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Decision-making during a crisis: the interplay of narratives and statistical information before and after crisis communication

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ABSTRACT

Decision-making during a crisis is affected by several sources of information and prior knowledge, such as factual (statistical) information, narratives of others, and real-time governmental messages. The present study investigated how two types of information (statistics and narratives) influence helping behavior after the occurrence of a traffic accident. We used a scripted crisis scenario in a virtual environment, where several types of behavior could be measured. The main dependent variable was whether participants would move the victim or not. By moving the victim, he would be rescued from a potentially unsafe position (the tilted truck could contain poisonous substances), but moving also entailed a risk of increased injury (according to the statistical information the most likely consequence). Our results indicate that more victims were moved in the narrative condition before an official message was received. Participants who had received statistical information or both types of information performed similar to the control condition. After the official message, informing participants to keep distance, more victims were moved in the narrative condition and in the combined narrative and statistical condition. A narrative therefore has stronger effects when (information about) the actual situation matches the narrative's content. In contrast with our expectations, affective response did not mediate the relationship between narrative information and moving victims. An alternative explanation would be that narratives trigger a more heuristic way of information processing.

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Hurricane Katrina made landfall on the Gulf Coast on 29 August 2005. It was by far the most expensive natural disaster with damages of over $100 billion, as well as one of the five deadliest hurricanes in U.S. history with over 1200 deaths (Galea et al. 2008). Two days before Hurricane Katrina made landfall, local governments spread information about the actual situation and evacuation orders via news broadcasts. As evaluation studies of the incident showed, however, people's decision to evacuate was not only affected by information provided by the government, but also by narratives of relatives and other members of people's social networks (Messias, Barrington, and Lacy 2012).

The information that individuals use to make their decision during a crisis is not only from different sources (e.g. government and family), but also of different types. On the one hand, official information

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distributed by the government is usually focused on presenting facts and statistics about the crisis itself, the (potential) consequences and courses of action (Reynolds and Seeger 2005; Steelman and McCaffrey 2013). On the other hand, information obtained from others who experienced similar crisis situations is mostly in the form of narratives (Brenkert-Smith et al. 2013; Lindell and Perry 2012). Both types of information may influence decision-making during a crisis in a different way.

Although some studies have shown how different types of information can influence behavior, less is known about how these two types of information interact with each other during a crisis situation (Olsen and Shindler 2010; Reynolds and Seeger 2005; Steelman and McCaffrey 2013). In the current study, we therefore aim to give a better insight into how narrative information and statistical information influence helping behavior after the occurrence of an accident and how these types of information interact with a governmental message, that is usually provided shortly after the incident occurred.

Situation assessment

When confronted with a crisis, individuals make several considerations before they act upon the situation. First an assessment of the situation is made, to learn what is going on. This may be quite difficult when individuals lack the knowledge and skills required (Fernandez, Barbera, and Van Dorp 2006; Hur 2012). They may, for example, not know the consequences of toxic substances or what would be a safe location to go to. For instance, after the 2007 Hebei Spirit oil spill in South Korea, many people were not aware of the toxicity and harmful effects of petroleum. As a result they took no precautionary actions, and as they were not properly clothed, they later suffered from skin diseases (Hur 2012). Second, people have to decide, under some level of uncertainty, between options with different outcomes and consequences (Seeger 2006). For example: Do I need to evacuate or can I stay to help others? Evacuation would increase an individual's chance of survival but possibly at the cost of those unable to leave the area by themselves.

In uncertain situations people may need information from professionals, enabling them to make an informed choice as to what to do (Reynolds and Seeger 2005; Seeger 2006). Several studies show that such crisis communication can enable individuals to deal adequately with a crisis. Sutton et al. (2014), for example, studied the tweets sent by official government accounts during a 48-h period after the Waldo Canyon wildfire in Colorado. The fire ravaged the mountainous area close to Colorado Springs. The researchers found that warning messages that included protective action guidance together with hazard impact, location and message source were more influential on taking protective actions, compared with messages that only provided situational updates without any protective action guidance (Sutton et al. 2014). Gutteling et al. (2014) evaluated NL-alert, a new broadcast system in The Netherlands to inform people in the direct environment of a disaster or emergency via their mobile phone. The study was based on survey data that were collected after the delivery of a NL-alert warning in three different crisis situations. Results of this study showed that receivers of a NL-alert message were quite willing to follow the given advice.

However, as noted above, what people actually do is not only influenced by crisis communication, but also by one's own experiences and considerations, as well as by narratives of other people, such as friends and neighbors (Eisenman et al. 2007). It is well known that an individual's own experiences with a crisis exert a strong effect on risk perception and behavior (Plapp and Werner 2006; Ruin, Gaillard, and Lutoff 2007). Ruin, Gaillard, and Lutoff (2007), for example, showed that people with flood experience tend to overestimate the potential danger of floods. In addition to a direct effect of personal experience on decision-making, there can also be an indirect effect through narratives of others. As noted by Wachinger et al. (2013), by hearing a narrative, people are able to empathize with the experiences of others, which helps them to envisage the negative consequences of a risk. This visualization of what may happen, leads to stronger intentions to act upon a crisis. Narratives of others may therefore influence individuals' decision-making during a crisis.

According to Seeger and Sellnow (2016) narratives play a fundamental role during crises, as these narratives improve our understanding of a crisis, provide information about what we should do, and

carry forward the lessons learned from prior crises. However, these narratives can create a complex, incomplete, and conflicting representation of the actual situation, as the viewpoint of the narrator influences the content of the narrative (Seeger and Sellnow 2016; Sellnow et al. 2018).

Narratives versus non-narrative persuasion

Narratives may lead to adequate decisions during a crisis, but when risks are involved their influence can be problematic. When narratives overrule statistical information, probabilities can be ignored, resulting in suboptimal decisions. A number of studies have compared narrative to non-narrative messages, but there is no consensus to date about their effect on human behavior. In medical decision-making research, narratives have often a more persuasive effect on individual's decisions than statistical information (Fagerlin, Wang, and Ubel 2005; Ubel, Jepson, and Baron 2001). When participants had read narratives describing choices of other people regarding a treatment, they were more inclined to choose the option in line with the narratives (Fagerlin, Wang, and Ubel 2005; Study 1; Ubel, Jepson, and Baron 2001; Study 1). A study of De Wit, Das, and Vet (2008), for example, showed a stronger influence of a narrative message compared with a statistical message on perceived risk and severity of contracting hepatitis B. Betsch, Renkewitz, and Haase (2013) compared the effect of narratives, statistical information, and a combination of both on the decision to vaccinate. Although each participant received the same initial information about the base rate of adverse events regarding vaccinating, narratives had a stronger impact on perceived risk and intention to vaccinate than statistical information. However, research of Shaffer, Tomek, and Hulsey (2014) showed no effect of narratives on treatment decisions regarding breast cancer.

