The effect of risk and crisis communication on the helping behavior during a virtual crisis situation

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Bachelor Thesis Psychology

29. JULI 2015

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1. ABSTRACT

Risk and crisis communication serve as helpful resources to improve one's awareness of crisis situations and threats. This study examines the influence of risk and crisis communication to the behavior and the decision-making processes. It is a 3 (risk communication) x2 (crisis communication) between-subject design. In the study students of the University of Twente participate. During this study, participants were placed in a virtual crisis simulation and we were interested what behavior citizens showed during a crisis situation. Also, we were interested in the participants' risk perception, information sufficiency and satisfaction of information. Results showed that risk communication had no impact on the behavior participants showed but crisis communication did had an influence on the behavior to a limited extent. Crisis communication had an influence on calling the emergencies, moving the victim and satisfaction of the information.

Samenvatting

Risico- en crisiscommunicatie dienen als nuttige bronnen om je bewust te maken van crisissituaties en bedreigingen. Deze studie onderzoekt de invloed van risico- en crisiscommunicatie op het gedrag en de besluitvorming van mensen. Het is een 3 (risicocommunicatie) x2 (crisiscommunicatie) tussen-subject design. In de studie hebben studenten van de Universiteit Twente deelgenomen. Tijdens deze studie werden de deelnemers in een virtuele crisis simulatie geplaatst en waren wij geïnteresseerd welk gedrag mensen vertonen in een crisis situatie. Ook werd er gekeken naar de risicoperceptie van de deelnemers, informatie toereikendheid en de tevredenheid van de informatie. De resultaten laten zien dat risicocommunicatie geen invloed heeft op het gedrag, maar dat crisiscommunicatie een beperkte invloed heeft. Crisis communicatie heeft invloed op de hulpdiensten bellen, het verplaatsen van slachtoffers en de tevredenheid over de informatie.

Content

2. INTRODUCTION

Risk management is an important part of the daily life. From the simple everyday acts of crossing the street or driving a car, the exposure to risk is inevitable (Kasperson et al., 1988). Governments and other organizations try to make citizens more self-reliant, so that citizens know how to cope with the effects of a crisis situation. How a crisis situation is perceived depends on the features of the environment as well as the experiences and knowledge of citizens. The features of the environment, such as causalities in case of an accident, can cause an increase in arousal. When citizens perceive a situation as more serious, citizens are more willing to help (ter Huurne & Gutteling, 2008). Experiences and knowledge of citizens may help the citizens to cope with a crisis situation (Hampel, 2006). Citizens' judgements of a crisis depends on risk perception. These judgments are based on the subjective view of the citizens about particular characteristics and challenges of a crisis situation. For example, people in areas where the chance of earthquakes is high, have more experience and knowledge about how they should behave in such a situation in comparison to people from areas where earthquakes are a rare occurrence.

In these kinds of crises the government and the media are an important source of information to the citizens. It seems the government and the media expose citizens to an image of panic-filled situations when it comes to a crisis. Many people believe that in crisis situations, these government fed images lead people to a panic. On the contrary, studies on fire accidents and other hazards reveal that victims mostly do not behave in panic during this type of crisis situations (Helsloot & Ruitenberg, 2004 and Quarantelli, 1954). They instead behave pro-social and rational instead of non-social and non-rational. Quarantelli (1954) points out signs of panic appear only when citizens have an overwhelming feeling of fear and feel they cannot cope with the coming threat or crisis. When it comes to dealing with a crisis, knowledge about how to handle a threat becomes vital. This knowledge can be gained through information, however, how do citizens get the information they need? It is also questioned, how do citizens respond to the threats? Citizens seek information not only during a crisis but also before a crisis occurs. With that said, risk and crisis communication can be used to inform citizens about particular threats and crisis, so that citizens can prepare themselves before a crisis occur and also help them make smarter and informed decisions during a crisis.

This study aims to analyze the effect of risk and crisis communication on information processing and helping behavior during a virtual crisis situation.

2.1 Information Processing

Before and during a crisis, citizens are confronted with an overwhelming amount of inputs from their environment. The input citizens get can help them handle the situation, but usually these inputs are not sufficient enough to do so in a proper way. Helsloot and Ruitenberg (2004) suggest that citizens react by following three stages which occur during a crisis: 1) alarm stage 2) acute stage and 3) recovery or rebuilding stage. They describe the information processing and actual behavior of citizens before, during and after a crisis. This study looks at the actions that can be taken during the alarm stage and acute stage.

However, one must be aware that the alarm and acute stages are difficult to distinguish in their starting and endpoint. During the alarm and the acute stage described by Helsloot and Ruitenberg (2004), citizens are dealing with a large amount of information, deciding how to deal with a crisis based on the information citizens have. Citizens are more likely to react to crisis and threats in which they are directly involved. If the incoming information from the crisis implies a direct risk for the citizen self, the citizen will prepare to handle the crisis. Thus, citizens have to make a lot of decisions and distinctions based on incoming information. For this decision making process, citizens rely on an intuitive path and an analytic path. Slovic (2004) points out that citizens use two pathways to process the incoming information: he named them the 1) analytical and 2) experimental pathway. The experimental or intuitive pathway describes the influence of feelings on the given situation. This means that the judgments and decisions citizens make, depend on the feeling and impression they have in a crisis. According to Helsloot and Ruitenberg (2004) and Slovic (2004) the intuitive pathway is a commonly used decision making process during an unexpected or sudden crisis that needs an immediate reaction. During this kind of crisis, citizens do not have sufficient time to analyze their environment and gather information. They therefore rely on their intuition. The analytic path on the other hand goes beyond emotions. The individual starts to analyze the situation and his or her surrounding to get an idea of what he or she can do. This can occur when the individual has time to think everything through and analyze the situation. During this situation, citizens mostly realize that they need more information to get through the crisis.

