Bachelor Thesis:
The Effects of Fear Appeal and Humour on the Willingness to Take Risk-Mitigating Actions in a Flood Scenario

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Abstract

As rising sea levels and resulting floods become a problem of ever-increasing scope, the employment of risk communication is of great importance to enhance one's individual flood risk management to take risk-mitigating actions. Many risk communication messages contain the common fear appeal approach to create awareness of a risk. However, the fear appeal approach as a type of risk communication does not necessarily provide a one-size-fits-all solution since not all people are equally receptive to messages of risk communication. Therefore, this research focuses, in addition to the fear appeal approach, on a different kind of message, namely a humorous one, in order to increase risk awareness. By implementing various levels of efficacy beliefs which are measured on different scales (RBDS and GSE), it is possible to draw inferences about the impact of different types of messages combined with different levels of self-efficacy on one's likelihood to take risk-mitigating actions in a flood scenario. This study was a 2 (Type of Message: Fear Appeal vs. Humorous Approach) x 2 (Level of Self-Efficacy: high vs. low) between-subject experiment. Since the effects of humour are of exploratory nature but constitute a good alternative to the fear appeal approach, it is expected that participating in the Humorous/high Self-Efficacy condition lead to the greatest intention to prepare for a flood. Results show that neither the Type of Message to create risk awareness nor the Level of Self-Efficacy has an impact on one's Behavioural Intention. However, when forming new Self-Efficacy conditions, based on one's score on the RBDS and GSE scale, significant differences were found between the conditions. Interestingly, the RBDS seemed to be more suitable to the Fear Appeal approach, yielding significant differences between the high and low Self-Efficacy condition, while the GSE scale seemed to be more applicable to the Humorous condition where the high levels of Self-Efficacy showed a significantly higher Behavioural Intention compared to the low Self-Efficacy condition.

Introduction

During the last decade, especially, climate change became a topic of ever-increasing importance (Christensen, Aldrian, & Ambrizzi, 2011). Recent news and studies have shown that Antarctica's ice caps are melting faster than ever. Many scientists did not expect this sudden acceleration, which took place already during the last decades and will continue in the future (Fox, 2019). Melting of the ice caps is only one of the consequences of climate change and global warming. This has a tremendous impact on many lives. Particularly, coastal cities are at risk if the ice caps continue to melt, and the sea level rises further. Scientists have estimated that if the sea level continues to rise by 1.80m, numerous coastal cities will be flooded (Pettit, 2019). This poses a risk for a large number of people since not only coastal areas are endangered but consequently, cities and towns close to rivers as well. Based on that, the question arises: How is it possible to create awareness for such a risk of this magnitude?

A study from 2003 already found an increasing trend towards heavier and more frequent episodes of flooding (Christensen & Christensen, 2003). This finding can be confirmed by recent reports of increased numbers of floods all around the globe, for example in France, August 2018, in China, July 2018, or Japan, summer 2018, to name a few (BBC, 2018; McKirdy, 2018; Reliefweb, n.d.). Since there are many different causes for floods to arise, the implementation and success of adaption to rising sea levels cannot be foreseen and are therefore large uncertainties (Nicholls & Cazenave, 2010). Consequently, the possible threats of a rising sea level require further analysis of the impact.

The Netherlands, particularly, like many other coastal countries, are at risk for episodes of flooding. 26% of the country lies below sea level, heightening the risk for flooding (Van Nes, Horsten, & Faddegon, 2011). All over the country, dykes were built and cooperative systems established in order to improve flood risk management within those regions (Van Nes, Horsten, & Faddegon, 2011). For the last years, the Netherlands has been working on measures on how to improve the protection for the rise of sea level as well as improving the overall safety (Nicholls & Cazenave, 2010). This indicates that in the respective regions, appropriate safety and protection measures have been taken. For the moment, those measures are helpful but if the weather conditions continue to change in future, one cannot be certain to what extent the Netherlands will be affected by the magnitude of floods (Ministry of Transport, Public Works and Water Management, 2006). As a result, one cannot exclude that floods might happen any time in the future, possibly unexpectedly.

During its risk management analysis, the Dutch government has come to realise that they are not able to guarantee safety to all citizens in case of a flood (Terpstra & Gutteling,

2008). Consequently, one's individual flood risk management is of increasing importance. According to Terpstra and Gutteling (2008), this involves one's own responsibility of taking risk-mitigating actions like having a proper insurance but also being aware of what measures are expected during a flood, like having a sufficient number of bottles of water or having an escape route planned in case water is starting to enter one's home. A study by Lalwani and Duval (2000) has shown that if people generally fail to recognise their responsibility, they also failed to take responsibility under conditions of a high threat, leading to the fact of not having enough resources to cope with the risk. As a result, even if a threat is enormous, it does not automatically mean that every individual is preparing for the threat or its possible consequences. Since the government cannot guarantee protection for every citizen either, taking own responsibility for the effects of a flood is essential. Based on this necessity to take risk-mitigating actions individually, the research question arises: Under which circumstances is one more inclined to prepare for a possible flood and its consequences?

Whether someone prepares for a threat and its consequences depends on a number of factors. One major factor that influences one's likelihood to take risk-mitigating actions is the perception of the risk. Risk perception focuses on how an individual would perceive a specific risk and how this person would assess this threat, as more or less dangerous. According to Cremers et al. (2014), the definition of risk perception involves simply the fact of being aware that a certain threat might occur and what risk it poses. Sjöberg (2000) mentions numerous factors which have the potential to influence one's risk perception. In his research, he came to the conclusion that not all factors influence risk perception equally. One prominent factor which seems to influence risk perception is one's attitude. He suggests that attitude influences risk perception, which in turn leads to the conclusion that one's individual risk perception is based on norms and values (Sjöberg, 2000). This would imply that risk communication cannot be generalised and that a one-size-fits-all approach cannot be used when trying to communicate a threat. Thereby, the individuality and uniqueness of risk perception are stressed.

Since risk perception appears to be non-uniform, disagreement between the definitions of several authors can be found. Generally, in order to measure one's behavioural intention, the Protection Motivation Theory (PMT) (Rogers, 1975) can be used, which focuses on fear arousal as a mean to initiate behavioural intention. According to Rogers (1975), two aspects, namely 'threat' and 'coping' have an impact on the intention to take action and lastly, the behaviour itself (Figure 1).

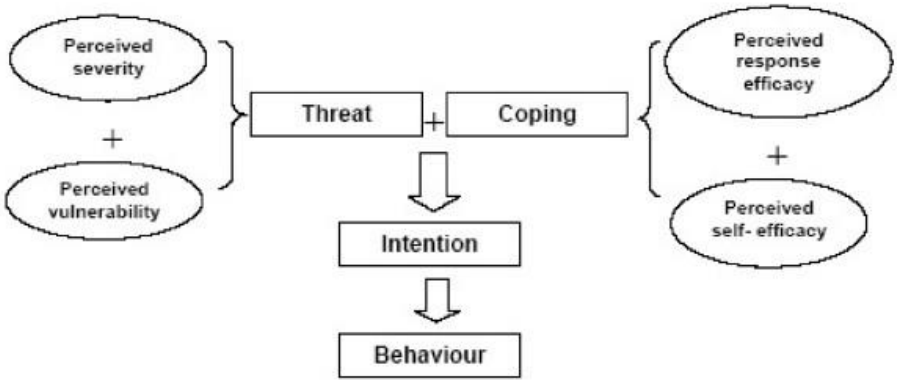

Figure 1. Protection Motivation Theory (Lee et al., 2007).