Studies in other domains, such as advertising, have found an equal influence or less influence of narrative messages compared with non-narrative messages. Dunlop, Wakefield, and Kashima (2010) found no advantage of a narrative over a non-narrative format in storyboards for advertisements about quitting smoking or the importance of protecting oneself from sunburn. Greene and Brinn (2003) found statistical information to be more effective than a narrative in reducing tanning bed usage.

Several meta-analyses that are conducted also showed mixed results. A meta-analysis of Allen and Preiss (1997) suggested that statistical information is more persuasive than narrative information, while a more recent meta-analysis of Reinhart (2006) did not find any differences between statistical and narrative information when all outcome measures were pooled together. However, when attitude as an outcome measure was singled out, narratives had a stronger effect than statistical information. Zebregs et al. (2015) differentiated the impact of statistical and narrative information on beliefs, attitude, and intention. Statistical information was found to have a stronger influence on beliefs and attitudes, whereas narrative information had a stronger influence on intentions.

To date, results about the persuasiveness of narratives versus non-narrative information are somewhat mixed. Shaffer and Zikmund-Fisher (2013) reasoned that this might be caused by the fact that narratives are generally seen as homogeneous. However, narratives may differ in format and content potentially leading to different results. Studies that compare narrative with non-narrative messages suggest that progress lies in investigating when and under what conditions narratives may have a stronger influence on people (Bilandzic and Busselle 2013).

Underlying mechanisms of narrative persuasion

Several models have been developed to explain the persuasive effect of narratives, such as narrative transportation and the exemplification theory. Narrative transportation means that people mentally enter a world that a story evokes. When people lose themselves in a story, their affective and cognitive responses, beliefs, attitudes, and intentions changes (Green et al. 2008; Van Laer et al. 2013). Transportation may lead to persuasion through two mechanisms. First, transportation may inhibit cognitive responding. Transported people may lose access to some real-world facts in favor of accepting the world of the narrative that has been created by the author (Green and Brock 2000). Second, through

transportation the narrative may feel like a real experience. Transported people are able to take the perspective of a character and see the narrative through this character's eyes. A consequence of such mental imagery is that people are able to deeply understand the emotions and the motivations of a character to behave in a certain way. Therefore, narrative transportation may influence the generation of affective responses, such that larger levels of transportation cause people to perceive the narrative as more realistic and, thus, to elicit stronger affective responses (Green 2004; Van Laer et al. 2013).

Related to narrative transportation is the exemplification theory. The exemplification theory addresses the formation and changes in beliefs on the basis of specific cases as examples (Dahlstrom 2014; Zillmann 2006). Gibson and Zillmann (1994) found that when narrative and statistical information are both present within a message, such as a news message that describes a general phenomenon, but also provides specific narratives, people's perceptions were more influenced by the specific narratives. Indeed, a recent study of Spence et al. (2015) on behavioral intentions toward consuming a specific type of meat (Lean Fineley Texture Beef, LFBT) showed that participants who received examples from others who, for example, avoided to eat this meat showed stronger levels of behavior intentions to avoid consuming LFBT, then those who also received factual information about consumption of LFBT. Similar results for the effect of examples on behavior were found for intentions to engage in behaviors associated with hurricanes (Westerman, Spence, and Lachlan 2009), and behavior intentions to protect against bed bugs (Westerman, Spence, and Lin 2015).

The exemplification theory posits several heuristics that evoke the persuasive effect of narratives, such as the representativeness heuristic and the availability heuristic. According to the representativeness heuristic, people estimate a frequency or probability of a situation based on similarity with a schema, stereotype, or other preexisting knowledge. As a consequence people may under- or overestimate actual frequencies and probabilities of a situation (Peters et al. 2006; Zillmann 2006). According to the availability heuristic, people estimate the frequency of a situation, or the likelihood of its occurrence, 'by the ease with which instances or associations come to mind' (Tversky and Kahneman 1973, 208). A consequence of this heuristic is that people believe that things that come to mind more easily, often the more emotional situations, are far more common and more accurate reflections of the real world. Consequently, people misjudge the frequency and magnitude of events (Zillmann 2006).

Expectations

Translating the insights of previous research on narrative versus non-narratives to a crisis situation, we predict that someone's behavior during a crisis is more strongly affected by narrative information, than by official risk information. Although meta-analyses of Allen and Preiss (1997) and Reinhart (2006) showed no persuasive effect of narratives, when the outcome variable intentions were singled out, narratives had a stronger influence compared with statistical information (Zebregs et al. 2015).

Based on the underlying mechanisms of narrative persuasion, we expect that affective responses are an important motivator for people's behavior. Based on the transportation theory, a narrative can seem quite realistic through mental imagery. As narratives are detailed, vivid, and concrete descriptions of a situation, people are able to understand the emotions and the motivation of someone to behave in a certain way. Therefore, narrative transportation may trigger affective reactions, which generally have strong effects on decision-making (Slovic et al. 2007; Winterbottom et al. 2008). In addition, based on the exemplification theory, narratives come more easily to mind, compared with the more abstract statistical risk information. Narrative information is easier to retrieve and/or coded in memory than statistical information, because of the affective responses related to the narrative information (Winterbottom et al. 2008). This also advocates the important role of affective responses in decision-making.

Present study

The aim of the current study is to give a better insight into how narrative information and statistical information influence helping behavior after the occurrence of an accident and how these types of

information interact with a governmental message, that is usually provided shortly after the incident occurred. We used a completely scripted scenario in a virtual environment, which makes it possible to have controlled manipulations yet still measure actual behavior. Another advantage is that experiencing a crisis in such a virtual environment is likely to increase more arousal than just imagining it, what makes the situation more realistic. Even though such a virtual environment is an abstraction of a real crisis situation, several studies showed that when people are faced with situations in a virtual environment, they tend to behave and respond in a similar way as in the real world (Gillath et al. 2008; Yee et al. 2007). As such, a virtual environment provides a good platform to study people's behavior during a crisis.

The virtual environment used in this study is similar to the one that was used by Stubbé, van Emmerik, and Kerstholt (2017) and Bakker, Kerstholt, and Giebels (2017). Participants were required to follow a specific route, but halfway through they witnessed a car accident. Our main research question was how the previously obtained statistical and narrative information would affect participants' reactions to this accident. The main dependent variable was whether participants would move the victim or not, as we manipulated the consequences of moving the victim in either statistical terms, as a narrative or as a combination of both types. Similar to what would occur in reality, participants received a formal crisis message shortly after the accident had occurred (Gutteling, Terpstra, and Kerstholt 2017). This way we could analyze the interaction between prior information (narratives and/or statistical information) and such crisis communication. Finally, in addition to the behavior in the virtual environment we were also interested in the question why narratives may have a stronger influence on the decisions people made. Based on previous research it is expected that narratives lead to higher affective response and higher risk awareness, compared with statistical information (e.g. Ruin, Gaillard, and Lutoff 2007; Winterbottom et al. 2008). Narratives provide a more vivid image of a situation and potential consequences, and the more precise the image, the more influence on affective response and risk awareness (Kerstholt et al. 2009; Wachinger et al. 2013).