2.1.1 Information (In)sufficiency

To make good decisions citizens have a need for information and knowledge about a crisis. With gained information and knowledge citizens can behave accordingly during a crisis situation. In order to gather this information citizens need the feeling of being directly involved in the crisis. To gather information, citizens can make use of public channels like

news and other medias. Furthermore, citizens can gain information by talking to bystanders or using websites with information. This need for information occurs when citizens become aware that their knowledge is not enough to overcome a crisis.

Ter Huurne and Gutteling (2008) define three ways in which information seeking can be grouped. First, there is the information seeking to gather knowledge about crisis or threats in which the person of a crisis situation is interested in. Citizens seek information when they know that it can benefit them and they want to reduce their information insufficient about a situation or crisis. Secondly, Ter Huurne and Gutteling (2008) state that information seeking is important for humans because they want to fit in with society. To fit in, people seek information so they can talk with others about specific subjects and to show that they have knowledge about specific topics. The third and last form of information seeking stated by Ter Huurne and Gutteling (2008) is the reduction of uncertainty. Citizens want to feel certain in all situations that can occur; therefore they need information so that they can reduce their uncertainty during uncertain situations. Citizens are motivated to gather information so they can reduce the discrepancy between an individual's current state of knowledge and the state he or she wants to achieve. Therefore, citizens seek information to reduce their information insufficiency and thus the uncertainty during a crisis. Information (in)sufficiency can be seen as an important variable to predict how citizens behave with the available information. Reducing uncertainty can occur through different channels. These channels can help citizens gather information or to sort the existing information.

2.1.2 Communication Resources

As mentioned above, information seeking is important to cope with threats. This gives rise to the question: how did citizens get the information they need? With the availability and advancement of technology, there are now a lot of channels where an individual can get information. Communication is a resource to help people to minimize their doubts and to understand the situation in which they are. Communicating with bystanders or using particular social media sites can help to reduce information insufficiency.

Kasperson et al. (1988) developed a social amplification theory whereby the indirect and direct impact of information can lead to a change in behavior. The direct influence hold the direct experience citizens made with a crisis. Information seeking is the indirect influence that holds information and experience from others about a crisis. Information can be gained through news media or other sites. The theory of social amplification compares the spreading of the information with a drop in the water. If a citizen has information about an accident,

they can tell others about it who can also can tell another and so on. The information will spread fast from one person to another; social media amplifies the spread of information so that it can also reach other people. Citizens who are directly involved in a crisis situation can use bystanders as an informational resource. They can exchange their information and thus reduce their uncertainty about the situation because with the gathered information citizens can improve their knowledge about the current situation.

Talking to bystanders can however provide insufficient information because bystanders can also lack information that can be important. In this case, the citizens need other ways to get the needed information. A study from Verroen, Gutteling and De Vries (2013) shows how social media can influence the behavior of citizens in crisis situations. They discovered social media outlets, such as Twitter and Facebook, were used to get information about what citizen can do in such situations, what really helps and how they should behave. Social media is made up of "digital technologies that allow people to connect, interact, produce and share content" (Dainton & Zelly, 2015, p.176). Social media gives the participant the possibility to take part in the exchange of information and can pick out the best suitable information to cope with the situation. The research of Verroen, Gutteing and De Vries (2015) shows social media can have a great impact on the behavior of citizen because they interact with other citizens. This is because information from other citizen can be seen as information from normal people who are placed in similar situation. Thus, the information can be seen as a confidential source of information. Exchanging information with other citizens can help the individuals in a crisis feel more comfortable with the situation.
Next to the information seeking, the authorities can also use risk and crisis communication to amplify the information of citizens. Thereby, they can influence the decision making process of citizens and also make them more comfortable with their actions during a crisis situation.

2.2 Risk and Crisis Communication

There are differences between the risk and crisis communication that authorities can use to guide citizen before crisis and during crisis. According to Reynolds and Seeger (2005), "risk communication facilitates decision making and risk sharing" (p. 45). Risk communication takes place before a crisis and should help citizens to obtain more knowledge about specific risks. Seeger (2006) mentions that the complexity of risk communication lies in the challenge of advising citizens on the identifiable risks that can occur. Also, risk communication is a way of minimizing the gap between the knowledge of citizens and the trust of the public in risk

management (Frewer, 2004). The goal of risk communication is to expand the knowledge of citizens about crisis and threats.

Crisis communication on the other hand "seeks to explain the specific event, identify likely consequences and outcomes, and provide specific harm-reducing information to affected communities in an honest, candid, prompt, accurate, and complete manner" (Reynolds & Seeger, 2005; p. 46). Crisis communication takes place during a crisis situation and is a source of information that gives citizens a course of action and helps to guide their behavior in a crisis situation. The goal of crisis communication is to advise citizens during a crisis on what they should do.

Crisis messages as well as risk messages must get the immediate attention of citizens and should provide useful and easily understandable information. According to Frewer (2004), communication processes need to be more consultative, transparent and inclusive of decision-making processes. It is important that the message is straight to the point, leaving no space for further interpretation. Communication messages can be ambiguous and so risk and crisis messages need to be clearly structured, should offer solutions where the individual can choose from, and should refer to the reasons and emotions citizens have (Freimuth, Liannan & Potter, 2000). This means that risk and crisis communication has to reflect the core elements of the message so that every citizen can easily absorb the information. In addition, risk communication should prepare citizens to take actions when a crisis occurs, while crisis communication should help citizen to behave in a proper way befitting the situation.

2.3 Present Study

In conclusion, it can be said that information and knowledge about certain threats can be helpful in managing crisis.

This study aims to ascertain if the availability of information can influence the decision-making processes of people during a crisis. This will be tested by looking at the behavior of participants during a simulated crisis situation.. As discussed above, communication can be used to guide the behavior of citizens before and during a crisis so that they can fulfill the best practice. Risk communication is one possibility in influencing the behavior of citizens before a crisis; giving citizens information about specific threats and helping them organize their actions according a crisis. Crisis communication is a second possibility that may influence the behavior during a crisis, guiding citizens to overcome a crisis.

