hosmer & Lemeshow goodness-of-fit test			1.80	4	.773	

Model summary: -2 Log likelihood=126.11, Cox & Snell $R^2=.16$, Nagelkerke $R^2=.22$. $N=112$.

3.4.2 Information satisfaction

A significant main effect was found of crisis communication, $F(1, 106)=9.35$, $p<.01$, partial $\eta^2=.08$. Participants who received the message with the recommended behaviours to talk to victims and not to move them were more satisfied with the information ($M=4.93$, $SD=1.00$) than when they were just told some general information about the accident ($M=4.34$, $SD=.99$).

No effects were found of risk and crisis communication on seriousness of risk, severity of consequences and self-efficacy, all $p=ns$.

4 Discussion

In this study, we examined the effects of risk and crisis communication on adequate behaviour in a virtual crisis situation. Overall, the results clearly indicate that all participants were willing to help when they were

confronted with a traffic accident. The most frequent reaction was to contact one of the victims or to call the emergency services. This finding confirms previous research, which indicates that people behave pro-socially during crises: they are willing to help others in need (Fischer et al., 2011). However, we also found that actual behaviour was affected by risk and crisis communication.

Crisis communication affected both whether victims were moved and how often participants talked to the victims. Participants who received the crisis communication message with recommended behaviours moved victims less often than participants who had not received this message. This is an important result, as it may guide bystanders towards the most appropriate action for the situation at hand. Moving victims is generally not the best option, as injuries may become more severe, and telling people not to do so actually reduces these risks. By communicating courses of action during crises, people may therefore be empowered to adequately deal with the situation at hand (Reynolds & Seeger, 2005; Rimal, 2001; Steelman et al., 2013).

Similar results were found for talking to victims. Participants who received directions to talk to the victims did this more often than participants who had not received this recommended behaviour. So it can be concluded we found clear effects of advice on actual behaviour.

However, adequate behaviour was not only affected by the advice given after the accident had happened, but also by the information that participants received beforehand. Participants who had read that moving victims might cause extra damage, moved the victims less often than participants who had not received this information. As predicted, actual behaviour during crisis is therefore also affected by prior knowledge

Table 6. Means and Standard Deviations Psychological Factors

	Risk communication			Crisis communication		
	Control condition	Risk information	Risk information with course of action	Without recommended behaviours	With recommended behaviours	Across conditions
Seriousness risk <i>M</i> (<i>SD</i>)	4.44 (1.14)	4.37 (1.12)	4.58 (1.37)	4.47 (1.05)	4.45 (1.36)	4.46 (1.21)
Severity consequences <i>M</i> (<i>SD</i>)	5.76 (.81)	5.54 (.69)	5.54 (.91)	5.65 (.80)	5.57 (.82)	5.61 (.81)
Affective response <i>M</i> (<i>SD</i>)	4.85 (1.43)	4.20 (1.22)	4.28 (1.29)	4.61 (1.30)	4.26 (1.37)	4.44 (1.34)
Self-efficacy <i>M</i> (<i>SD</i>)	4.38 (1.41)	4.23 (1.17)	4.45 (1.32)	4.25 (1.24)	4.46 (1.35)	4.35 (1.29)
Information satisfaction <i>M</i> (<i>SD</i>)	4.73 (.98)	4.35 (1.00)	4.79 (1.09)	4.34 (.99)	4.93 (1.00)	4.62 (1.04)
<i>N</i> *	36	38	38	58	54	112

All variables were measured on a seven-point Likert scale.

* Total number of participants in the condition.

(Kusev et al., 2012). However, in our experiment, the information provided before and after the accident is consistent and applicable in the situation at hand, which may not always be the case. Particularly in ambiguous situations, individuals may search for additional information through social media, the Internet or face to face with people at the same location.

Risk communication also influenced affective responses. Participants who received relevant risk information about traffic accidents were less worried about the accident, as compared with the control condition. A possible interpretation of this result is that information about risks gives a person some sense of control over a threatening situation (Seeger, 2006). This finding is the more interesting as level of emotional response also correlated with less adaptive behaviour: the more worried the participants were, the more often they moved victims and the less often they contacted the emergency services. As argued by, for example, Peters et al. (2000), affective reactions have a major impact on human judgment and decision-making. However, even though affect may increase a tendency towards pro-social behaviour, these reactions may not always be optimal.