Method

Participants

An experiment was conducted with 177 graduate students. Some students participated in exchange for course credits and some participated in exchange for 5 Euro. The data of 21 participants who failed to correctly answer the three questions about the content of prior information and crisis communication were removed,[1] leaving 156 participants for statistical analyses (mean age = 20.76, SD = 2.56; 71 females, 85 males; 141 Dutch nationality, 15 German nationality). No differences were found between the four conditions for all measured demographic variables: age, $F(3, 152) = .85$, ns., gender, $\chi^2(3, N = 156) = 5.30$, ns., and nationality, $\chi^2(3, N = 156) = 1.31$, ns. In addition, no differences were found between the four conditions for experience with accidents as a victim, $F(3, 152) = 1.41$, ns., experience with accidents as a witness, $F(3, 152) = 1.35$, ns., imagining the situation, $F(3, 152) = .41$, ns., or computer skills, $F(3, 152) = 1.42$, ns.

Design

The experiment consisted of a one-factorial between-subject design. Participants were randomly assigned to one of three types of prior information (plus one control condition): statistical, narrative, or statistical plus narrative information. In the statistical condition, participants read a newspaper article about the risk of traffic accidents, the potential consequences, and the fact that in 80% of the situations victims should not be moved, because injuries can occur or can become more severe, and thus in 20% that victims should be moved (in case of a fire or explosion risk), because otherwise not moving may lead to a fatal outcome (See Appendix 1). Participants assigned to the narrative condition read a testimonial of an individual who recently witnessed a traffic accident. In this testimonial, the person made the decision to not move the victim and this decision resulted in fatal consequences for the victim.

Participants assigned to the statistical and narrative combination, received the same information as in the statistical condition and the same narrative as in the narrative condition. To counterbalance for order of information, half of the participants in this condition, first received the statistical information and then the narrative, and the other half received it in reversed order.[2] In the control condition, participants read a newspaper article about Dutch people and their holidays, and consequently read no relevant prior information.

Participants assigned to the three prior information conditions all received the same crisis communication information in the virtual environment. One minute after the accident, participants received a text message on a virtual mobile phone, which stated that there was an accident on the bridge with explosion risk. Participants were told to take some distance and to wait for the emergency services. In the control condition, they received a text message on their mobile phone only stating that there was an accident on the bridge.

Procedure

Participants entered the experimental room and were seated behind a computer. They could immediately start reading the instructions on the computer screen. As an overarching cover story, participants were asked to imagine 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 selection round.

Participants were told that as part of the selection they were required to do a memory task, which was actually the prior information manipulation. Participants were asked to read a half-page article carefully. The content of this article depended on the experimental condition. After reading the article, a short check of the manipulated information followed and a questionnaire to measure their affective response and risk awareness.

After reading the article with the prior information manipulation, participants were introduced to the second task in which participants were entered into a virtual environment. In this virtual environment, participants were asked to help a person finding lost parcels. In fact, this was a practice scenario to learn how to control the virtual environment as a preparation on dealing with the experimental scenario. In the practice scenario, participants received instructions with a map of the virtual environment, an explanation of how to control the virtual environment, and a picture that showed control actions on the keyboard. This practice scenario lasted for about 10 min. When participants were done with the practice scenario, they started with the experimental scenario by walking to their job interview. For a detailed description of this scenario, see below.

Finally, when participants finished the experimental scenario, participants were asked to fill out a questionnaire on their computer skills, ability to imagine the situation, experiences with traffic accidents, and their sex, age, and nationality. The experiment ended with a debriefing.

Experimental scenario

Scenario

The overall task for participants was to follow a route in order to go to a job interview. On their route, participants had to cross a river using a bridge. When they approached the bridge, a truck drove past them, and shortly thereafter the sound of a claxon and colliding cars could be heard. During the collision, the screen moved and turned to white for a brief period of time. The moment the screen returned to normal a truck blocked the bridge and a car was on its side. 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, who did not take any action by themselves but they could respond to specific behaviors of participants. In all cases, participants had to take the initiative. There was one exception; immediately after the accident a bystander provided the following statement: 'Hi! I know this type of truck. Last week, such a truck was tilted and

that one contained dangerous substances. At that time there was an explosion risk, maybe it is better to take some distance'? Besides talking with bystanders, each participant had a (virtual) mobile phone for communicating and searching for information. Participants were also able to move victims. One minute after the accident, participant received a text message on their mobile phone with information about the accident (see design). The scenario ended 3 m after the accident, when the ambulance arrived. In total, the experimental scenario lasted about 6 m.

Reactions participants

Directly after the accident, participants were able to react in several ways. First of all participants were able to move victims, by selecting the option 'moving victim' in a drop down menu. In addition, participants had the possibility to communicate with victims and bystanders. They could communicate by means of a drop down menu with preselected questions and sentences. Besides, participants had a (virtual) mobile phone, which they could use by pressing a specific button. Dependent on the reaction of the participants, there would be a pre-programmed reaction from the virtual environment.

Bystanders

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

Victims

Participants could talk with victims, but only the first victim was able to say that he was in pain. Both victims moaned with pain.

Mobile phone

Participants had a (virtual) mobile phone for communication. They had the possibility to call the emergency services and to send tweets. To measure information seeking, participants had the possibility to choose between one of four Web site links with an informative name. Two of these links were relevant for the topic of traffic accidents and two Web site links were irrelevant to the topic. When participants clicked on one of the four links, they received the text that there was no Internet connection, so they received no additional information about the topic (see Kievik and Gutteling 2011).

Measures

Behavior

All actions performed by participants were registered during the experimental scenario. Participants could react in six different ways when they witnessed the accident: move a victim, contact one of the victims, contact a bystander, call the emergency service, send a tweet and search for information. For talking to victims and bystanders, we noted how often participants spoke with them. For the other four reactions (move a victim, call the emergency service, send a tweet and search for information), we registered whether participants showed these behaviors. In the data, a distinction was made between behavior before the crisis communication, after the crisis communication, and during the entire experiment. The part of the data before the crisis communication was given, was used to test the effect of the types of prior information. The part of the data after the crisis communication was used to test the interaction between prior information and crisis communication.

Affective response

Directly after the prior information manipulation, participants indicated their affective reaction in response to the risk of a traffic accident in terms of feeling tense, anxious, nervous, and concerned (7 point Likert type scale: not at all – very much; $\alpha = .90$). Affective response measures were adapted from Wiegman and Gutteling (1995).

Table 1. Pearson correlations.

		Correlations							
Constructs		1	2	3	4	5	6	7	8
1	Move victims[a]	1							
2	# Contacts victims[b]	.04	1						
3	# Contact bystanders[b]	−.20*	−.03	1					
4	Call emergencies[a]	−.21**	−.06	−.01	1				
5	Send a tweet[a]	−.15	.00	−.01	−.01	1			
6	Search for information[a]	−.24**	−.04	.12	.14	.21*	1		
7	Affective response[c]	.20*	.05	−.05	−.04	−.20*	−.08	1	
8	Risk awareness[c]	.16*	−.05	−.12	−.00	.08	−.08	.31**	1

Note: $N = 156$.
[a]Binary variables: no = 0, yes = 1.
[b]Counting variables.
[c]Scale variables: 1–7.
*$p < .05$; **$p < .01$.