2.4 Hypothesis

This study specifically examines the influence of given information on the behavior of citizens in crisis situation. The theoretic framework already explained why it is important to take a closer look at the influence of information on the behavior of citizen. The following hypothesis will serve as a guide in answering this study's research question: *The effect of risk and crisis communication on the risk perception, information (in)sufficiency, satisfaction of information and helping behavior during a virtual crisis situation.*

1. Risk and Crisis communication with a course of action are associated with more talking with victims and less moving victims.
2. Risk communication and crisis communication with a course of action are associated with higher risk perception than without a course of action.
3. Risk communication and crisis communication with a course of action are associated with higher information sufficiency and satisfaction of information than without a course of action.

3. METHOD

This research is a sub research of a current experiment. The following sections are dealing with certain variables in particular: risk perception, information satisfaction, information (in-) sufficiency and the actual behavior. These variables are important for this research.

3.1 Participants

In this study, 84 students (male=29 and female=55) from the University of Twente were asked to participate. These students were 59 Dutch and 25 German. The average age of the participants was 21.77 (SD=4.11). The participants were chosen through the SONA system where the participants could get a course credit in exchange. Other participants were chosen by directly contacting them; they participated voluntarily. An ethics committee reviewed and approved the experimental protocol.

The participants were randomly assigned to one of the six conditions that are based on the three risk communication manipulations and the two crisis communication manipulations.

3.2 Design

This study adopted a 3 (risk communication) x2 (crisis communication) between-subject design. Through the risk communication, the risk perception of participants was manipulated. The participant in the first condition had to read a story with information about traffic accidents. In the second condition, the participant also had to read the same story about traffic accidents but they had a course of action that the victims should not be moved.

The last condition is the control condition, where participants receive a text about Dutchman on vacation. There is no manipulation given. Each of this manipulation were followed-up by two questions about the stories to test if the participants read the story well. With the manipulation check it could be seen that 95.3 percent from condition 1 answered right, from condition 2 96.43 percent and from condition 3 96.55 percent. The three stories for the risk communication manipulation are included in the appendix section

In the crisis communication manipulation, the course of action from the participants is manipulated. In condition one, the participant received a message on the phone that the emergency rescue services were on their way. In the second condition, apart from informing them that the emergency rescue services were on their way, it also included instruction to talk to the victims and that the victim should net be moved. No control condition was included, because there was time for “spontaneous” behavior in the first minute after the accident.

3.3 Procedure

After the participant entered the room, he or she was placed behind a laptop. The researcher explained to the participant that the experiment is subdivided into four parts: 1) first part of a questionnaire, 2) exercise scenario, 3) experimental scenario, and 4) second part of a questionnaire. The participant began with the first part of the questionnaire. The researcher informed the participants that at a certain moment a message would appear during the questionnaire and that he or she should make contact with the researcher. All further instructions were provided via the computer screen. The instructions started with an informed consent and the explanations of the task. As a cover story, participants were told that they were in an applications procedure. In the first round of the selection, several skills and characteristics were tested. Participants were told the first test would be a memory task, where they were asked to read a half-page story carefully that was randomly chosen by the system, which was followed by two questions about the story. The story was part of the risk communication manipulation. Afterward the participants were asked about their emotional state and further about the pro-social personality.

Following the first part of the questionnaire, the participant started with the experimental task. During the experimental task, the participants were placed in a virtual environment. The experimental task was divided into an exercise scenario and an experimental scenario. First, the participants started with the exercise scenario. The participants received a map and instructions about the virtual environment and the buttons that could be used (these were needed for both scenarios.) Since the exercise scenario took a long time to accomplish, the participant was given instructions to fulfill the first challenge. This first challenge included picking up a packet and to calling the person who asked for the challenge. The researcher had to make sure that the participant knew how to use the buttons. Afterwards, the experimental scenario was started; it was important to ensure that the manipulations were equally distributed. During the experimental scenario the participant was given instructions to go to the application meeting. In the following section, Experimental Task the experimental scenario will be described more detailed.

At the end of the experimental scenario, the researcher shut down the program and returned to the questionnaire, so the participant could fill in the last part of it. The second part of the questionnaire examined the emotional state after the scenario. Furthermore, the questionnaire inquired about the risk perception of the participant, the self-efficacy, the response-efficacy, the information insufficiency, the satisfaction of the information, the use of

social media, and some general questions. Due to the fact that this research is a sub-research this study focused on the variables of risk perception, information (in-) sufficiency and information satisfaction.

3.4 Experimental Task

The main task of this study was to measure how people would react and behave when placed in a crisis situation, and how the information processing could influence these reactions and behaviors. In the following section a detailed description of the experimental scenario will be given.

3.4.1 The Scenario

During the experimental scenario the participant had to put himself or herself in the position of the virtual figure so that the participant could got a feeling of being part of the scenario itself. To make it more realistic, the participants were asked to put on some headphones so they could hear the sounds of the environment. The participants were told that the goal of this experimental scenario is to go to the application meeting by following a particular route. They were also given the information that they had to be on time and should appear neatly. After a few meters, the participants reached a river where a car was sitting in front of a bridge. As the participant got closer to the car, it started to move forward and drive onto the bridge. On the other side of the bridge a truck was also crossing. The truck and the car crashed into each other. At this moment, the screen shook and turned white. During this time the participants only could listening to the sounds of the crash, which was announced by horns of the truck and the car. Following this, the screen turned back to normal and the participant could see that the truck was blocking the bridge and that the car was lying on it's side, also blocking the bridge. Both drivers were thrown out of their cars and were moaning with pain. One of the drivers was lying visible on the street while the other was hidden behind the tilted car. After the accident three bystanders came by. They could not perform any actions and could only react on the behavior of the participants. The participants also had the opportunity to use a mobile phone with which they could do some actions like calling the emergency.

After the accident happened, the participants had one minute worth of time to freely take actions they would also do in real life. When the minute is over a message with one of the two crisis communication manipulation occurred on the screen. All reactions of the participant were logged from the program.