The aspect of threat generally falls under the definition of risk perception, while coping can be considered as equal to self-efficacy. Self-efficacy is a construct which is defined as one's own belief to be able to reach a goal or being able to cope with a situation (Bandura, 1982). As a result, self-efficacy has an impact on the way one believes to be able to handle a certain threat, like a flood. High self-efficacy beliefs would translate into feelings of being able to cope with such a threat, whereas low self-efficacy beliefs would mean having no or low beliefs in one's coping abilities. Those two aspects, threat and coping, taken together influence one's behavioural intention and consequently, behaviour.

Initially, the PMT was based on the fear appeal approach (Rogers, 1975). Fear arousal has been a successful method in persuasion. Higher levels of fear appeal have been found to be more persuasive regarding numerous factors compared to lower levels of fear appeal, as the perceived severity and vulnerability as well as the perceived self- and response efficacy (Rogers, 1975; Witte & Allen, 2000). As a result, fear has been considered as a motivation to prevent or escape a threat. In line with Witte and Allen's (2000) Extended Parallel Process Model, for this research's purposes, it will be assumed that higher levels of fear translate into higher states of fear arousal which leads to an increase in risk perception.

In more recent studies, there has been a disagreement between authors regarding the definition of the fear appeal approach. As some authors suggest, the aspect of self-efficacy needs to be included in the definition of fear appeal. It is argued that individuals will go into a state of denial if not provided with adequate information to increase one's self-efficacy beliefs (Kievik, ter Huurne, & Gutteling, 2012; Witte, 1992). In line with much previous research, in this paper, self-efficacy is considered of great importance regarding one's willingness to take risk-mitigating action when being confronted with a threat. However, contrary to the assumption that self-efficacy is essential for defining fear appeal, for the purpose of this

research, the definition of fear appeal, based on the PMT, only involves the perceived severity as well as the perceived vulnerability. Based on this, self-efficacy will be considered as a separate construct and is thus not included in the definition of fear arousal. The construct will be, however, taken into account and measured nonetheless. As a result, self-efficacy is, next to risk perception, the second major factor that influences one's likelihood to take risk-mitigating actions.

In contrast to what is often assumed, fear arousal is not the only form of risk perception to create risk awareness. One other possible way of communicating risk is using humour. Although humour might not seem to be the most obvious and natural choice when it comes to creating risk awareness, humour was found to be a prominent method in persuasion (Perloff, 2017; Shabbir & Thwaites, 2007; Skalski, Tamborini, Glazer, & Smith, 2009). In a study on self-affirmation, it was found that those subjects who self-affirmed values such as humour were more inclined to be open to evidence that opposed their initial attitude compared to a control group who was not asked to affirm values beforehand (Cohen, Aronson, & Steele, 2000). Therefore, people who affirm the self are more likely to change their attitudes compared to people who are not self-affirmed.

Moreover, humour has been used increasingly in the field of advertising. Research in this field has shown that messages which have a humorous tone of voice do not negatively influence the comprehension of the message, and most of the times attract attention (Weinberger & Gulas, 1992). In their meta-study, Weinberger and Gulas (1992) found that humour can have significant advantages compared to non-humorous messages depending on the product that is being advertised. Since the relationship of humour and risk awareness has received no attention so far, it is interesting to have a look at how messages with a humorous tone of voice affect risk awareness and consequently, the likelihood to change one's behaviour regarding a threat. As with the fear appeal approach, it can be assumed that higher self-efficacy beliefs need to be induced in order to achieve behavioural intention regarding the preparation for a flood. However, no literature can be found in this field, leaving the effects of humour an explorative research topic.

As discussed, fear arousal, as well as humour, both seem to be possible means to perceive risk and thus create risk awareness. Regarding the fear appeal approach, authors disagree whether self-efficacy beliefs need to be induced in order to avoid possible states of risk denial. The same argument can be held for the humorous approach. Since no literature is available regarding humour as a means of creating risk awareness and disagreements can be found considering the importance of self-efficacy beliefs, one hypothesis was formulated in

order to answer the research question under which circumstances one is most inclined to take risk-mitigating action regarding a possible flood. Due to this exploratory research nature, four experimental conditions will be considered in order to measure the effect of Fear Appeal/high Self-Efficacy, Fear Appeal/low Self-Efficacy, Humour/high Self-Efficacy, and Humour/low Self-Efficacy on one's likelihood to prepare for the possible consequences of a flood. As the scope of the fear appeal approach is widely discussed, the hypothesis is formulated as the following:

H1: Participating in the high Self-Efficacy/Humorous condition leads to greater Behavioural Intention than participating in the other conditions.

Methods

Design

In order to measure people's likelihood to prepare for the possible consequences of a potential flood, a 2 (Type of Message: Fear Appeal vs. Humour) x 2 (Level of Self-Efficacy: high Self-Efficacy vs. low Self-Efficacy) between-subjects design as part of an online survey was employed. Consequently, there were two independent variables with two levels respectively, namely the approach being used measuring the Type of Message with two levels (Fear Appeal and Humour) and the Level of Self-Efficacy beliefs with two levels (high or low). The dependent variable was the likelihood to prepare for the consequences of a possible flood, indicated as Behavioural Intention.

Participants

This research comprised a convenience sample mainly of undergraduate students from the University of Twente. In total, the sample consisted of $N = 253$ respondents. The participation in this study was voluntary and anonymous via SONA-systems of the Behavioural, Management and Social Sciences Faculty of the University of Twente. In addition, friends and family were invited to participate in the study.

Participants were excluded based on different criteria. Due to the four conditions present in this study (Fear Appeal, Self-Efficacy high vs. low; Humorous Approach, Self-Efficacy high vs. low), participants had to answer a manipulation check question correctly for the data to be taken into account. After having a look at the comics, all respondents had to identify the tone of voice of the comic. Participants of the two fear appeal condition had to recognise a worrisome tone of voice while participants of the two humorous conditions had to recognise a humorous tone of voice, respectively. On a five-point Likert scale, it had to be identified to what degree the participants agree or disagree that a specific tone of voice is present. Consequently, participants of the fear appeal condition needed to rate the worrisome tone of voice as four (somewhat agree) or five (strongly agree) on the Likert scale. Participants of the humorous condition had to rate the humorous tone of voice as four or higher, respectively. As a result, 68 ($N = 68$) respondents needed to be excluded, reducing the sample to the size of $N = 185$ participants.

Among the $N = 185$ respondents, $N = 39$ were male (21.10%) and $N = 146$ were female (78.90%). The age of the participants varied between 17 and 51 ($M = 21.04$; $SD = 3.75$). The sample included participants with various nationalities, the most representative being German (73.00%) and Dutch (16.80%). The remaining 10.30% had a different national

background. Out of the 185 respondents, 51 were randomly assigned to the Fear Appeal/low Self-Efficacy condition, 50 randomly to the Fear Appeal/high Self-Efficacy condition, 42 randomly to the Humorous/low Self-Efficacy condition and 42 randomly to the Humorous/high Self-Efficacy.