Opposite to our expectations, we did not find an effect of crisis communication on self-efficacy. The behaviour that was addressed was not to move victims, as this could lead to more severe injuries. So even though direct effects on behaviour were found (less moves), this behaviour cannot be explained by means of this mechanism. Still, the results did show that self-efficacy correlated with more adaptive behaviour, that is, less moves of victims and more contacts with emergency services, which is in line with previous findings (Kievik et al., 2011; Verroen et al., 2013). A possible explanation is that the recommended behaviours were not that difficult to conduct. We would predict that crisis communication will have clearer effects on self-efficacy in more ambiguous situations, with less straightforward advice. Another reason for not finding a clear effect of crisis communication on self-efficacy could be due to the instruction to refrain from doing something ('do not move victims'). Actually, receiving specific instructions on how to act may lead to a stronger increase in self-efficacy than instructions on how not to act. Indeed, participants who were instructed not to do something may have had no clue what else they actually could do to help. Doing nothing might not feel like 'helping', leading to lower levels of self-efficacy.

As for the psychological factors, we only found an effect of crisis communication on information satisfaction. When participants received the text message with courses of action, they were more content with the given information than the participants who did not receive the recommended behaviours. This result

is in line with the idea that providing accurate and understandable harm-reducing information leads to more satisfaction and acceptance of the message (Reynolds et al., 2005; Steelman et al., 2013).

While several interesting results were found on the effects of risk and crisis communication on helping behaviour, this experimental study also has limitations. First of all, this study used a convenience sample. All participants were students, which limits the generalizability of the results. In addition, students who were willing to participate in this study were maybe more pro-social by nature than those who did not participate, what might lead to an overestimating of pro-social behaviour during the virtual crisis situation. Furthermore, all students were in their twenties. Older people could have more experience with traffic accidents and assess risks differently, which could lead to other results of helping behaviour. For example, people who have experienced traffic accidents may know better how to act, which would result in a reduced effect of additional information. Another limitation of this experiment is that it is possible that the knowledge of being observed influences one's behaviour – the Hawthorne effect (Adair, 1984). For example, participants in this experiment might show more pro-social behaviour because they know their outcomes will be measured. However, in our study, we included control conditions to ensure that the effects of risk and crisis communication could not be explained by the Hawthorne effect. Finally, the crisis situation in this study was rather obvious and unambiguous; a pedestrian witnessed a traffic accident and received messages about the situation. Most crisis situations are far more complex, such as when the situation is ambiguous, with a broad range of response options, and helping others is risky for the helper. Possibly, different effects are found when the situation is more ambiguous and/or severe with less obvious courses of action. Future research needs to reveal whether the effects as found in the present study also hold for more ambiguous and complex situations.

Taken together, our results provide valuable implications for risk and crisis communication. From a theoretical perspective, this is the first empirical study that looked at the interaction between risk and crisis communication. We found that communication before and during a crisis situation both affected behaviour during crisis. Furthermore, our results support the claim by Sellnow et al. (2015) that messages should not only focus on explaining the current situation (sender-focused). To stimulate adequate behaviour, a receiver-oriented approach should be used by incorporating the following information: relevance of the potential crisis, information about specific and meaningful actions, and the information should be brief, understandable and clear. Subsequently, our results have

implications for governmental institutions and crisis management organizations. First, a comprehensive strategy should be developed integrating risk and crisis communication efforts. In addition, as ordinary citizens are willing to help during crisis, this capacity needs to be incorporated in mitigation, adaption or emergency management and recovery plans. Furthermore, the results of this study suggest that risk and crisis messages aimed at promoting adequate helping behaviour are effective when recommendations are given about courses of action. In risk communication, this information also reduces affective reactions. Knowledge can restore a sense of control, what might lead to less worries about a crisis situation and more adequate behaviour.