3.4.2 Reactions Participants

The participant could choose between eight different actions: contact the first victim, contact the second victim, call the emergency number, contact a bystander, sending a tweet, check the information app, move a victim, and they could walk away. These actions were pre-programmed so that every action the participant would did had a particular reaction from the virtual world.

One of the options was to talk to the bystanders. In this case, the participants could use the mouse or the number pad on the keyboard to choose an action. When the participants moved the mouse over a person, a question appeared. After selecting one of the numbers, which corresponded to the questions, the participant could start talking to the bystanders. The bystanders could not do any actions by themselves. By talking with the bystanders, the participant could gain more information. For example, the bystanders could draw the attention of the participant to the mobile phone by saying that they do not have one to call for an emergency. Furthermore, the attention could be drawn to the victims by saying that someone should check on them, or that the victims need help.

The action of talking with the victims was also possible. The first victim was laying visible on the street, was screaming in pain. The second victim was laying between the vehicles, was quiet and not moving. The participants also had the option to move or readjust the position of the victim. This also was directed by moving the mouse over to the person and by choosing the action. If the participants saw no need for helping the victims of the accident they could also go away. Another possible action could be done through using the mobile phone. The mobile phone could be used for calling the emergency, for sending a tweet, or for using an information app.

3.4.3 Ending

One possible ending occurred if the participants called the emergency After doing this the participant had a few minutes to take some of the given actions. The scenario stopped after three minutes because the ambulance arrived. On the screen appeared a message that the scenario is over and the participant can go on with the second part of the questionnaire.

Another possible ending of the scenario occurred after four minutes. This happened when the participant did not call the emergency. Just as in the other ending a message on the screen appeared, saying that the scenario is over and that the participant had to go on with the second part of the questionnaire.

The scenario also could end if the participants fell into the river and got wet. Since the simulation was programmed as if the participants were meant to attend an application meeting, a wet suit was seen as a failure. The program would stop and a message on the screen would appear saying that the participant should go on with the questionnaire.

3.5 Measures

Due to the fact that this thesis is a sub-research of a current research, the following section will describe the variables, which are important for this study, and how they were measured. The actual behavior was measured with the experimental scenario self. Risk perception, information insufficiency, and the satisfaction of information, were measured with a questionnaire. Also, general questions and demographics were measured with a questionnaire.

3.5.1 Actual Behavior

All actions the participant took are logged during the experimental scenario. Participants could react in eight different ways when the accident occurred: contact the first victim, contact the second victim, call the emergency number, contact a bystander, sending a tweet, check the information app, move a victim, and they could walk away. We registered whether or not and how often the eight possible actions were taken during the scenario. In addition, we were interested in what the participants' first action was after the accident had occurred and the first action after the crisis communication manipulation.

3.5.2 Questionnaire

The questionnaire included items about three constructs: *risk perception*, *information insufficiency* and *satisfaction of information*. The *risk perception* scale was based on previous studies performed by Slovic (1987) and Gutteling and Wiegman (1990). This construct was divided into two sub-constructs the *risk awareness* and the *affective responses*. The *risk awareness* included six questions (Cronbach's $\alpha = .71$): 'The risk of a traffic accident is high', 'I am aware that traffic accidents occur regularly.', 'A traffic accident could bring consequences.', 'I am aware that a traffic accident leads to lot of damage.' and 'I am aware that traffic accidents lead to personal injuries.'. These questions are scaled from 'completely disagree' to 'totally agree'. The question 'The probability that a traffic accident occurs in my environment is…' was scaled from 'very little' up to 'very high'. The *affective responses* measured four item, scaled from 'not at all' till 'very much'. ('When I think of a traffic accident, I feel tense.', 'When I think of a traffic accident it instills fear in me.', 'When I think

of a traffic accident, I get nervous.' and 'When I think of a traffic accident I feel worried.' (Cronbach's α = .92).

The *Information (in) sufficient* scale was also based on previous studies performed by Huurne and Gutteling (2008). Participants were asked questions regarding six items (Cronbach's α =.73) how satisfied they were with the given information during the scenario ('I had enough information about what I could do during the scenario', 'I feel that I knew enough about how to act', 'I am content with the information I received during the scenario', 'I had the need for more information about what actions I could take', 'I did not know how to act' and 'I had the need for more information about the accident'). The participant could score on a seven point scale from 'totally disagree' till 'totally agree'.

The *satisfaction of the information* scale was developed during the study. It inquires through four statements (Cronbach's α = .80) about the satisfaction of the participant with the given information before and during the scenario. These statements 'understandable', 'complete', 'reliable' and 'clear' could be scored on a seven point scale from 'not at all' till 'very much'.

3.5.3 General Questions and Demographics

The *general question and demographics* asked the participant to give some information about himself or herself. These demographic questions asked about the gender (1=male and 2=female), the age (years), the nationality and education of the participant. The general questions included questions like 'How well are you able to empathize with the scenario?' and 'How skilled are you generally in dealing with computers' which are scaled from not at all till very much. It also included a question about 'How often do you use social media sites like Facebook, Twitter or SMS/ WhatsApp?' which is scaled from 'less than once a month' till 'several times a day'.

3.6 Analysis

For answering the research question '*what effect does risk and crisis communication have on the helping behavior during a virtual crisis situation?'* this study made use of the 22 edition of Statistical Package for the Social Sciences (SPSS 22). Beginning with a descriptive analysis, constructs of the questionnaire are checked regarding the reliability. It also will be checked if one or more items need to be converted or removed.

Second, a correlation analysis of the constructs was made. The output of the correlation was calculated and compared. Through compute variable new variables were

made for the constructs of the actual behavior, which is important for the correlation analysis. With the correlation scores the cohesion of actual behavior and the constructs from the questionnaire were compared. The cohesion of constructs of the questionnaire with each other was also compared.

Third, the interaction and main effect of the actual behavior was calculated. This was made with the function General Linear Model. The Multivariate analysis was chosen to analyze the effects of risk and crisis communication. During this analysis the communication conditions were implicated in the analysis and used as fixed variables. Each action that could be done, during the experimental scenario, was labeled as the dependent variables. The constructs of the questionnaire were analyzed through main and interaction effect analysis and were taken as dependent variables. During the whole experiment a level of significance of .05 was one sided tested.