Materials

The material for this study was combined in a self-rating questionnaire that needed to be filled in by the respondents. The survey consisted of items which were taken from two already existing standardised questionnaires, namely the Risk Behaviour Diagnosis (RBD) Scale (Witte, McKeon, Cameron, & Berkowitz, 1995) and the Generalised Self-Efficacy (GSE) Scale (Schwarzer & Jerusalem, 1995). In addition, items which were supposed to measure the participants' likelihood to take preventive actions in order to avoid the negative consequences of a possible flood were added. Furthermore, questions on age, gender, and nationality were taken into account.

Firstly, the respondents were randomly assigned to one of the four experimental conditions. In each condition, a different comic was shown to the participants which included the two independent variables, namely the Level of Self-Efficacy (high vs. low) as well as the Type of Message in relation to the Fear Appeal or Humorous Approach. In every comic, two or three penguins are sitting in their igloo, discussing the negative impact of climate change and its consequential floods (Appendix B). In the two comics which were based on the Fear Appeal approach, the penguins state dramatic facts about the negative consequences. Comparably, in the Humorous condition, the topic of climate change and flooding, respectively, is discussed in a less serious manner. Moreover, in the high Self-Efficacy condition, the participants are indirectly presented with a solution on how to escape a flood by preparing an escape route in advance. This solution is implied by the penguins but not labelled as a solution as such (Appendix B). Consequently, the participants get indirectly the idea of being able to cope with such a situation.

In order to check whether the participants perceived the comic as worrisome (fear appeal approach) or as humorous respectively, a manipulation check question was asked. If the question 'How would you best describe the tone of voice of the comic?' was answered correctly, serious participation of the respondents could be assured.

Independent Variables

Items seven to twelve of the original RBD Scale (Witte et al., 1995) were adapted according to the threat scenario of consequences a flood might bring about and applied to the questionnaire in order to measure the participants' risk perception. The first three items taken independently were supposed to measure the perceived threat, while the other three items taken alone measure the perceived susceptibility to the threat (Witte et al., 1995), in this case, the consequences of a possible flood. For both dimensions, when taken into account individually, a Cronbach's Alpha of .85 was measured for perceived susceptibility to the threat as well as .90 for perceived severity (Witte, 1996). However, when taken both dimensions together, and thus measuring risk perception, a reasonably low Cronbach's Alpha was established (α = .54) (Witte, 1996). In the present study, similar reliability could be established. Considering the perceived threat, a Cronbach's Alpha of .71 was measured. Regarding perceived susceptibility, α = .83 could be established. In comparison to Witte's (1996) results, perceived threat had slightly lower reliability but was nevertheless in the acceptable range. When taken both sub-scales together, as Witte (1996) found as well, fairly low reliability was found (α = .66). In order to measure one's risk perception, a five-point Likert scale reaching from 'strongly disagree' (1) to 'strongly agree' (5). According to Witte et al. (1995), a low score on this scale represents a low perception of risk leading to no control of fear or danger. The opposite can be said for high scores on this scale.

From the same RBD scale, items four to six were taken into account in order to measure one's self-efficacy. Likewise, the content was adapted to the flood scenario and the possible consequences a flood might bring about. The efficacy items on this scale showed good reliability of α = .71 (Witte, 1996). In this study, it was possible to calculate fairly high reliability of α = .81. As with the other items of this scale, as stated by Witte and colleagues (1995), a high score on this dimension indicates high self-efficacy beliefs while low scores would represent low self-efficacy beliefs regarding the threat. The same five-point Likert scale was applied (strongly disagree to strongly agree).

In addition to the three items on self-efficacy of the RBD scale, the Generalised Self-Efficacy Scale was used. The GSE Scale consists of ten items measuring the respondent's general self-efficacy beliefs (Schwarzer & Jerusalem, 1995) and is thus a trait variable since it focuses on the respondent's overall efficacy beliefs, unrelated to the flood risk scenario. The scale shows good content validity as well as otherwise good psychometric properties and reliability (α = .82 to .93) (Schwarzer & Jerusalem, 1995). The reliability of this study falls

precisely in this range, measuring good reliability of $\alpha = .84$. All items can be answered on a four-point Likert scale, ranging from 1 ('not true at all') to 4 ('exactly true'). As a result of this, a low score on the scale indicates low self-efficacy beliefs, while a high score would represent high self-efficacy beliefs, vice versa.

For the purpose of this research, both self-efficacy scales will be taken into account. As indicated, the GSE, as a trait variable, might focus more intensely on the respondent's overall levels of self-efficacy while the RBDS is topic-specific and measures levels of self-efficacy regarding the flooding context. Previous studies have shown inconsistencies regarding the necessity of self-efficacy regarding the topic of risk perception. Those inconsistencies might be due to interchanging of those scales. Based on this, both scales will be considered in this study and contrasted in order to be able to draw inferences about each scale's applicability. However, due to the inconsistencies in the literature, no hypotheses can be formulated regarding the appositeness of the two scales.

Dependent Variable

Furthermore, four items were added which intend to measure the likelihood of the respondents to take preventive actions in order to avoid or mitigate the consequences of a flood. Respondents were asked to indicate on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) to what extent they are inclined to take preventive actions in future. Thereby, high scores represent a high willingness to take action, while low scores show the opposite. The Behavioural Intention scale was developed for this research.

A factor analysis was conducted to measure the scale's validity. Considering the nature of this study, the factor analysis was exploratory in order to verify that all four items do indeed measure one's behavioural intention regarding one's likelihood to prepare for the possible consequences of a flood. Consequently, it was assumed that all items load on one single factor. Considering the Elbow Criterion, indeed, one underlying factor was found. As a cut-off score, an Eigenvalue greater than 1.00 was used in order to indicate the number of underlying constructs or components.

Even though all four items of the scale load on one factor, it gets evident that item three loads significantly less on this factor than the other items do (Appendix E). Based on the extraction method, one component was found, indicating that all items measure the same underlying construct.

Including all four items, Cronbach's Alpha showed a reliability of $\alpha = .66$. When excluding the third item of this scale due to a relatively low inter-item correlation (Table 1),

the reliability increases to $\alpha = .72$. Sijtsma (2009) suggests the use of Guttman's λ-2 for more accurate reliability measures. Considering Guttman's λ-2, the reliability increases even further up to λ-2 = .73, which falls within the acceptable range, according to Carmines and Zeller (1979). Respectively, it can be concluded that 73% of the variance can be affiliated to true scores while the remaining 27% are due to error.

Table 1

Inter-Item Correlation Behavioural Intention Scale

	Item 1	Item 2	Item 3	Item 4
Item 1	1.00			
Item 2	.43	1.00		
Item 3	.19	.23	1.00	
Item 4	.47	.50	.19	1.00

Based on the factor analysis and inter-item correlation of the Behavioural Intention scale, it was decided that the third item will not be considered for further analyses.

Lastly, three more items on age, gender, and nationality were added to the questionnaire. In total, the questionnaire consists of 30 items (Appendix C).

Procedure

The questionnaire which was created on the online platform Qualtrics was sent to students of the University of Twente of the faculty Behavioural, Management and Social Sciences as well as family and friends. Students of the faculty could sign up for the study through an internal platform accessible for BMS students exclusively, thus by random sampling. Friends and family were sent the link manually who were invited to forward the link even further, inducing a snowball sampling. Since the questionnaire needed to be filled in online, respondents completed the questionnaire in an uncontrolled environment and could consequently participate over their phone, laptop, tablet, or any other device that has access to the internet. Once the respondent followed the hyperlink to the questionnaire, the respondent was presented the informed consent (Appendix A). The consent form included the approximate time frame of five minutes that is needed to fill in the questionnaire. It is further mentioned that participation is voluntary and that participation from the study can be withdrawn at any given time without any consequences. The participants will be further

informed that the results of the study will be treated anonymously and kept in confidentiality. By proceeding, the participant confirms that he or she agrees with the participation.