Risk awareness

Straight after the affective response, we measured risk awareness (Wiegman and Gutteling 1995). Participants indicated how they judged in general the risk of a traffic accident, based on seriousness and perceptions of consequences. A six-item scale was used to assess the risk and this was measured after the prior information manipulation: 'There is a high risk of traffic accidents,''I am aware that traffic accidents occur frequently,''A traffic accident has serious consequences,''I am aware that a traffic accident might lead to personal injuries,' (scale: strongly disagree – strongly agree) and 'The probability of a traffic accident in my district is…' (7-point Likert type scale: very small – very high; $\alpha = 0.73$).

General questions and demographics

Participants reported how well they were able to imagine the situation (7-point Likert type scale: not at all – very much) and their perceived computer skills (7-point Likert type scale: not at all – very much). Participants also indicated how often they were involved in a traffic accident as a witness and as a victim. In addition, participants indicated their gender (male = 0, female = 1), age (in years), and nationality (Dutch = 0, German = 1).

Results

Correlations

Table 1 presents the Pearson correlation coefficients for the dependent variables in this study. For moving victims, several significant correlations were found. Participants who moved one of the victims, talked less often to bystanders ($r = -.20$), called less often the emergency services ($r = -.21$), and searched less often for information ($r = -.24$). In addition, participants who moved victims scored higher on affective response ($r = .20$), and risk awareness ($r = .16$).

Moving victims

A logistic regression analysis was conducted for moving victims to test if there was a difference between participants who received different prior information. Type of prior information was coded as a dummy variable, the control group was chosen as the reference variable. To be able to better understand the interplay of the types of information, and crisis communication, we made a distinction between the period before participants received the crisis communication message and afterward.

When only looking at the time period from before the crisis communication message was sent out, we only found a significant effect for the participants in the narrative condition on moving victims, compared to the control condition $\chi^2(1, N = 156) = 5.58$, $p = .018$, $e^b = 12.76$, 95% CI: 1.54–105.48, see Figure 1.

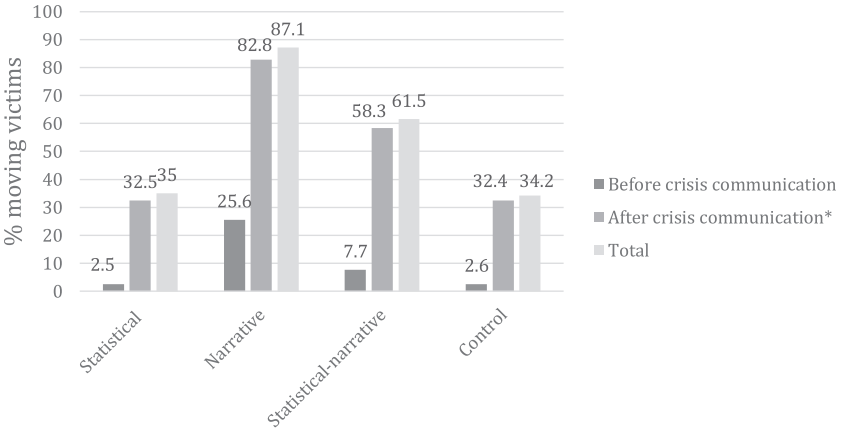

Figure 1. Percentages of moving victims between conditions.
Note: *Participants were excluded who moved one of the victims before they received the crisis communication message.

Table 2. Logistic regression moving victims during entire experiment.

Predictor	β	$SE\,\beta$	Wald's χ^2	df	p	e^{β}
Constant	−.65	.34	3.66	1	.056	.52
Statistical vs. control	.04	.48	0.01	1	.942	1.04
Narrative vs. control	2.57	.59	19.08	1	.000	13.08
Statistical/narrative vs. control	1.12	.48	5.61	1	.018	3.08
Test			χ^2	df	p	
Omnibus test of model coefficients			32.54	3	.000	

Notes: Model summary: −2 Log likelihood = 182.46, Cox & Snell R^2 = .19, Nagelkerke R^2 = .25. N = 156.

In short, before the crisis communication message was sent, only in the narrative condition we found that the victims were more often moved compared to the control condition.

However, when looking at the time period after the crisis communication,[3] a significant effect was found for the narrative condition, $\chi^2(1, N = 141) = 14.53$, $p < .001$, $e^b = 10.00$, 95% CI: 3.06–32.68, and for the statistical plus narrative information condition, $\chi^2(1, N = 141) = 1.07$, $p = .028$, $e^b = 2.92$, 95% CI: 1.12–7.58, when a comparison was made with the control condition. This indicates that, in the period after the crisis communication was sent, victims were moved more often in the narrative condition and the statistical plus narrative information condition compared with the control condition. In addition, participants who read both types of information (statistical plus narrative information) moved victims less often compared with participants who only read the narrative, $\chi^2(1, N = 141) = 4.27$, $p = .039$, $e^b = 3.43$, 95% CI: 1.07–11.04, indicating an attenuating effect of statistical information on the effect of narratives.

When looking at the entire experiment, the period before and after the crisis communication together, there is no difference between the statistical condition and the control condition with regard to moving victims, $\chi^2(1, N = 156) = .01$, ns., $e^b = 1.04$, 95% CI: .41–2.63, see Table 2. Therefore, participants who had read statistical information about moving victims moved victims as often as participants who did not receive any relevant information. However, participants who read a narrative about moving a victim after an accident, moved victims more often, as compared with the control condition, $\chi^2(1, N = 156) = 19.08$, $p < .001$, $e^b = 13.08$, 95% CI: 4.13–41.44, and with the statistical information condition, $\chi^2(1, N = 156) = 18.95$, $p < .001$, $e^b = 12.63$, 95% CI: 4.03–39.55. Participants who read both statistical information and the narrative moved victims more often, compared with the control condition, $\chi^2(1, N = 156) = 5.61$, $p = .018$, $e^b = 3.08$, 95% CI: 1.21–7.80, and the statistical information condition, $\chi^2(1, N = 156) = 5.44$, $p = .020$, $e^b = 2.97$, 95% CI: 1.19–7.42. However, participants who read both types of

Table 3. Means, standard deviations, and percentages per condition.