4. RESULTS

4.1 Descriptives

Table 1 shows the mean scores of the general question. As can be seen, social media sites like Facebook score with a mean of 6.31 (SD=1.23) and SMS/ WhatsApp with a mean of 6.75 (SD=0.67). On the other hand Twitter scores with a mean of 1.93 (SD=1.92). The computer skills of the participants have a mean of 4.89 (SD=1.36). The emphasizing of participants in the scenario has a mean of 4.89 (SD=1.36).

Table 1

Mean and Standard Deviation of General Questions

	Mean	**Std. Deviation**
Computer Skills	5.69	1.22
Emphasize with Scenario	4.89	1.36
Using SMS/ WhatsApp etc	6.75	0.67
Using Twitter	1.93	1.92
Using Facebook	6.31	1.23

N = 84

4.2 Correlation between Actual Behavior and Dependent Variables

Table 2 contains the correlation of the constructs from actual behavior and the questionnaire. It is shown that the correlation between the constructs of the actual behavior report has a positive cohesion between *contact bystanders* and *information app* (r = 0.34). The Table also reports a negative cohesion between *moving the victim* and *information app* (r = -0.24). It can be seen that the correlation between this actions is significant ($p < 0.05$)
For the correlation between the constructs of the questionnaire, it can be seen that *information sufficiency* correlates positive with *satisfaction of information* (r = 0.41). The significant value of this correlation is $p < 0.00$. *Satisfaction of information* also correlates with *risk awareness* and *affective response*. Both correlations are negative: *risk awareness* (r = -0.24) en *affective responses* (r = -0.37). The correlation of these constructs has a significant value of $p < 0.05$. *Risk awareness* and *affective response* have a positive correlation. The significant value of this correlation is $p < 0.00$.

Table 2 also shows the correlation between the constructs of actual behavior and the constructs of the questionnaire. It can be seen the only significant correlation exists between *route* and *satisfaction of information*, and *route* and *risk awareness*. The cohesion of *route*

and *satisfaction of information* is with a value of $r = -0.27$ negative. The correlation between *route* and *risk awareness* on the other hand is with a value of $r = 0.28$ positive. The significant value of these constructs is $p < 0.05$.

Table 3

Correlation between all constructs

			1	2	3	4	5	6	7	8	9	10	11	12
Behavior	1.	Contact 1st Victim	-	-0.05	-0.15	0.05	-0.16	0.08	-.06	-.02	.09	.06	-.18	-.05
	2.	Contact 2nd Victim		-	-0.18	-0.08	-0.05	-0.05	-.08	.02	-.18	.04	.06	-.09
	3.	Contact Bystanders			-	0.11	0.07	0.02	.04	.34**	-.07	-.11	.07	-.04
	4.	Call Emergency				-	-0.15	0.10	.05	.21	.14	.06	-.10	-.16
	5.	Moving Victims					-	-0.04	.11	-.24*	-.08	-.21	.17	.21*
	6.	Number Tweets						-	-.04	.07	.13	.04	-.01	-.14
	7.	Route							-	-.12	-.07	-.27*	.28**	.15
	8.	Information App								-	.09	.04	-.19	-.04
Variables Questionnaire	9.	Information sufficiency									-	.41**	-.06	-.06
	10.	Satisfaction of information										-	-.24*	-.37**
	11.	Risk awareness											-	.38**
	12.	Affective response												-

Note. N=84, *= correlation significant on a level of 0.05(one sided) **= correlation significant on a level of 0.01(one sided)

4.3 Actual Behavior

4.3.1 Descriptive

The following table (Table 4) shows the mean scores and standard deviation of the actions of the actual behavior. The table contains the mean scores of the six conditions. Risk and crisis communication are taken into account in this analysis. The mean of each action is divided into the six conditions. It appears that the control group has a mean of 0.00 by the action tweets. This means that the control group did not tweet something about the accident. It appears that the mean of calling the emergency varies between 0.71 and 1.00 (SD = 0.00 and 0.47). The data file *call emergency* is noted with 0 = not calling the emergency and 1 = calling the emergency. The mean score shows that among the participants, a majority would call the emergency. *Moving victim* also is noted with 0 = not moving the victim and 1 = moving the victim. From table 4, it can be seen that the mean scores varies from 0.12 and 0.64 (SD = 0.33 and 0.74). For the *route,* it appears that the mean is between 2.00 and 2.18 (SD = 0.00 and 0.40). Through the classification it appears that participants tend to go away after the accident happens. The *information app* has a mean between 0.18 and 0.45 (SD = 0.48 and 0.69).

Table 4

Mean and Standard Deviation of Actual Behavior

Risk communication	Crisis communication	Behavior							
		Contact First Victim[a]	Contact Second Victim[a]	Contact Bystanders[a]	Call Emergency[b]	Moving Victims[b]	Number Tweets	Route	Information App[b]
Control	Without course of action	9.06 (5.29)	0.41 (0.94)	5.29 (5.46)	0.82 (0.39)	0.59 (0.51)	0.00 (0.00)	1.00 (0.00)	0.18 (0.53)
	With course of action	11.00 (10.71)	0.64 (1.21)	4.55 (3.62)	0.82 (0.40)	0.18 (0.40)	0.00 (0.00)	1.09 (0.20)	0.45 (0.69)
Risk awareness	Without course of action	7.79 (3.83)	0.43 (0.94)	5.71 (4.32)	1.00 (0.00)	0.64 (0.74)	1.04 (0.27)	1.07 (0.13)	0.29 (0.48)
	With course of action	8.00 (4.71)	1.78 (3.38)	4.43 (4.26)	0.79 (0.43)	0.29 (0.61)	0.14 (0.36)	1.00 (0.00)	0.29 (0.48)
Risk awareness + course of action	Without course of action	7.18 (4.60)	0.73 (1.68)	6.45 (3.01)	1.00 (0.00)	0.18 (0.40)	0.00 (0.00)	1.00 (0.00)	0.45 (0.52)
	With course of action	11.00 (8.67)	3.29 (6.08)	3.35 (3.41)	0.71 (0.47)	0.12 (0.33)	0.06 (0.24)	1.00 (0.00)	0.41 (0.51)