As a next step, the participants will be randomly allocated to one of the four conditions. Thereby, he/she will be presented with one out of four comics (Appendix B). After having seen the comic, one question will be asked to check whether the participants understood the tone of voice of the comic correctly, assuring that the manipulation of the four conditions worked. Afterwards, 23 items follow measuring constructs like Risk Perception, Self-Efficacy, as well as Behavioural Intention in terms of one's preparedness regarding the possible consequences of a flood. Once those questions were completed, the participant was asked to fill in his age, gender and nationality (Appendix C). At the end of the questionnaire, the participants were given a chance to leave comments and remarks regarding the study.

Lastly, a small debriefing followed. Since the purpose of the study was not revealed before participation in order to keep several biases to a minimum, participants were made familiar with the true nature of the study. It was explained that the purpose of this study was to gather information on one's likelihood to prepare for the possible consequences of a flood. Further, it was explained that this kind of research and the allocation to one of the four experimental conditions is necessary in order to assess how messages regarding a threat need to be presented to facilitate risk-mitigating or preventive actions (Appendix D). Since the true nature was not revealed earlier, participants were asked once again whether they agree that their data will be used for this research. Participants of the BMS faculty were offered compensation in the form of academic coursework credits.

Results

Since the independent variables of this research are Risk Perception and Self-Efficacy, new variables have been computed. As Self-Efficacy was measured on two different scales, two different variables for Self-Efficacy were established and taken into account independently in order to make inferences about each Self-Efficacy scale regarding reliability, validity and the extent to be able to predict other factors. Lastly, one new variable considering the dependent variable Behavioural Intention which focuses on one's likelihood to take risk-mitigating actions was created. The descriptive statistics for each variable can be found in Table 2.

Table 2

Descriptive Statistics and correlations of the major variables (N= 185)

	M	*SD*	1	2	3	4
1. Risk Perception 1*	3.68	.54	1			
2. Self-Efficacy 1* (RBDS)	2.64	.99	.09	1		
3. Self-Efficacy (GSE) 2*	3.02	.40	.04	.23***	1	
4. Behavioural Intention 1*	3.01	.83	.32***	.24***	.15**	1

Note. For all scales under 1*, a mean of 1.00 indicates a low score, while a mean of 5.00 indicates a high score. For 2*, a mean of 1.00 indicates a low score as well, while a mean of 4.00 indicates a high score. ** indicates $p < .05$, *** indicates $p < .01$.

As can be taken from Table 2, the correlations between the different variables are fairly low. Risk perception and Behavioural Intention show the highest correlation of $r(185) = .32$, $p < .001$. The two Self-Efficacy variables of the GSE scale and the RBDS correlate with $r(185) = .23$, $p = .001$. Self-Efficacy of the RBDS and Behavioural Intention show a correlation of $r(185) = .24$, $p = .001$, while Self-Efficacy of the GSE and behavioural intention correlate with $r(185) = .15$, $p = .04$, in comparison. Both self-efficacy variables show almost no correlation with risk perception. Risk Perception and Self-Efficacy measured

on RBDS show a correlation of $r(185) = .09$, $p = .24$, while Risk Perception and Self-Efficacy of the GSE scale correlate with $r(185) = .04$, $p = .58$. Those numbers represent the whole sample. Different results can be expected when considering each condition separately.

To test for the hypothesis, a normal distribution, as well as linearity between the independent and dependent variable, is assumed. To account for a normal distribution, the skewness of each scale was taken into account. As a rule of thumb, a scale is approximately normally distributed and symmetric when the skewness is neither lower than -.50 nor higher than .50 (Field, 2013). As the skewness for risk perception was found to be .10, for the first Self-Efficacy scale (RBDS) .22, for the second Self-Efficacy scale (GSE) .16 and for the Behavioural Intention scale -.12, it can be assumed that all scales are approximately symmetrical. Regarding the check for linearity, the three independent variables were plotted against the dependent variable. All three relationships of dependent and independent variables were found to be linear (Appendix F).

In order to test the hypothesis, claiming that participants of the high Self-Efficacy/humorous condition show a greater Behavioural Intention than participants of the other three conditions, a 2x2 factorial ANOVA was applied. Thereby, the impact of the Type of Message and the Level of Self-Efficacy on the dependent variable Behavioural Intention was measured. However, neither the Level of Self-Efficacy [$F(1, 184) = .66$; $p = .42$] nor the Type of Message [$F(1, 184) = .02$; $p = .89$] seem to have an impact on one's behavioural intention. The interaction effect of those two variables was not found to be significant either [$F(1, 184) = .08$; $p = .78$]. Therefore, the hypothesis needs to be rejected.

Additional Analyses

As neither the Type of Message nor the Level of Self-Efficacy makes a significant difference regarding participant's behavioural intention to prepare for the possible consequences of a flood, additional analyses were conducted including Self-Efficacy measured on two additional scales, namely the RBDS and the GSE scale. Due to the interchanging of those two scales in previous studies, both scales were taken into account in order to make inferences about each scale's applicability. The Type of Message, on the contrary, was not adapted for further analyses.

Firstly, Self-Efficacy measured on the RBDS will be taken into account. Since the analysis regarding the initial hypothesis has not shown any significant results, the Self-Efficacy conditions (high vs. low) were altered and adapted according to the scores acquired on the RBDS. The scores on this scale ranged from one to five, with one indicating no self-

efficacy beliefs at all, while a score of five would indicate very high self-efficacy beliefs. Since a value of three indicates a neutral opinion, mean scores ranging from one to three are classified as the new low Self-Efficacy condition while scores higher than three are classified as the new high Self-Efficacy condition, for the following analyses. Consequently, participants are no longer randomly assigned to either the high or the low Self-Efficacy condition, leading to variations in the number of participants. As with the initial hypothesis, a 2x2 factorial ANOVA was conducted. The plot of this analysis can be found in Figure 2.

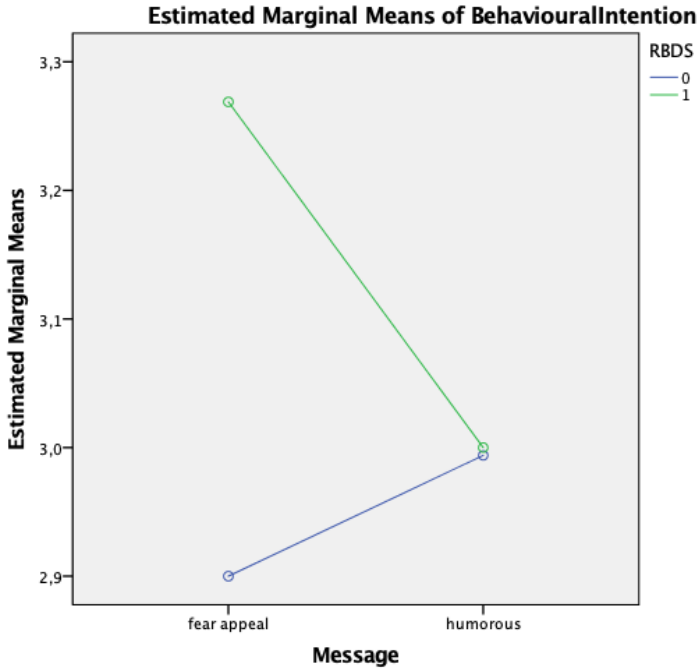

Figure 2. 2x2 factorial ANOVA displaying the impact of the Type of Message and score on the RBDS on Behavioural Intention. Regarding the RBDS, 0 indicates low Self-Efficacy while 1 indicates high Self-Efficacy.