	Statistical	Narrative	Statistical – narrative	Control
Move victims[a] *N* (%)	14 (35.0)	34 (87.2)	24 (61.5)	13 (34.2)
# Contact victims[b] *M* (SD)	5.48 (5.32)	6.00 (3.33)	5.64 (4.15)	4.16 (2.85)
# Contact bystanders[b] M (SD)	3.43 (3.34)	2.54 (2.30)	4.23 (3.64)	3.92 (3.66)
Call emergencies[a] *N* (%)	30 (75.0)	24 (61.5)	28 (71.8)	26 (68.4)
Search for information[a] *N* (%)	4 (10.0)	3 (7.7)	6 (15.4)	10 (26.3)
Send a tweet[a] *N* (%)	1 (2.5)	0 (0.0)	0 (0.0)	2 (5.3)
Affective response[c] *M* (SD)	3.81 (1.28)	4.69 (1.02)	4.50 (1.24)	3.83 (1.39)
Risk awareness[c] *M* (SD)	4.96 (.78)	5.16 (.86)	5.06 (.84)	4.79 (.84)

Note: $N = 156$.
[a]Binary variables: no/yes.
[b]Counting variables.
[c]Scale variables: 1–7.

information (statistical plus narrative information) moved victims less often compared with participants who only read the narrative, $\chi^2(1, N = 156) = 6.20$, $p = .013$, $e^b = .24$, 95% CI: .08–.74.

Other behavior

Besides moving victims, participants had several other options in the virtual environment: talking to victims, talking to bystanders, calling the emergency services, sending a tweet, and searching for information. Table 3 displayed the mean scores or percentages on these various types of behavior for the four types of prior information.

Analyses showed no significant effects between the four conditions on talking to victims, talking to bystanders, calling the emergency services, and checking the information app, all p = ns. In addition, we found no effect on sending a tweet, probably due to the low number of participants who sent a tweet ($N = 3$).

Affective response and risk awareness

To learn more why certain information has more influence on people's decisions, we were also interested in whether type of prior information (statistical, narrative, or both) has an influence on affective response and risk awareness. Analysis of variance was applied. Table 3 presents the means on these measures for the four types of prior information.

Affective response

Consistent with the manipulation of type of prior information, significant differences were found between the conditions on affective response, $F(3, 152) = 5.31$, $p = .002$, partial $\eta^2 = .10$. Pairwise *post hoc* comparisons, using a Bonferroni adjustment, showed that affective response was rated significantly higher in the narrative condition ($M = 4.69$), compared to the statistical condition ($M = 3.81$, $p = .011$) and control condition ($M = 3.83$, $p = .016$). The difference between the narrative condition and the statistical plus narrative information condition ($M = 4.50$), however, was not significant. In addition, the statistical plus narrative information condition scored also marginal higher on affective response, compared to the statistical condition ($p = .083$).

Risk awareness

No effects were found for type of prior information on risk awareness, all p = ns.

Mediation analysis

To investigate whether affective responses mediate the relationship between type of prior information and moving victims, we used a multiple mediator process model that allows for a multicategorical independent variable (Hayes and Preacher 2013). With this model we estimated the confidence intervals (based on 10,000 bootstraps) of the indirect effect of type of prior information on moving victims, through affective response. Consistent with our previous analyses, we found direct effects of narratives, $b = .86$, SE = .28, $p = .003$, 95% CI [.31; .1.42], and affective response on moving victims, $b = 2.46$, SE = .60, $p < .001$, 95% CI [1.29; 3.63]. However, the indirect effect of narratives on moving victims through affective response did not differ significantly from zero, $b = .12$, 95% CI [–.10; .45]. Therefore, affective response did not mediate the relationship between narratives and moving victims.

Discussion

Decision-making during a crisis is affected by several sources of information and prior knowledge, such as factual (statistical) information, narratives of others, and real-time governmental messages. Our main research question was how these two types of information, provided separately or simultaneously, influence behavior during two distinct phases of an incident: before and after an official crisis message was provided. In line with our expectations, the results show that in times of relative uncertainty about the situation (i.e. before the crisis communication), victims were most often moved by participants who had only received the narrative information. This result was to be expected as the narrative vividly highlighted a potential negative effect of not moving the victim, whereas in the statistical information this potential consequence was only mentioned. The persuasive effect of the narrative is consistent with prior research in medical decision-making, which shows that narratives often have a stronger influence on individual's decisions regarding a treatment than statistical information (Fagerlin, Wang, and Ubel 2005; Ubel, Jepson, and Baron 2001; Winterbottom et al. 2008). This result is also in line with the meta-analysis of Zebregs et al. (2015), which made a differentiation on the outcome measures. Narrative information was found to have a stronger influence on behavioral tendencies. However, when participants had also received statistical information besides the narrative, this persuasive effect was reduced. So despite the persuasive strength of narratives, participants' decisions were mostly informed by the statistical information. This result corresponds with the findings of Fagerlin, Wang, and Ubel (2005), which were obtained in the medical domain.

However, after the crisis message was received, victims were not only moved more often by participants who had received the narrative information, but also by those who had received both statistical and narrative information. In the statistical information condition, the same percentage was found as in the control condition. The crisis communication message informed participants that the situation could be dangerous, and that they should take some distance and wait for the emergency services to arrive. In all conditions the number of victim movements increased after this message, but most so in the narrative condition and the statistical plus narrative information condition. So unlike the first phase, we did not see a mitigating effect of the statistical information on the narrative information.

One explanation for the persuasive effect of narratives on decision-making may be that affective responses (e.g. stress and anxiety) are triggered, which generally have strong effects on decision behavior (Betsch, Renkewitz, and Haase 2013; Slovic et al. 2007; Winterbottom et al. 2008). In line with this explanation, we found that participants had stronger affective responses in the narrative condition and in the statistical plus narrative condition, than in the control and statistical conditions. However, in contrast to what we expected, we did not find that affective responses mediate the relationship between type of prior information and moving victims. This suggests that the persuasive effect of narratives is caused by other mechanisms than affect. Based on the theory of narrative transportation, narratives

could inhibit negative cognitive responding. As a consequence people are less open to counter arguments, and less aware of real-world facts that contradict the assertions made in the narrative (Green and Brock 2000). The exemplification theory, on the other hand, exerts that narratives evoke specific heuristics, such as the representativeness heuristic and the availability heuristic (Gibson and Zillmann 1994; Zillmann 2006). Common in both heuristics is that people's perceptions are strongly influenced by examples that come to mind easily, under or overestimating the actual frequencies of situations. Fur future research, it would be interesting to systematically investigate why narratives have this persuasive effect on decision-making and behavior.

We found no evidence to support our expectation that prior information influences risk awareness. This contrasts with previous research, where it was found that narratives led to a higher level of risk awareness, compared with statistical information (Fagerlin, Wang, and Ubel 2005; Wachinger et al. 2013). A possible explanation is that the crisis situation in this study was quite clear and relatively common. Most people already have some awareness of risks involving traffic accidents. This familiarity could have moderated the effect of additional information on risk awareness, even when it is a narrative. Another explanation may be that the content of our messages was not well suited to influence risk awareness, as none of the messages involved any personal risk for the participants (Kievik and Gutteling 2011).