Note. N=84, a = measured with a count variable; b = measured with yes/no

4.3.2 The effect of risk and crisis communication on actual behavior

The following table shows the main effect and interaction effect analysis of the action of the actual behavior. It shows if the effects of the risk and crisis communication manipulation are significant or not. Evidently none of the constructs of actual behavior have significant effects on risk communication manipulation. No main effect is found of risk communication on *first action after the accident* ($F(1,78) = 0.06$, p = n.s.), *first action after crisis communication* ($F(1,78) = 0.50$, p = n.s.), *contact first victim* ($F(1,78) = 0.06$, p = n.s.), *contact second victim* ($F(1,78) = 0.07$, p = n.s.), *contact bystander* ($F(1,78) = 1.45$, p = n.s.), *call emergency* ($F(1,78) = 0.01$, p = n.s.), *moving victims* ($F(1,78) = 0.28$, p = n.s.), *number tweets* ($F(1,78) = 2.67$, p = n.s.), *route* ($F(1,78) = 1.83$, p = n.s.), and *information app* ($F(1,78) = 0.59$, p = n.s.). Therefore, none of the constructs has a significant value under the average of $p = 0{,}05$.
The main effect of crisis communication manipulation shows that the constructs of *first action after crisis communication, calling emergency* and *moving victims* are significant. After the crisis communication appears on the screen most of the participant execute an action. *First action after crisis communication* is with a level of significance $F(1,78) = 11.17$, $p < 0.001$ significant. Also *calling the emergency* also is significant $F(1,78) = 4.66$, $p \leq 0.05$. Furthermore the action *moving the victim* shows with a level of significance $F(1,78) = 5.69$, $p \leq 0.05$ a main effect of the crisis communication. Through further examination of the data, it appears that crisis communication with a course of action has a higher impact on the action than without a course of action. No main effect is found for crisis communication on on *first action after the accident* ($F(1,78) = 0.47$, p = n.s.), *contact first victim* ($F(1,78) = 1.81$, p = n.s.), *contact second victim* ($F(1,78) = 3.76$, p = n.s.), *contact bystander* ($F(1,78) = 3.41$, p = n.s.), *number tweets* ($F(1,78) = 0.84$, p = n.s.), *route* ($F(1,78) = 0.84$, p = n.s.), and *information app* ($F(1,78) = 0.45$, p = n.s.).

There is just one interaction effect of risk and crisis communication manipulation registered of the route the participants taking. This interaction effect van *route* $F(1,78) = 3.52$, $p \leq 0.05$ significant. There are no further significant interactions seen: *first action after the accident* ($F(1,78) = 0.02$, p = n.s.), *first action after crisis communication* ($F(1,78) = 0.15$, p = n.s.), *contact first victim* ($F(1,78) = 0.50$, p = n.s.), *contact second victim* ($F(1,78) = 0.88$, p = n.s.), *contact bystander* ($F(1,78) = 0.58$, p = n.s.), *call emergency* ($F(1,78) = 1.16$, p = n.s.), *moving victims* ($F(1,78) = 0.84$, p = n.s.), *number tweets* ($F(1,78) = 0.21$, p = n.s.) and *information app* ($F(1,78) = 0.73$, p = n.s.).

Table 5

Main and Interaction Effect of Actual Behavior

	Behavior									
	First Action	First Action after Crisis	Contact First Victim	Contact Second Victim	Contact Bystanders	Call Emergency	Moving Victims	Number Tweets	Route	Information App
Risk Communication	0.06	0.50	0.70	1.45	0.01	0.28	2.67	1.83	1.71	0.59
Crisis Communication	0.47	11.17**	1.81	3.76	3.41	4.66*	5.69*	0.84	0.84	0.45
Risk*Crisis Communication	0.02	0.15	0.50	0.88	0.58	1.16	0.84	0.21	3.52*	0.73

Note. N=84, *= effect significant on a level of 0.05(one-sided) **= effect significant on a level of 0.01(one-sided)

4.4 Questionnaire

4.4.1 Descriptive

The following table shows the mean and standard deviation of the constructs of the questionnaire. The mean scores show how the participants score on a seven point scale. For risk awareness most of the participants score between 5.11 and 5.41 (SD = 0.45 and 0.91). In the control condition the course of action scores higher than without a course of action but in the risk awareness and risk awareness with a course of action condition participants score higher when they get the crisis communication without a course of action. For affective response the mean is between 3.63 and 4.78 (SD = 1.11 and 1.82). It seems that in the control and risk awareness condition participants with a crisis communication without a course of action score higher than in the crisis communication with a course of action. In the condition risk awareness with a course of action, participants with a crisis communication with a course of action score higher than without a course of action For information sufficiency the mean scores varies between 4.18 and 4.47 (SD = 0.37 and 0.86). The control condition scores higher with a course of action during the crisis communication than without a course of action. By the risk awareness and risk awareness with course of action condition participants score higher without a course of action in the crisis communication. Information satisfaction scores between 4.09 and 5.01 (SD = 0.85 and 1.29). With a course of action the participants score higher on the information satisfaction than without a course of action.