Similar as with the initial hypothesis (H1), neither the Type of Message [$F(1, 184) = .45$; $p = .50$] nor the Level of Self-Efficacy [$F(1, 184) = 2.06$; $p = .15$] show a significant influence on Behavioural Intention. The interaction effect was not found to be significant either [$F(1, 184) = 1.37$; $p = .17$]. Interestingly, within the fear appeal condition, there seems to be a great difference between the Levels of Self-Efficacy. In order to test for this difference, an additional independent sample t-test was applied. The mean scores for this independent t-test can be found in Table 3.

Firstly, the difference in Levels of Self-Efficacy within the Fear Appeal condition was considered. Indicating high scores on the RBDS showed a greater Behavioural Intention (*M* =

3.27, *SD* = .84) compared to indicating low scores on the RBDS (*M* = 2.90, *SD* = .80). This difference, -.370, BCa 95% CI [-.72, -.02] was found to be significant, *t*(99) = -2.11, *p* = .002. Therefore, it can be concluded that people presented with a fear appeal and message and possess high self-efficacy beliefs regarding the perception of a possible flood are more inclined to take risk-mitigating actions in order to avoid its consequences.

Table 3

Descriptive Statistics displaying the impact of the RBDS on the dependent variable Behavioural Intention

	Fear Appeal	Humorous
High Self-Efficacy	*N* = 31	*N* = 29
	M = 3.27 (*SD* = .84)	*M* = 3.00 (*SD* = .88)
Low Self-efficacy	*N* = 70	*N* = 55
	M = 2.90 (*SD* = .80)	*M* = 2.99 (*SD* = .83)

As can be taken from Figure 2 and Table 3, the difference of the Level of Self-Efficacy regarding the RBDS is within in the Humorous condition not as pronounced as in this fear appeal condition. Therefore, no additional independent t-test was conducted.

Regarding self-efficacy measured on the GSE scale, the factorial 2x2 ANOVA was repeated. As with the previous Self-Efficacy scale, the conditions were altered and adapted according to one's scores on the GSE scale. The GSE scale is scored from one to four, one indicating no self-efficacy beliefs while four does indicate self-efficacy beliefs. Since the overall score of this scale was already relatively high, only mean scores of higher than three were considered as high Self-Efficacy beliefs. Scores less or equal than three are consequently low Self-Efficacy beliefs. The outcome of the 2x2 factorial ANOVA can be seen in Figure 3.

Similar to the other analyses, the Type of Message did not have an impact on Behavioural Intention [*F*(1, 184) = .11; *p* = .74]. For the GSE variable, however, the Level of Self-Efficacy makes a significant difference regarding the impact on Behavioural Intention [*F*(1, 184) = 4.80; *p* = .03] indicating that participants of the high Self-Efficacy condition show greater Behavioural Intention regarding a possible flood than participants of the low Self-Efficacy condition (Figure 3). The interaction effect, again, was not found to be significant [*F*(1, 184) = 1.07; *p* = .30]. When having a look at Figure 3, within the Humorous condition, it appears that there is a rather strong difference between the levels of Self-Efficacy. As with the RBDS, an independent sample t-test was applied in order to test for this

difference within the Humorous condition. The mean scores for the independent sample t-test can be found in Table 4.

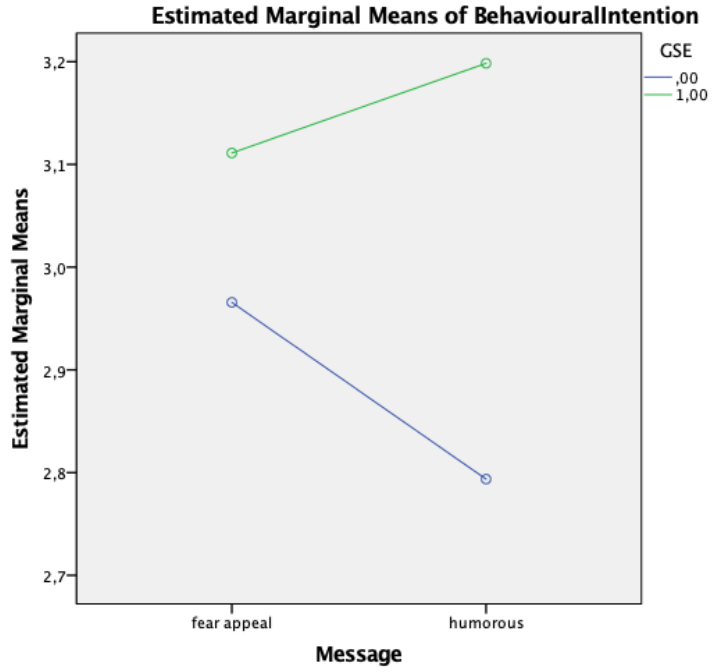

Figure 3. 2x2 factorial ANOVA displaying the impact of the Type of Message and score on the RBDS on Behavioural Intention. Regarding the GSE scale, 0 indicates low Self-Efficacy while 1 indicates high Self-Efficacy.

Table 4

Descriptive Statistics displaying the impact of GSE scale on the dependent variable Behavioural Intention

	Fear Appeal	Humorous
High Self-Efficacy	N = 33	N = 42
	M = 3.11 (SD = .92)	M = 3.20 (SD = .84)
Low Self-efficacy	N = 68	N = 42
	M = 2.97 (SD = .78)	M = 2.79 (SD = .81)

When considering Self-Efficacy measured on the GSE, high Self-Efficacy leads to greater Behavioural Intention than low Self-Efficacy among the respondents of the Humorous condition. Those differences in mean scores show significant differences. While the low Self-Efficacy condition shows a mean of M = 2.79 (SD = .81), the high Self-Efficacy condition

shows a mean of $M = 3.20$ ($SD = .84$) on the Behavioural Intention scale. This difference, -.41, BCa 95% CI [-.76, -.05] was found to be significant, $t(82) = -2.25$, $p = .01$. As a result, it can be concluded that high Self-Efficacy measured on the GSE scale will lead to higher Behavioural Intention scores among the participants of the Humorous condition.

Considering the participants of the Fear Appeal condition, the differences between the high and low Self-Efficacy condition do not seem noticeable enough to show significant results. Therefore, no independent sample t-test was conducted within the Fear Appeal condition.

In order to make inferences about which Self-Efficacy variable explains more of the variation regarding Behavioural Intention, a regression analysis was employed, independently of the hypothesis and conducted analyses. To be able to make predictions for the whole population, all respondents will be considered simultaneously. When comparing Self-Efficacy measured on the RBDS and on the GSE scale independent of each other, both constructs were found to be significant, $F(1, 183) = 11.40$; $p = .001$ for the previous and $F(1, 183) = 4.44$; $p = .04$ for the latter. Regarding the RBDS, an R^2 value of .06 was found, indicating that this variable explains approximately 6% of the variation in Behavioural Intention. For the GSE scale, a value of .02 was found.