Note

- As a manipulation check, participants had to answer two questions about the risk communication to make sure that they were able to reproduce what they had read. Given the importance of this information for the manipulation, data from participants that failed to answer the questions correctly were removed from the final sample. For crisis communication, participants had to read a text message. The time participants spent on reading the message varied between four and fifteen seconds, which gave a fair indication that all participants had read the text.

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A. Appendix Manipulations risk communication

Risk information

Road accidents

It is hard to say how many traffic accidents occur in the Netherlands annually. The police registers traffic accidents in the Netherlands, but when the police is not warned, the accident is not registered. In general, it appears that accident registration mostly depends on the severity of the accident. The severity of the accident is determined by the number of people with injuries and the types of injuries.

Accidents lead to an estimation of 840.000 injuries every year. Medical treatment by a doctor was needed in 20% of these cases. In addition, 15% was treated in the emergency room and nearly 5% was admitted to the hospital. Finally, 650 people were deceased in traffic accidents.

Risk information with course of action

Road accidents

It is hard to say how many traffic accidents occur in the Netherlands annually. The police registers traffic accidents in the Netherlands, but when the

police is not warned, the accident is not registered. In general, it appears that accident registration mostly depends on the severity of the accident. The severity of the accident is determined by the number of people with injuries and the types of injuries. Injuries can occur or become more severe, when victims are moved.

Accidents lead to an estimation of 840.000 injuries every year. Medical treatment by a doctor was needed in 20% of these cases. In addition, 15% was treated in the emergency room and nearly 5% was admitted to the hospital. Finally, 650 people were deceased in traffic accidents.

Control

The Dutch on holiday

It is difficult for the Dutch to abandon their holiday. Holiday is considered to be very important. TNS-NIPO registers the holiday plans of Dutch citizens, but they do this only during summer and for vacations of a week or longer. In general, it appears that despite the economic conditions, Dutch citizens massively keep going on holiday. However, they save on holidays by going short or less far on holiday.

About 12.5 million go on holidays every year. In total, 52% of these people used their car as transport. In addition, 36% travelled by plane and nearly 10% travelled by bus. Finally, Germany is the number one on the list of most visited countries for foreign holiday destinations.

B. Appendix Instructions virtual environment

Instructions

For the next assignment you are going to navigate through the virtual environment to finally arrive at your job interview (see the map below). The end point is the location of your interview.

To familiarize yourself with the control actions on the keyboard and the options in the virtual environment, you will start with a practice scenario. In the practice scenario you are going to help a virtual person to find lost parcels.

When you are ready with the practice scenario, please give a sign to the experimental leader. She can start the scenario where you are going to navigate to your job interview.

Below, a map of the virtual environment, an explanation about how to control the virtual environment and a summary of the control actions on the keyboard. Please read these instructions carefully. [Colour figure can be viewed at wileyonlinelibrary.com]

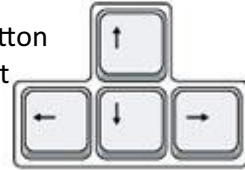


How to control the virtual environment?

In the virtual environment several options are possible, these options are written below.

Walking

To walk to a certain direction, you can use the arrow buttons. Press the ↑ button to walk straight. The other buttons can be used to walk to the left, to the right or to walk back.



Talking

You are not alone in the virtual environment. To have a conversation, you have to walk to the person were you want to talk with. When you are close to a person, use the pointer of your mouse to see the (numbered) conversation options. Use the numbers on the numpad of your keyboard to actually choose a conversation option.



Phone use

Off course you are not going on your way without a smartphone. To use your smartphone, press the P-button. Subsequently, you have several options in your phone, e.g. you can call somebody or can send a tweet. An option can be chosen by clicking on them with your mouse (left button).



Pick up/moving

In the virtual environment you have the option to pick up something or to move objects. When this is possible, the option appears in a menu. When you are close to the object that you want to pick up or move, use your mousepointer to select this option. When the desired option is selected, press the [Enter]- button.



Summary of the options

When you are close to the person, use the pointer of your mouse to see the (numbered) conversation options. Use the numbers on the numpad of your keyboard to actually choose a conversation option. [Colour figure can be viewed at wileyonlinelibrary.com]