While this study revealed several interesting effects of different types of information on decision-making during a crisis, we wish to acknowledge some limitations and strengths of this experimental study. One important limitation of this study is that our results are only based on one very specific form of a narrative (a vivid portrayal of possible consequences when someone decide not to not move a victim after a car accident) and one specific form of statistical information (probability information about moving a victim and potential consequences). Results may be different when the information contains a different purpose, content or valence and for that reason our results cannot be generalized to narrative and statistical information in general (Shaffer and Zikmund-Fisher 2013; Steiner 2005). Another concern regarding the generalizability of our results is that we used one specific (virtual) crisis situation that was relatively clear. In real life, most crisis situations are far more complex, with more victims and helpers, a broad range of response options, more confusion about what exactly is going on, and where something is actually at stake. Although the virtual environment allowed us to measure actual behavior instead of intentions, and helped reach high levels of immersion and realism, it is still not completely similar to actual crisis situations. More research is needed to investigate the effects of these additional variables on human behavior in crisis situations.

Another limitation of the current study is that the type of information manipulation was given just before participants were confronted with the traffic accident. In real life, there is often time between receiving information about a potential crisis (e.g. narratives and risk information), and an actual crisis situation. This may lead to an overestimation of the effect of narratives in our research. As noted by Baumeister et al. (2007) the affective response related to a narrative is likely to diminish over a period of time, or is likely to be overruled by affective reactions triggered by other situations. This suggests that the effect of statistical information lasts longer, compared with the narrative. However, as our research showed, a trigger such as an official governmental message can enable people to recall previously stored information, and this can again increase the influence of the narrative on people's behavior. To gain more insight into the persistence of the effect of narratives, future research should focus on research designs where the crisis follows the prior information after a longer period of time, or one with some cognitive or affective load between the information and the crisis.

Our results provide valuable implications for governmental institutions and crisis management organizations. First, what has been learned about the persuasive effect of narratives can be used to create more effective campaigns in order to stimulate adequate behavior during a crisis. Most campaigns are only focused on statistics and factual information about risks and protective behaviors, but our research showed that narratives could have a stronger influence on people's behavior. To create a more effective campaign, it may be wise to include narratives of people who tell about their own experiences with crises, as this may enhance the influence of the information on people's behavior during an actual crisis. Additional research is needed to investigate how these narratives can best be

disseminated (this can be done for example via short movies or written crisis stories). Second, in today's digital society, narratives are not only shared personally. Immediately after a crisis, a lot of narratives about the crisis spread rapidly through citizens' online social networks. As our research shows the persuasive effect of narratives on people's behavior, we advise governmental institutions and crisis management organizations to monitor the narratives on social media during a crisis. By doing so, they can adequately respond to incorrect or inappropriate crisis information conveyed in the narratives, which may help to stimulate adequate behavior during crises. In addition, it is important to respond in a personal way to make it look like a narrative of a real person instead of an institution for a stronger influence on behavior. However, future research needs to investigate whether real-time responding in a personal way to 'wrong' information actually helps in stimulating adequate behavior during crises.

In conclusion, our results indicate that more victims were moved in the narrative condition before an official message was received. Participants who had received statistical information or both types of information performed similar to the control condition. After the official message, informing participants to keep distance, more victims were moved in the narrative condition and in the combined narrative and statistical condition. A narrative therefore has stronger effects when (information about) the actual situation matches the narrative's content. In contrast with our expectations, affective response did not mediate the relationship between narrative information and moving victims. An alternative explanation would be that narratives trigger a more heuristic way of information processing.

Notes

1. The 21 of 177 participants who had to be excluded were equally distributed across conditions.
2. Analyses showed no order effects.
3. Note that this analysis only included participants who had not already moved one of the participants.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Allen, Mike, and Raymond W. Preiss. 1997. "Comparing the Persuasiveness of Narrative and Statistical Evidence Using Meta-analysis." *Communication Research Reports* 14 (2): 125–131. doi:10.1080/08824099709388654.

Bakker, Marije H., José H. Kerstholt, and Ellen Giebels. 2018. "Deciding to Help: Effects of Risk and Crisis Communication." *Journal of Contingencies and Crisis Management* 26 (3). doi: 10.1111/1468-5973.12155.

Baumeister, Roy F., Kathleen D. Vohs, C. Nathan DeWall, and Liqing Zhang. 2007. "How Emotion Shapes Behavior: Feedback, Anticipation, and Reflection, rather than Direct Causation." *Personality and Social Psychology Review* 11 (2): 167–203. doi:10.1177/1088868307301033.

Betsch, C., Frank Renkewitz, and Niels Haase. 2013. "Effect of Narrative Reports about Vaccine Adverse Events and Bias-Awareness Disclaimers on Vaccine Decisions a Simulation of an Online Patient Social Network." *Medical Decision Making* 33 (1): 14–25. doi:10.1177/0272989X12452342.

Bilandzic, Helena, and Rick Busselle. 2013. "Narrative Persuasion." In *The Sage Handbook of Persuasion: Developments in Theory and Practice*, edited by J. P. Dillard and L. Shen, 200–219. Los Angeles: SAGE publictations.

Brenkert-Smith, Hannah, Katherine L. Dickinson, Patricia A. Champ, and Nicholas Flores. 2013. "Social Amplification of Wildfire Risk: The Role of Social Interactions and Information Sources." *Risk Analysis* 33 (5): 800–817. doi:10.1111/j.1539-6924.2012.01917.x.

Dahlstrom, Michael F. 2014. "Using Narratives and Storytelling to Communicate Science with Nonexpert Audiences." *Proceedings of the National Academy of Sciences* 111 (Supplement 4): 13614–13620. doi:10.1073/pnas.1320645111.

De Wit, John B. F., Enny Das, and Raymond Vet. 2008. "What Works Best: Objective Statistics or a Personal Testimonial? An Assessment of the Persuasive Effects of Different Types of Message Evidence on Risk Perception." *Health Psychology* 27 (1): 110–115. doi:10.1037/0278-6133.27.1.110.

Dunlop, Sally M., Melanie Wakefield, and Yoshihisa Kashima. 2010. "Pathways to Persuasion: Cognitive and Experiential Responses to Health-Promoting Mass Media Messages." *Communication Research* 37 (1): 133–164. doi:10.1177/0093650209351912.

Eisenman, D. P., K. M. Cordasco, S. Asch, J. F. Golden, and D. Glik. 2007. "Disaster Planning and Risk Communication with Vulnerable Communities: Lessons from Hurricane Katrina." *American Journal of Public Health* 97 (1): S109–S115. doi:10.2105/AJPH.2005.084335.

Fagerlin, Angela, Catharine Wang, and Peter A. Ubel. 2005. "Reducing the Influence of Anecdotal Reasoning on People's Health Care Decisions: Is a Picture worth a Thousand Statistics?" *Medical Decision Making* 25 (4): 398–405. doi:10.1177/0272989X05278931.

Fernandez, Lauren, Joseph Barbera, and Johan Van Dorp. 2006. "Strategies for Managing Volunteers during Incident Response: A Systems Approach." *Homeland Security Affairs*2 (3), 1–15.