However, when taking both scales together and compare them simultaneously, different results were found. Even though the value of R^2 increased slightly to .07 when looking at the coefficients of the two independent Self-Efficacy variables and the dependent variable Behavioural Intention, only the first construct including the RBDS variable is significant ($t = 2.96$; $p = .003$).

Discussion

The overall research question of this work is 'Under which circumstances is one more inclined to prepare for a possible flood and its consequences?'. It was hypothesised that one's likelihood to prepare for the possible consequences of a flood depends on different factors, such as the approach being used to create risk awareness, as well as one's level of self-efficacy, to what extent one is convinced of being able to reach this goal.

For this study, the prevailing fear appeal approach was used but also a newly introduced method of using humour for persuasion purposes. Since humour has not been used yet as a means to create risk awareness, this research is to some extent of exploratory nature. The fear appeal approach and different levels of self-efficacy are well-studied topics. However, the combination of self-efficacy and humour taps into a new field of research. Based on previous studies, it was hypothesised that high levels of self-efficacy are of importance in order to be willing and inclined to take risk-mitigating actions. In addition, Self-Efficacy was measured on two different scales, the RBDS and GSE scale. Measuring Self-Efficacy on a topic-specific scale and on a general Self-Efficacy scale, in addition, can help to make inferences which scale is more adequate in the context of this type of research question and this risk domain since flooding might seem to have a rather low level of individual control compared to other hazards.

As can be taken from the hypothesis, no significant results were found and the hypothesis that participants in the high Self-Efficacy/Humorous condition show the greatest Behavioural Intention thus needs to be rejected. Due to the insignificance of the results, it can be concluded that the conditions, Level of Self-Efficacy (high vs. low) as well as Type of Message (Fear Appeal vs. Jumour) had no impact on one's likelihood to prepare for the possible consequences of a flood.

Regarding the Level of Self-Efficacy, within the Fear Appeal condition, no significant differences were found between the high and low Self-Efficacy condition with regards to the dependent variable Behavioural Intention. Consequently, it can be concluded that it does not matter which condition one was ascribed to considering the Level of Self-Efficacy. The same results were found for participants of the Humorous condition. Participation in the high or low Self-Efficacy condition did not seem to impact one's likelihood to take action regarding a flood. However, one can see a slight trend that the high Self-Efficacy condition yields higher scores on the Behavioural Intention scale compared to the low Self-Efficacy condition. Unfortunately, in this research, it was not possible to show the significance of these results.

In a paper by Kievik and Gutteling (2011), the importance of efficacy beliefs is pointed out. In their research, they conclude that it is possible that respondents who receive a fear appeal message and do not receive instructions on how to act towards a risk might develop a state of denial leading to the fact of not taking risk-mitigating actions at all (Kievik, ter Huurne, & Gutteling, 2012; Witte, 1992). However, it should be taken into account that Kievik's and Gutteling's (2011) study only involved participants of the Netherlands who experience the highest risk for flooding. In the current study, the sample consists, to a large extent, of students from Germany. It might be possible that people from Germany or other countries that are not highly at risk for flooding do not see the necessity to take risk-mitigating actions. In addition, Dutch participants might be more familiar with the topic leading to higher self-efficacy beliefs overall since they are acquainted with what to do and how to act in case of a flood. Therefore, it is possible that there are certain differences regarding risk perception within different regions or countries which should be taken into account.

The impact of the Type of Message on Behavioural Intention was measured as well. As with the Level of Self-Efficacy, no significant results could be established, indicating no difference between the conditions. No research has compared those two types of messages before which makes this result of great importance. Even though the Humorous approach does not show an increase in Behavioural Intention compared to the Fear Appeal approach, it gets clear that it at least results in the same Behavioural Intention as the Fear Appeal condition. As mentioned earlier, when the fear appeal is not supported by high levels of efficacy beliefs, it is possible that people will start to deny the risk and the necessity to take action in order to prevent possible consequences. This poses a problem for several types of media since there is only a fine line between warning people in a factual way about potential hazards and scaring them (Gerbner & Gross, 1976). Therefore, using a message with a humorous tone of voice might be a good alternative. Nevertheless, more research needs to be done regarding under which circumstances it is appropriate to use a humorous tone of voice and possibly also which age group is the most receptive to such an approach. Humour is a type of attitude and might not be applicable to all people.

Having a look at the RBDS measuring Self-Efficacy independently of the Self-Efficacy condition one was ascribed to initially, it gets clear that self-efficacy does have an impact on one's behavioural intention. Even though no significant results could be established considering the Type of Message and Level of Self-Efficacy, it was possible to notice the impact of self-efficacy. Notably, within the Fear Appeal condition, the mean difference score

between the high and low Self-Efficacy condition was found to be significant, indicating that high Self-Efficacy scores on the RBDS do lead to greater Behavioural Intention. For the Humorous approach in comparison, no significant differences were found. Considering the Fear Appeal approach, the findings are in line with previous results that high Self-Efficacy leads to an increase in Behavioural Intention compared to the low Self-Efficacy condition (Kievik & Gutteling, 2011; Zaalberg, Midden, Meijnders, & McCalley, 2009). Based on these results, one could argue that the self-efficacy level was not adequately presented in the initial comics. As it seems, a subtle message on how to prevent the possible consequences of a flood is not enough in order to increase one's level of self-efficacy. This can also be seen when looking at the number of participants in the high and low Self-Efficacy conditions. For both, Humorous and Fear Appeal, more participants rated their level of Self-Efficacy on this topic-specific scale as rather weak. For future studies, it might be advisable to differentiate the high and low efficacy levels in the comics more clearly since as it seems, there are indeed differences between the different levels.

This point gets even more apparent when having a look at Self-Efficacy measured on the GSE scale. As with Self-Efficacy measured on the RBDS, no significant differences were found between the Types of Message. However, the differences between the high and low Self-Efficacy condition appeared to be significant. Therefore, the difference of the Level of Self-Efficacy within the Humorous and Fear Appeal condition were considered. Within the Fear Appeal approach, no significant differences between the conditions regarding Behavioural Intention were found here. However, one can see a clear tendency that the high Self-Efficacy condition yield higher Behavioural Intention scores than the low Self-Efficacy condition, based on the GSE scale. For the Humorous condition, in comparison, a significant difference was found. As proposed by previous literature, the high Self-Efficacy condition shows greater Behavioural Intention than the low Self-Efficacy condition.

It is interesting to notice that within the Fear Appeal condition, the RBDS is of importance in order to yield a significant difference between the high and low Self-Efficacy condition. For the Humorous condition, the RBDS did not seem to make a difference since the scores for both efficacy levels are quite similar. Considering the GSE scale, the opposite is noticeable. While within the Humorous condition, high and low Self-Efficacy conditions seem to differ fairly much regarding Behavioural Intention, within the Fear Appeal condition, differences are not that pronounced. Since there are no obvious explanations why different scales seem to work differently for different conditions, one could hypothesise that the RBDS is more useful for the Fear Appeal condition since it is more topic-specific. As people might

deny a certain risk if not presented with a clear message on how to take risk-mitigating actions, a topic-related scale might be of an advantage since it is connected to the topic. Even if it does not provide specific information on how to act, it might encourage people to think of possible actions in case of an actual flood.

