Katastrophenforschungsstelle
Working Paper Reihe

KFS
Working Paper
26

Structure and Content of Weather Warnings – Potential for Improvement

Evidence from a randomised survey experiment

Katja Schulze, Dr.
Martin Voss, Prof. Dr.

2023

Zitierweise: Schulze, Katja; Voss, Martin (2023): Structure and Content of Weather Warnings. Potential for Improvement. KFS Working Paper Nr. 26. Berlin: Katastrophenforschungsstelle. Online verfügbar unter https://www.geo.fu-berlin.de/geog/fachrichtungen/anthrogeog/katastrophenforschung/publikationen-vortraege/working-paper-konzepte/index.html.

DOI: http://dx.doi.org/10.17169/refubium-39680

Katastrophenforschungsstelle (KFS)
Freie Universität Berlin
FB Geowissenschaften
Carl-Heinrich-Becker-Weg 6-10
12165 Berlin

Inhaltsverzeichnis

Zusammenfassung

Das vorliegende Working Paper stellt die Ergebnisse eines von der Katastrophenforschungsstelle (KFS) im Projekt WEXICOM III durchgeführten repräsentativen Online-Experimentes zur Testung der Wirkung verschiedener Warnformate vor. Es wurden unterschiedliche Strukturierungsgrade und Inhalte sowie Erfahrungsberichte als alternative Warnformate untersucht. Dabei war nicht nur die Wirkung auf die allgemeine Bevölkerung, sondern auch auf besonders gefährdete Personengruppen relevant.

Schlüsselwörter: Wetterwarnung, Struktur, Nutzergruppenspezifische Informationen, Narrative, Experiment

Abstract

This working paper presents the results of a representative online experiment conducted by the Disaster Research Unit (DRU) in the WEXICOM III project to test the impact of various warning formats. We examined different degrees of structuring and content, as well as narratives. Not only the effect on the general population but also on particularly vulnerable groups of people was relevant.

Keywords: Weather warning, Structure, User-specific information, Narratives, Experiment

Background of the Study

The presented study is part of the research project "**W**eather Warnings: from **EX**trem event **I**nformation to **COM**munication and Action" (WEXICOM III; for more information, see the Box 1) supported by the Hans Ertel Centre for Weather Research. This network of universities, research institutes, and the *Deutscher Wetterdienst* is funded by the BMVI (Federal Ministry of Transport and Digital Infrastructures).

In WEXICOM III, the Disaster Research Unit (DRU) aims at improving the coping capacities of the public concerning weather risks through user group-specific warning communication formats. Based on an extensive literature review, a theoretical framework (Schulze and Voss 2020), several workshops and surveys (Schulze and Voss 2022a; Schulze et al. 2022), we will develop warning communication formats tailored to the needs of specific user groups and test them in a final study.

The results presented below are part of one study used to test several weather warnings differing in content and structure. Sample characteristics are presented in Table 1 - Table 3). Using the study design shown in the Figure 1, we wanted to answer the following questions:

1. Can a modified structure, supplement information or narratives improve weather warnings?
2. Do different weather warnings address specific user groups better than others?
3. How would people respond to weather warnings and which factors impact the response?
4. How do Germans perceive weather forecasts and does it change over time?

Box 1. Project WEXICOM III

Project WEXICOM III – Weather warnings: from EXtreme event Information to COMunication and action

WEXICOM III is an interdisciplinary research project to improve the use of weather forecasts for society. The focus is on warnings of extreme weather specifically tailored to the needs of the recipients. Special attention will be paid to the communication of the uncertainties of the forecasts as well as the weather impacts at different lead times and for specific user groups.

Website
https://www.geo.fu-berlin.de/met/wexicom/index.html

Project duration
01/2019 - 12/2022

Project partners
Institute for Meteorology (FU Berlin)
AG Interdisciplinary Security Research (FU Berlin)
Disaster Research Unit (FU Berlin)
Max Planck Institute for Human Development

Funded by
Hans-Ertel-Zentrum für Wetterforschung

Population	German-speaking resident population in Germany aged 18 to 75
Methodology	Online survey (CAWI)
Sample size	N = 3 053
Quota based	For sex, age, education and region
Data collection	20 March 2022 – 13 June 2022

Figure 1. Study Design

The report begins with a summary of the main findings according to the four research questions. The results are presented in more detail in the following chapters. The first chapter describes the experimental design and the analysing methods. Afterwards, we present the results of the experiment addressing the questions if people react differently depending on the weather event, if a modified structure, supplement information or narratives can improve weather warnings and if different weather warnings address specific user groups better than others. We present further analysis regarding people's response to weather warnings and influencing variables. The report ends with a discussion of Germans' perception of weather forecasts and possible changes over time. Each page addresses a topic relevant to the study. The results are presented graphically and described verbally.

Table 1. Gender distribution of the representative German sample.