Galea, Sandro, Melissa Tracy, Fran Norris, and Scott F. Coffey. 2008. "Financial and Social Circumstances and the Incidence and Course of PTSD in Mississippi during the First Two Years after Hurricane Katrina." *Journal of Traumatic Stress* 21 (4): 357–368. doi:10.1002/jts.20355.

Gibson, Rhonda, and Dolf Zillmann. 1994. "Exaggerated versus Representative Exemplification in News Reports: Perception of Issues and Personal Consequences." *Communication Research* 21 (5): 603–624. doi:10.1177/009365094021005003.

Gillath, Omri, Cade McCall, Phillip R. Shaver, and Jim Blascovich. 2008. "What Can Virtual Reality Teach Us about Prosocial Tendencies in Real and Virtual Environments?" *Media Psychology* 11 (2): 259–282. doi:10.1080/15213260801906489.

Green, Melanie C. 2004. "Transportation into Narrative Worlds: The Role of Prior Knowledge and Perceived Realism." *Discourse Processes* 38 (2): 247–266. doi:10.1207/s15326950dp3802_5.

Green, Melanie C., and Timothy C. Brock. 2000. "The Role of Transportation in the Persuasiveness of Public Narratives." *Journal of Personality and Social Psychology* 79 (5): 701–721. doi:10.1037/0022-3514.79.5.701.

Green, Melanie C., Sheryl Kass, Jana Carrey, Benjamin Herzig, Ryan Feeney, and John Sabini. 2008. "Transportation across Media: Repeated Exposure to Print and Film." *Media Psychology* 11 (4): 512–539. doi:10.1080/15213260802492000.

Greene, Kathryn, and Laura S. Brinn. 2003. "Messages Influencing College Women's Tanning Bed Use: Statistical versus Narrative Evidence Format and a Self-Assessment to Increase Perceived Susceptibility." *Journal of Health Communication* 8 (5): 443–461. doi:10.1080/713852118.

Gutteling, Jan M., José Kerstholt, Teun Terpstra, and N. Van As. 2014. *Gebruik en effecten van NL-Alert* [The use and effects of NL-Alert]. Enschede: Universiteit Twente-Faculteit Gedragswetenschappen.

Gutteling, Jan M., Teun Terpstra, and José H. Kerstholt. 2017. "Citizens' Adaptive or Avoiding Behavioral Response to an Emergency Message on Their Mobile Phone." *Journal of Risk Research* 82: 1–13. doi:10.1080/13669877.2017.1351477.

Hayes, Andrew F., and Kristopher J. Preacher. 2013. "Statistical Mediation Analysis with a Multicategorical Independent Variable." *British Journal of Mathematical and Statistical Psychology* 67 (3): 451–470. doi:10.1111/bmsp.12028.

Hur, Joon-Young. 2012. "Disaster Management from the Perspective of Governance: Case Study of the Hebei Spirit Oil Spill." *Disaster Prevention and Management: An International Journal* 21 (3): 288–298. doi:10.1108/09653561211234471.

Kerstholt, Jose H., Fred van der Zwaard, Hans Bart, and Anita Cremers. 2009. "Construction of Health Preferences: A Comparison of Direct Value Assessment and Personal Narratives." *Medical Decision Making* 29 (4): 513–520. doi:10.1177/0272989X09331809.

Kievik, Milou, and Jan M. Gutteling. 2011. "Yes, We Can: Motivate Dutch Citizens to Engage in Self-Protective Behavior with Regard to Flood Risks." *Natural Hazards* 59 (3): 1475–1490. doi:10.1007/s11069-011-9845-1.

Lindell, Michael K., and Ronald W. Perry. 2012. "The Protective Action Decision Model: Theoretical Modifications and Additional Evidence." *Risk Analysis* 32 (4): 616–632. doi:10.1111/j.1539-6924.2011.01647.x.

Messias, De Anne K. Hilfinger, Clare Barrington, and Elaine Lacy. 2012. "Latino Social Network Dynamics and the Hurricane Katrina Disaster." *Disasters* 36 (1): 101–121. doi:10.1111/j.1467-7717.2011.01243.x.

Olsen, Christine S., and Bruce A. Shindler. 2010. "Trust, Acceptance, and Citizen–Agency Interactions after Large Fires: Influences on Planning Processes." *International Journal of Wildland Fire* 19 (1): 137–147. doi:10.1071/WF08168.

Peters, Ellen, Kevin D. McCaul, Michael Stefanek, and Wendy Nelson. 2006. "A Heuristics Approach to Understanding Cancer Risk Perception: Contributions from Judgment and Decision-Making Research." *Annals of Behavioral Medicine* 31 (1): 45–52. doi:10.1207/s15324796abm3101_8.

Plapp, T., and U. Werner. 2006. "Understanding Risk Perception from Natural Hazards: Examples from Germany." *Risk* 21: 101–108.

Reinhart, Amber Marie. 2006. *Comparing the Persuasive Effects of Narrative versus Statistical Messages: A Meta-analytic Review*. Buffalo, NYState University of New York at Buffalo.

Reynolds, B., and M. W. Seeger. 2005. "Crisis and Emergency Risk Communication as an Integrative Model." *Journal of Health Communication* 10 (1): 43–55. doi:10.1080/10810730590904571.

Ruin, Isabelle, Jean-Christophe Gaillard, and Celine Lutoff. 2007. "How to Get There? Assessing Motorists' Flash Flood Risk Perception on Daily Itineraries." *Environmental Hazards* 7 (3): 235–244. doi:10.1016/j.envhaz.2007.07.005.

Seeger, M. W. 2006. "Best Practices in Crisis Communication: An Expert Panel Process." *Journal of Applied Communication Research* 34 (3): 232–244. doi:10.1080/00909880600769944.

Seeger, Matthew, and Timothy L. Sellnow. 2016. *Narratives of Crisis: Telling Stories of Ruin and Renewal*. Stanford: Stanford University Press.

Sellnow, Timothy L., Deanna D. Sellnow, Emily M. Helsel, Jason M. Martin, and Jason S. Parker. 2018. "Risk and Crisis Communication Narratives in Response to Rapidly Emerging Diseases." *Journal of Risk Research*: 1–12.