For the Humorous approach, the opposite might be true. In comparison to the Fear Appeal approach, humour as a means of creating awareness for a risk might not lead to states of denial since people are not frightened (Zaalberg et al., 2009). As a result, it can be hypothesised that self-efficacy beliefs on a general level, as it is the case with the GSE scale, are enough to encourage people to take risk-mitigating actions. Studies on self-affirmation have shown that people who self-affirm with traits such as humour are more likely to be open to evidence that opposes their initial view (Cohen et al., 2000). Self-Efficacy measured on the GSE scales thus seems to be more of a trait variable with which participants can identify at any given time leading to overall higher levels of efficacy beliefs. This might be an explanation of why participants of the Humorous condition only need lower or less specific self-efficacy levels in order to be willing to prepare themselves for the possible consequences of a flood. However, these are only speculations and need to be tested further.

When taking into account the extent to which the RBDS and GSE variable explain the variation in Behavioural Intention, one can see that the RBDS accounts for more variation than the GSE variable. This might be the case since the RBDS is more risk-specific and not kept general, as the GSE. However, since both variables do not explain the variation in Behavioural Intention very well, more research needs to be done focussing on which variables explain the variation more extensively. Consequently, no conclusions can be drawn yet which Self-Efficacy scale is more accurate for such a type of research.

With these additional analyses, it was possible to show the impact of self-efficacy on taking risk-mitigating actions. Even though, the initial hypothesis needed to be rejected, the importance of efficacy beliefs was nevertheless pointed out. Looking at the correlations between the variables, it is interesting to notice that all three independent variables, namely Risk Perception, Self-Efficacy measured on the RBDS and Self-Efficacy measured on the GSE scale show positive significant correlations with the dependent variable Behavioural Intention. Those positive correlations give an idea how closely connected self-efficacy and the likelihood to take action are and support the finding that both Self-Efficacy based on the RBDS and Self-Efficacy based on the GSE scale play an important role when it comes to the topic of risk communication and convincing participants to take action in case of a flood.

Conclusion

In conclusion, this research gave a lot of insight regarding risk perception and risk communication in combination with different levels of efficacy beliefs. Based on the different comics including two levels of the Type of Message (Fear Appeal and Humour) as well as two Levels of Self-Efficacy (high and low), it was shown that neither the Type of Message nor the Level of Self-Efficacy beliefs seemed to influence one's Behavioural Intention and likelihood to take risk-mitigating actions. However, when considering Self-Efficacy measured on separate scales, independently of the comics, one could notice that high Self-Efficacy leads to greater Behavioural Intention, as it was hypothesised and also supported by previous research. Since it was possible to establish these results, it can be concluded that the Type of Message to create risk awareness and the Level of Self-Efficacy were not yet pointed out clearly enough within the comics. This might have been the case since those messages were not pretested beforehand. In addition, since humour differs between people, the humorous message might need to be represented more strongly in order to be able to differentiate it clearly from the worrisome tone of voice.

Nevertheless, this research is of great importance since it taps into a new field of research regarding risk perception and efficacy beliefs. Implementing the Humorous approach has shown that there are possible alternatives to the Fear Appeal approach. By comparing two different approaches, it can be seen that risk communication does not follow a one-size-fits-all approach. As fear appeal might cause people to enter states of denial regarding certain hazards, humour might not be understood by everyone. It can be concluded that risk communication needs different approaches if many people are supposed to be reached and encouraged to take action. It was also shown that measuring Self-Efficacy on the RBDS increased Behavioural Intention among participants of the Fear Appeal approach, while Self-Efficacy measured on the GSE scale seemed to enhance Behavioural Intention among participants of the Humorous condition. More research needs to be done in order to generalise this finding and to implement the humorous approach more broadly, at last.

Future research might want to focus more extensively on respondents who are at risk for flooding. As ter Huurne (2008) has pointed out, feelings of personal involvement are of importance regarding risk information-seeking. It can be concluded that personal involvement is thus also an essential factor concerning taking risk-mitigating actions. Furthermore, more types of risk communication and creating risk awareness should be explored. Since there is no one-size-fits-all solution regarding risk communication, many more types of messages should be employed in order to reach as many people as possible in case of actual risk. One might be

interested if humour is only an option for risk communication in a flood scenario or if it works in other situations as well, or maybe even better. Since it is not possible to create an individual risk message for every person, different approaches could be combined. The effect of combining fear appeal and humour on behavioural intention can be studied. As can be seen, there are many possibilities to extend the domain of risk communication and risk perception.

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Appendices

Appendix A

Dear Participant,

You are being invited to take part in a research study conducted within the scope of the Faculty of Behavioural, Management and Social Sciences of the University of Twente.
The following questionnaire consists of two different scales and some additional questions which should be filled in carefully. The goal of the study is to gather information on one's feelings about oneself. Filling in the whole questionnaire will take around 5 minutes. The participation is completely voluntary and it is possible to withdraw without any consequences at any time. Once the questionnaire is filled in and submitted, it is not possible to withdraw due to anonymization. The results of the study will be kept in confidentiality and will not be passed on to third parties. If you have any questions, please contact Celine Pfeiffer.

If you have any complaints about this research, please direct them to the secretary of the Ethics Commission of the faculty Behavioural, Management and Social Sciences at the University of Twente through ethicscommittee-bms@utwente.nl.

'I hereby declare that I have read and understood the provided information. I have been informed in a manner that is clear to me about the nature and the method of the research. Further, I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I voluntarily agree to take part in this research.'

By proceeding, you agree with participating in this study.

Appendix B

Figure 4. Condition 1: Fear appeal approach without a solution (low self-efficacy)

Figure 5. Condition 2: Fear appeal approach with a solution (high self-efficacy)

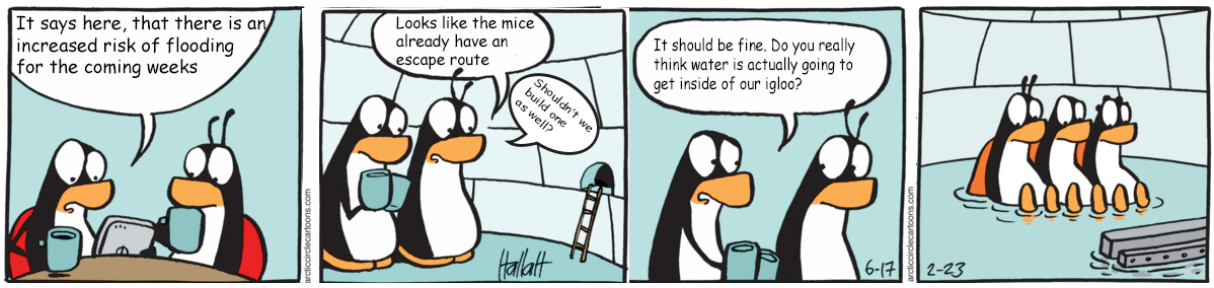

Figure 6. Condition 3: Humorous approach with a solution (high self-efficacy)

Figure 7. Condition 4: Humorous approach without a solution (low self-efficacy)

Appendix C

How would you best describe the tone of voice in this comic?

1=strongly disagree 2=disagree 3=neither agree nor disagree 4=agree 5=strongly agree

Worrisome	1 2 3 4 5
Happy	1 2 3 4 5
Humorous	1 2 3 4 5
Angry	1 2 3 4 5

Below is a list of statements dealing with your attitude concerning the consequences of flooding. Please indicate for each question how strongly you agree or disagree.