Table 6

Mean and Standard Deviation of Questionnaire

		Questionnaire			
Risk communication	Crisis communication	Risk Awareness	Affective Response	Information sufficiency	Information Satisfaction
Control	Without course of action	5.11 (0.45)	4.78 (1.12)	4.19 (0.81)	4.49 (0.85)
	With course of action	5.41 (0.82)	4.66 (1.82)	4.47 (0.55)	5.00 (1.29)
Risk awareness	Without course of action	5.31 (0.72)	4.70 (1.11)	4.30 (0.37)	4.09 (1.07)
	With course of action	5.25 (0.57)	3.63 (1.36)	4-18 (0.48)	4.82 (0.90)
Risk awareness + course of action	Without course of action	5.41 (0.84)	4.20 (1.75)	4.35 (0.47)	4.70 (1.09)
	With course of action	5.33 (0.91)	4.37 (1.42)	4.22 (0.86)	5.01 (0.90)

Note. N=84

4.4.2 The effect of risk and crisis communication

The analysis of the main and interaction effect is itemized in table 7. The main and interaction effects of risk and crisis communication manipulation on the four constructs are tested: risk awareness, affective response, information (in-) sufficiency and information satisfaction. Evidently, it can be seen that the risk communication manipulation has no significant main effect: *risk awareness* (F(1.78) = 1.18, *p* = n.s.), *affective response* (F(1.78) = 1.16, *p* = n.s.), *information (in-)sufficiency* (F(1.78) = 0.13, *p* = n.s.) and *information satisfaction* (F(1.78) = 1.81, *p* = n.s.).

There is a significant main effect of crisis communication manipulation found. The *information satisfaction* F(1,78) = 5.44 $p \leq 0.05$. No main effect is found for crisis communication on *risk awareness* (F(1.78) = 0.12, *p* = n.s.), *affective response* (F(1.78) = 1.20, *p* = n.s.) and *information (in-)sufficiency* (F(1.78) = 0.01, *p* = n.s.).

No interaction effect is found for risk and crisis communication on *risk awareness* (F(1.78) = 0.58, *p* = n.s.), *affective response* (F(1.78) = 1.44, *p* = n.s.), *information (in-)sufficiency* (F(1.78) = 0.90, *p* = n.s.) and *information satisfaction* (F(1.78) = 1.30, *p* = n.s.).

Table 7

Main and Interaction Effect of Questionnaire

	Questionnaire			
	Risk Awareness	Affective Response	Information Sufficiency	Information Satisfaction
Risk Communication	0.18	1.16	0.13	1.81
Crisis Communication	0.12	1.20	0.01	5.44*
Risk*Crisis Communication	0.58	1.44	0.90	0.30

Note. N=84, *= effect significant on a level of 0.05(one-sided) **= effect significant on a level of 0.01(one-sided)

5. DISCUSSION

5.1 Hypothesis 1:

Risk communication and crisis communication with an action perspective are associated with more talking to victims and less moving victims.

The analysis of the effects of risk communication on the actual behavior showed that risk communication has no significant effect. It appears that the manipulation of risk communication has no impact on the actions participants showed during the scenario. The manipulation check used in this study showed that participants read the story carefully and could answered the questions right. It was expected that participants who got the story with a course of action and risk communication should more contact the victim. It appears that this risk communication had no effect on the behavior. The manipulation check gives no explanation why the risk communication had no influence on the behavior of the participants. It could be that the manipulation used in the experiment was not strong enough to influence the participants in their actions. Earlier research found out that risk communication is a source of information given to citizens so that they can prepare themselves against hazards. A study of Neuwirth, Dunwoody and Griffin (2000) showed that citizens' responses rang from completely silence to even panic. The reaction of citizens depends on the impact of the crisis. Thus, if citizens have the feeling that the crisis is not important to them or do not directly involve them, they will stay silent and the information will have no influence. On the other hand if the crisis is seen as direct hazard, citizens will adopt the information and behave accordingly. For this study it can mean that the incoming information from the risk communication was classified as not as important as it should be. This can be explained through the importance of the participants' estimate to the information and hazard. As the study from Verroen, Gutteling and De Vries (2013) showed, effective risk communication can help citizens to cope with crisis situations. Both studies (Neuwirth, Dunwoody & Griffin, 2000 and Verroen, Gutteling & De Vries, 2013) explained that risk communication had an impact on the behavior citizens execute in a crisis situation, when the crisis is seen as a direct hazard to them. The findings from this study showed that using risk communication with a course of action does not automatically lead to a more appropriate behavior.

On the other hand, crisis communication does have influence to some extent. Crisis communication has an influence on the actions: *first action after crisis communication, call emergency* and *moving victim*. The analysis shows that after the crisis communication, the condition with a course of action is outstandingly. They have more influence on the behavior

than the conditions without a course of action. According to Mara (1998), crisis communication should give the citizens instructions and coordinate their behavior. It appears that some participants did not include the crisis information as it was provided. Comparing the dataset of moving the victim before and after the crisis communication it appears that more participants used the action of moving the victim after the crisis communication. This finding is in some aspects in conflict with the expectations. According to the literature crisis communication should help citizens execute right behavior. In this study, the message in the crisis communication informs the participants not to move the victim. It appears that after the crisis communication still some participants moved the victim. More participants in the condition without a course of action moved the victim than in the condition with a course of action. Also, more participants called the emergency after the crisis communication appeared on the screen. Here also participants in the condition without a course of action called more often the emergency than participants in the condition with a course of action.

Finally, there is also no connection found between risk and crisis communication on the helping behavior. This means that a combination of risk and crisis communication has no influence on the behavior participants execute. A detailed analysis of the interactions an influence on the route can be found. It appears that the cover story of the application meeting did not influence the route of the participants. Almost every participant remained in the accident site.

5.2 Hypothesis 2:

Risk communication and crisis communication with an action perspective are associated with higher risk perception than without an action perspective.

The analysis of risk and crisis communication on the risk perception shows that there is no effect. Risk perception was divided into two variables: *risk awareness* and *affective response.* The mean scores on for *risk awareness* show that participants estimate the crisis as risky. Also the scores of *affective response* showed that participants also score relatively high on the scale. According to research of Helsloot and Ruitenberg (2004), more information leads to a higher risk awareness and less affective response. The findings of the literature showed that the participants who got a course of action scored less on risk awareness and affective response. It appears that the course of action helps participants estimate the crisis better compared to participants who did not got the course of action. However, the findings of this study showed no influence of the risk perception on the behavior of the participants. It could be explained that the participants did not see the simulated crisis as a real crisis which

could bring harm to their lives. So The findings also showed a combination of risk and crisis communication did not have any influence on the behavior. An explanation why risk perception no influence had, could be that the participants calculate the risk as not as important as it was meant to. Due to the fact that the average age of the participants was 21.77 it could be that the risk perception of young citizens is not as developed as by older citizens.