Shaffer, Victoria A., and Brian J. Zikmund-Fisher. 2013. "All Stories Are Not Alike: A Purpose-, Content-, and Valence-Based Taxonomy of Patient Narratives in Decision Aids." *Medical Decision Making* 33 (1): 4–13. doi:10.1177/0272989X12463266.
Shaffer, Victoria A., Sara Tomek, and Lukas Hulsey. 2014. "The Effect of Narrative Information in a Publicly Available Patient Decision Aid for Early-Stage Breast Cancer." *Health Communication* 29 (1): 64–73. doi:10.1080/10410236.2012.717341.
Slovic, Paul, Melissa L. Finucane, Ellen Peters, and Donald G. MacGregor. 2007. "The Affect Heuristic." *European Journal of Operational Research* 177 (3): 1333–1352. doi:10.1016/j.ejor.2005.04.006.
Spence, Patric R., Kenneth A. Lachlan, Xialing Lin, Deborah D. Sellnow-Richmond, and Timothy L. Sellnow. 2015. "The Problem with Remaining Silent: Exemplification Effects and Public Image." *Communication Studies* 66 (3): 341–357.
Steelman, Toddi A., and Sarah McCaffrey. 2013. "Best Practices in Risk and Crisis Communication: Implications for Natural Hazards Management." *Natural Hazards* 65 (1): 683–705. doi:10.1007/s11069-012-0386-z.
Steiner, John F. 2005. "The Use of Stories in Clinical Research and Health Policy." *JAMA* 294 (22): 2901–2904. doi:10.1001/jama.294.22.2901.
Stubbé, H. E., M. L. van Emmerik, and J. H. Kerstholt. 2017. "Helping Behavior in a Virtual Crisis Situation: Effects of Safety Awareness and Crisis Communication." *Journal of Risk Research* 20 (4): 433–444. doi:10.1080/13669877.2015.1071865.
Sutton, Jeannette, Emma S. Spiro, Britta Johnson, Sean Fitzhugh, Ben Gibson, and Carter T. Butts. 2014. "Warning Tweets: Serial Transmission of Messages during the Warning Phase of a Disaster Event." *Information, Communication & Society* 17 (6): 765–787. doi:10.1080/1369118X.2013.862561.
Tversky, Amos, and Daniel Kahneman. 1973. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5 (2): 207–232. doi:10.1016/0010-0285(73)90033-9.
Ubel, Peter A., Christopher Jepson, and Jonathan Baron. 2001. "The Inclusion of Patient Testimonials in Decision Aids." *Medical Decision Making* 21 (1): 60–68. doi:10.1177/0272989X0102100108.
Van Laer, Tom, Ko De Ruyter, Luca M. Visconti, and Martin Wetzels. 2013. "The Extended Transportation-Imagery Model: A Meta-Analysis of the Antecedents and Consequences of Consumers' Narrative Transportation." *Journal of Consumer Research* 40 (5): 797–817. doi:10.1086/673383.
Wachinger, Gisela, Ortwin Renn, Chloe Begg, and Christian Kuhlicke. 2013. "The Risk Perception Paradox-Implications for Governance and Communication of Natural Hazards." *Risk Analysis* 33 (6): 1049–1065. doi:10.1111/j.1539-6924.2012.01942.x.
Westerman, David, Patric R. Spence, and Kenneth A. Lachlan. 2009. "Telepresence and the Exemplification Effects of Disaster News." *Communication Studies* 60 (5): 542–557.
Westerman, David, Patric R. Spence, and Xialing Lin. 2015. "Telepresence and Exemplification in Health Messages: The Relationships among Spatial and Social Presence and Exemplars and Exemplification Effects." *Communication Reports* 28 (2): 92–102.
Wiegman, Oene, and Jan M. Gutteling. 1995. "Risk Appraisal and Risk Communication: Some Empirical Data from the Netherlands Reviewed." *Basic and Applied Social Psychology* 16 (1–2): 227–249. doi:10.1080/01973533.1995.9646111.
Winterbottom, Anna, Hilary L. Bekker, Mark Conner, and Andrew Mooney. 2008. "Does Narrative Information Bias Individual's Decision Making? A Systematic Review." *Social Science and Medicine* 67 (12): 2079–2088. doi:10.1016/j.socscimed.2008.09.037.
Yee, Nick, Jeremy N. Bailenson, Mark Urbanek, Francis Chang, and Dan Merget. 2007. "The Unbearable Likeness of Being Digital: The Persistence of Nonverbal Social Norms in Online Virtual Environments." *CyberPsychology & Behavior* 10 (1): 115–121. doi:10.1089/cpb.2006.9984.
Zebregs, Simon, Bas van den Putte, Peter Neijens, and Anneke de Graaf. 2015. "The Differential Impact of Statistical and Narrative Evidence on Beliefs, Attitude, and Intention: A Meta-Analysis." *Health Communication* 30 (3): 282–289. doi:10.1080/10410236.2013.842528.
Zillmann, Dolf. 2006. "Exemplification Effects in the Promotion of Safety and Health." *Journal of Communication* 56 (1): S221–S237. doi:10.1111/j.1460-2466.2006.00291.x.

Appendix 1. Manipulation type of information

Participants in the statistical-narrative condition received both the statistical information and the narrative. All manipulations are translated from Dutch.

Statistical information

Never had so much traffic accidents

The number of traffic accidents whereby cars were involved has increased in the past year to a record of 5,00,000 reports. That shows the Risk-monitor Traffic 2015 written by the Association of Insurers. The exact number is unknown, because a traffic accident is not registered when the police is not warned.

Further, the study shows that traffic accidents lead to an estimation of 8,40,000 injuries every year. Medical treatment by a doctor was needed in 40% of these cases. In addition, 20% was treated in the emergency room and nearly 10% was admitted to the hospital. Finally, 950 people were deceased in traffic accidents.
The first minutes after a traffic accident are crucial to a successful outcome and full recovery of victims. Research shows that in 80% of the situations, victims should not be moved after an accident, because injuries can occur or can become more severe. However, in 20% of the situations victims should be moved because of immediate environmental hazards, such as a fire or explosion risk. Otherwise, not moving may lead to a fatal outcome.

Narrative

A narrative about an own experience

Anne: 'It was a big nightmare. On that particular evening I was on my way home, when I witnessed a terrible accident. A truck collided with the car that drove in front of me. After I stopped my car I ran straight to the location of the accident. In the car that was hit, I saw a man with a lot of scratches, he looked deathly pale and seemed in shock. There was a lot of blood on his leg, but I was not able to clearly see the wound. I decided to not move the victim and to wait for the emergency services. Until I realized that there was a lot of smoke that came from the hood of the car, and before I realized what was going on the entire car was ablaze. I tried to get the victim out of the car, but I was not able to do that because of all the flames. At this moment I still feel very guilty about this. If I had moved the victim immediately to a safe place, then the whole situation was ended differently'.

Control

Many Dutch go on holiday

The number of Dutch citizens going on holiday this summer has risen to a record of 12.5 million people this year.
This is reflected in the ANWB vacation plans-monitor 2015. The exact number is unknown, because a holiday is only registered when the holiday is booked through a authorized travel agency.
The survey further shows that people spend approximately 1500 euros annually on their vacation. By 40% of the people, the holiday money is used to pay their holiday. In addition, 20% spent their year-end benefits and 10% of the holidaymakers use their savings to pay their holiday. Finally, a small percentage takes a loan.
For couples and families, the woman is decisive in booking a holiday. The survey shows that in 80% of the situations, the woman searches the holiday, because she is the major regulator and is the most active one in seeking and booking holidays. However, in 20% of the situations, the whole family helps in figuring out the holiday, even if the woman is finally the big regulator.