1=strongly disagree 2=disagree 3=neither agree nor disagree 4=agree 5=strongly agree

1. I believe that the consequences of flooding are severe 1 2 3 4 5
2. I believe that the consequences of flooding can be seriously negative 1 2 3 4 5
3. I believe that the consequences of flooding are extremely harmful 1 2 3 4 5
4. It is likely that I will experience the consequences of flooding 1 2 3 4 5
5. I am at risk for experiencing the consequences of flooding 1 2 3 4 5
6. It is possible that I will experience the consequences of flooding 1 2 3 4 5

Below is a list of statements dealing with your feelings about yourself. Please indicate to what extent you think the statements are true about yourself.

1=strongly disagree 2=disagree 3=neither agree nor disagree 4=agree 5=strongly agree

1. I am able to prepare myself to prevent being affected by the consequences of flooding 1 2 3 4 5
2. I have the means to be continuously prepared to prevent the consequences of flooding 1 2 3 4 5

3. I can easily be prepared to prevent the consequences of flooding 1 2 3 4 5

Below is a list of statements dealing with your feelings about yourself. Please indicate to what extent you think the statements are true about yourself.

1=not true at all 2=hardly true 3=moderately true 4=exactly true

1. I can always manage to solve difficult problems if I try hard enough 1 2 3 4
2. If someone opposes me, I can find the means and ways to get what I want 1 2 3 4
3. It is easy for me to stick to my aims and accomplish my goals 1 2 3 4
4. I am confident that I could deal efficiently with unexpected events 1 2 3 4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations 1 2 3 4
6. I can solve most problems if I invest the necessary effort 1 2 3 4
7. I can remain calm when facing difficulties because I can rely on my coping abilities 1 2 3 4
8. When I am confronted with a problem, I can usually find several solutions 1 2 3 4
9. If I am in trouble, I can usually think of a solution 1 2 3 4
10. I can usually handle whatever comes in my way 1 2 3 4

Below is a list of statements dealing with your feelings about yourself. Please indicate to what extent you think the statements are true about yourself.

1=strongly disagree 2=disagree 3=neither agree nor disagree 4=agree 5=strongly agree

1. I feel that it's of great importance to prepare myself for the possible consequences of a flood. 1 2 3 4 5
2. I am willing to take action considering the possible consequences of a flood. 1 2 3 4 5
3. When thinking of possible floods, I have ideas on how to prepare myself for the consequences. 1 2 3 4 5

4. I would like to inform my peers about the possible risks and consequences of flooding so that they can take action as well. 1 2 3 4 5

Please indicate your age

Open Question

What is your gender?

Male

Female

Other, namely *Open Question*

What is your nationality?

Open Question

If you have any comments or recommendations, please indicate them in the box below.

Open Question

Appendix D

Thank you for your participation in this study!

The purpose of this study was to gather information on one's likelihood to prepare for the possible consequences of a flood. Thereby, you were assigned to one out of four experimental conditions. Based on that, it is possible to assess how a message of a threat needs to be presented in order to facilitate risk-mitigating or preventive actions. In order to minimise possible biases, the true nature of the study was not mentioned beforehand.
If you have any questions regarding the survey don't hesitate to contact Celine Pfeiffer.

Do you agree that your anonymised data will be used for the purpose of this research?

Yes

No

Appendix E

Table 5

Component Matrix Behavioural Intention Scale

	Component
	1
Item 1	.76
Item 2	.79
Item 3	.45
Item 4	.80

Appendix F

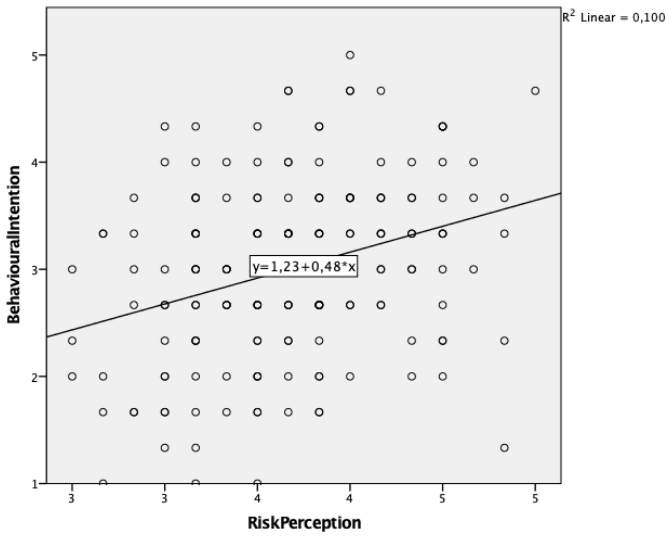

Figure 8. Linear relationship of risk perception and behavioural intention

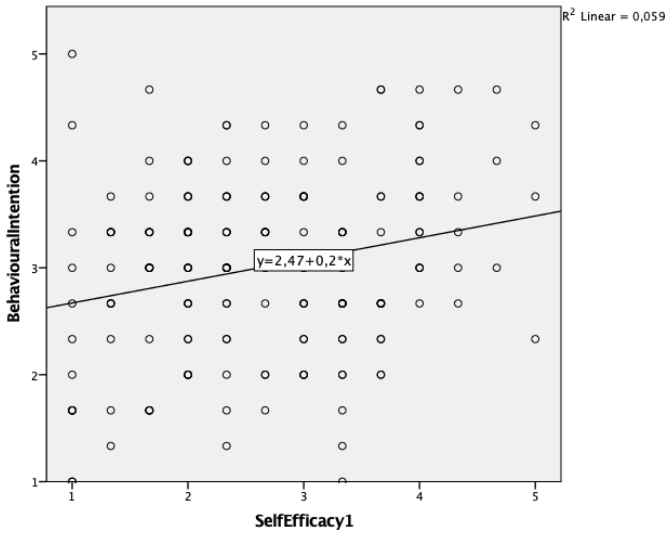

Figure 9. Linear relationship of the first self-efficacy scale and behavioural intention

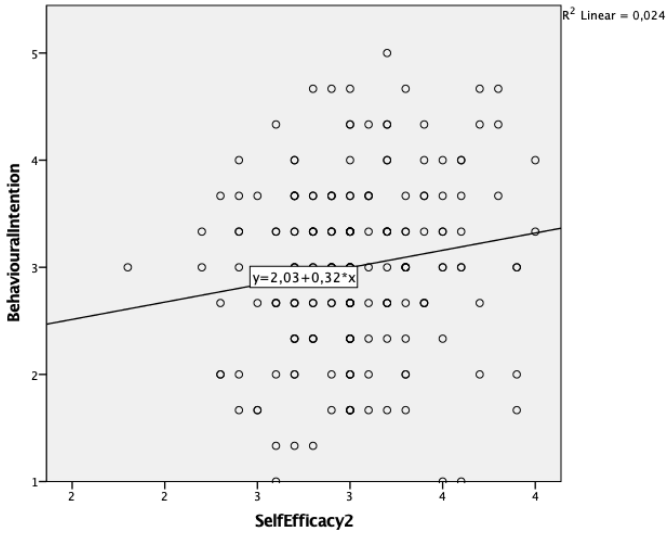

Figure 10. Linear relationship between the second self-efficacy scale and behavioural intention.