5.3 Hypothesis 3:

Risk communication and crisis communication with an action perspective are associated with higher information sufficiency and higher satisfaction of information than without an action perspective.

The analysis of risk and crisis communication on the information sufficiency shows that no effect is found. It was expected that the information, given through the risk and crisis communication, should positively influence the information sufficiency. Thus, more information lead to a higher sufficiency. According to Mara (1998) and Freimuth et al. (2000), risk and crisis messages need to be clear and understandable. It appears that the information in the study was not as sufficient as expected.

The analysis of the satisfaction of information shows that the effects of crisis communication do exist. The mean scores of information satisfaction show that participants found the given information satisfying. It appears that the participants without a course of action are less satisfied with the information compared to participants with a course of action. Through the crisis communication participants knew what they could do and what they could not do. The crisis message informed the participants about the action that moving the victim is not desired. This information satisfied the participants because they knew what was expected of them.

5.4 Limitations and Recommendations

The study includes an experiment that simulates an accident to see how participants will behave during a crisis situation. As accidents are difficult to simulate in real life, a computer program creates an effective channel to simulate accident,. so participants can be included in an accident without harm to themselves or others. Through the cover story used in this study the participants got the idea that they were in an application meeting. This helps to measure the effect of risk and crisis communication as naturally as possible.

One limitation of this study was be that the participants were placed in one room. Most of the time two or more participants were in the room doing the experiment. This could cause

the participants to be distracted by another participants also present in the room or even the researcher. The scores on the scale emphasized in the scenario are high, but this could be improved if the participants were alone and in private. This can be achieved by allowing one participant in the room at a time, making sure they are completely alone. By doing so the participant can stay focused on the scenario and have less distraction compared to sitting in a room with other participants. If participants could more emphasize with the scenario maybe the instructions would be read more carefully. It would be interesting to look if the results would change if participants completed the experiment in a separate room.

Furthermore, in consultation with the participants, it appears that they had difficulties remembering the buttons of using the mobile phone or how they could carry someone. Also the combination of using the keyboard and the mouse was for mostly the woman difficult to handle. An explanation could be that a combination of this both tools mostly is used by gamers and most of the woman are not typically gamer. On the other hand the result show that most participants did move the victim or use the phone but talking to them after the experiment it appears that they had to look it up a few times. This problem could be prevented if maybe the exercise scenario will be other programmed. In the exercise scenario from this experiment the participants had to use the mobile phone only once and also using the carry function only once. This was because otherwise the exercise scenario would be too long. So if the exercise scenario will be programmed in a way that participants need to use this buttons more often, they could easier remember the buttons.

One last limitation that is worth pointing out, is the available time participants had to complete the scenario. Towards the end of the exercise, participants had a period of time where they could not do anything because the available actions lead to no further solutions. Accordingly, the participants could not get any further information through for example talking to bystanders. It appears that the actions, that could be done by contacting the victims or bystanders lead to a dead end because the victims and bystanders did not say anything new. After the actions were done, participants did not know what they could do further so they did actions that had no purpose. The experimental scenario during this study was shortened in the beginning but it appears that the possible actions could not fill the time till the end of the scenario. It could be useful for further research to imply more actions or to expand the existing actions, so that no actions arise to bridge the gap.

5.5 Conclusion

To summarize, previous research show that information is an important aspect in managing a crisis in an effective way. Information is essential for preventing damage to oneself and to others and to manage such situations. On the contrary, this study revealed conclusions which contradict what the majority of literature suggests. The experiment shows the impact of risk and crisis communication was not as big as anticipated. The limitations and recommendations are named above. Further research on this field should take into account the limitations and recommendations of this study. It is interesting to look how older citizens will score on this experiment. How are the differences between younger and older citizens and how can this help further research. Also more research should be done on the risk and crisis communication to see which of these two have more influence on the behavior and how they should be structured to have an influence on the behavior.

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7. APPENDIX

7.1 Risk Communication Manipulation:

7.1.1 Condition 1: traffic accidents (risk communication)

It's hard to say how many road accidents occur annually in the Netherlands. The police records traffic accidents in the Netherlands, but when the police is not warned an accident is not registered. In practice, registration of accidents mainly depends on the severity of the accident. The severity of an accident is determined by looking at the number of people with injuries and the type of injury. Annually traffic accidents lead to an estimated 840,000 injuries. For 20% of these lesions was treated by a medical doctor is required. In addition, 15% were treated in the emergency room and was nearly 5% hospitalized. Finally 650 people deceased as a result of a traffic accident.

7.1.2 Condition 2: traffic accidents (risk communication + information moving)

It's hard to say how many road accidents occur annually in the Netherlands. Police records of road accidents in the Netherlands, but when the police warned an accident is not registered. In practice, registration of accidents mainly depends on the severity of the accident. The severity of an accident is determined by looking at the number of people with injuries and the type of injury. Injury may arise or become severe, when victims are moved. Every year road accidents lead to an estimated 840,000 injuries. for 20% of these lesions was treated by a medical doctor is required. In addition, 15% were treated in the emergency room and was nearly 5% hospitalized. Finally 650 people deceased as a result of a traffic accident.

7.1.3 Condition 3: Netherlands on vacation (control group)

It is difficult for the Dutch to take distances from their holidays. Vacation is found very important. TNS-NIPO records the vacation plans of Dutch, but it refers only to vacations of a week or more during the summer. Practice shows that despite the economic conditions, the Dutch population continues to go massive on vacation. Every year, an estimated 12.5 million people go on holiday. For 52% of people the car is transport to go on holiday. In addition, 36% went by plane and nearly 10% by bus. Finally, Germany is number 1 of the most popular foreign holiday destinations.