Gender	Absolute frequency	Percentage	Valid Percentage
Female	1561	51.1	51.1
Male	1486	48.7	48.7
Diverse	6	0.2	0.2
Total	3053	100.0	100.0

Table 2. Age distribution of the representative German sample.

Age	Absolute frequency	Percentage	Valid Percentage
18 to 29 years	485	15.9	25.9
30 to 39 years	507	16.6	16.6
40 to 49 years	512	16.8	16.8
50 to 59 years	722	23.6	23.6
60 years or older	[27	27.1	27.1
Total	3053	100.0	100.0

Table 3. Education distribution of the representative German sample.

Education level	Absolute frequency	Percentage	Valid Percentage
Low	857	28.1	28.1
Middle	1015	33.2	33.2
High	1181	38.7	38.7
Total	3053	100.0	100.0

Summary

Can a modified structure, supplement information, or narratives improve weather warnings?

First of all, warning perception and response depend on the **weather event.**

- Germans perceived a hurricane force gale warning as more threatening and relevant than a thunderstorm and rainfall warning.
- Following a storm warning, people would take more protective action and change plans than following a thunderstorm warning.
- How people evaluated the warning text (e.g. if there were felt agitated or active, if they paid attention or if they understood the warning) did not depend on the weather event.

The **structure** of a warning impacts the warning perception and response.

- The well-structured weather warning enhanced warning perception and, to a lesser degree, response.
- Warnings consisting only of links resulted in the lowest perception and response.
- The structure did not affect the evaluation of the warning message (e.g. if they felt agitated or active, if they paid attention or if they understood the warning).

Overall, the investigated warning **contents** (event comparison; user-specific information) did not impact the warning perception and response.

- But we found an interaction between warning content and weather scenario.
- The findings suggest that thunderstorm and rainfall warnings with user-specific information enhance warning perception and response.
- On the other hand, thunderstorm warnings, including user-specific information, should be used with caution.
- The content of the warning did not affect the text evaluation.

The examined **narratives** resulted in a similar warning perception and willingness to act as weather warnings.

- Similar variables affect the reaction to narratives and warnings.
- Though, the narratives resulted in a higher warning perception and response for weather-affected people compared to weather-conscious and weather-disinterested people and people with low or medium compared to a high education level.

We gained further insights **using links** in weather warnings:

- Interestingly, one-third of the participants did not select any link with basic information about the weather event (meteorological parameters, warning level, danger indication, recommendation). They were not interested in specific information about the weather event and only assessed the warnings based on the headlines (e.g. Meteorological Parameters, Warning Level, Danger Indication, Recommendation).
- Although people did not obtain detailed information about the event, they reported a high warning perception and reaction. However, compared to people who received or saw this information, the rating was lower.
- All basic information and event comparisons seem equally relevant for the participants to assess the situation. Respondents usually check out all links with this information (almost equally often and in order of presentation) or none.
- User-specific information was selected less frequently and according to their interests. Too many links seem to be discouraging.

Do different weather warnings address specific user groups better than others?

We investigated the impact of structure (original, well-structured, links), content (original including recommendations, event comparison, user-specific), and narratives in interaction with 1) attitudinal types, 2) behavioural types, 3) lifestyles, and 4) sociodemographic variables and living conditions such as gender, age, education level, size of home town, and experiencing damage due to high-impact weather events.

Overall, we found little evidence that different warnings better address specific subgroups.

- Warnings with different structures (original structure, well-structured, links) did not address specific user groups better than others.
- Event comparisons enhanced the warning response for males and people showing risky behaviour.
- User-specific information did not address specific user groups better than others. But subgroups such as cyclists or pedestrians selected corresponding user-specific information more often.
- Narratives increased the perception of warnings and the behavioural response for women, people with lower education, people living in suburban and urban areas, weather-affected people, weather-ignorant people, and people who would usually show no self-protecting behaviour.

How would people respond to weather warnings and which factors impact the response?

As in previous studies (Schulze and Voss 2020; Schulze and Voss 2022a), we found a **high willingness to act** on weather warnings.

- The majority would adapt their behaviour after receiving a weather warning, e.g. eight out of ten would take preparatory measures. Seven out of ten would change private or professional plans.
- More than eight out of ten people would take a warning seriously. More than three-fourths perceived them as personally relevant, and about seven out of ten as threatening.
- Most respondents would also be attentive after reading the weather warnings.

Overall, we found that considering participants' characteristics, the differences in warning formats are less relevant for warning perception and response.

We also replicated earlier research identifying **weather attitudes** as the strongest predictor for warning perception and response (Schulze and Voss 2022a, 2022b).

- Weather-disinterested people stated the lowest perceived threat, relevance, and seriousness following the weather warnings. They were significantly less likely to take protective action or change plans following a weather warning than weather-conscious or weather-affected participants.
- The more people report confidence in the reliability of weather forecasts, the more likely they are to show a behavioural response to a weather warning and the higher they rated warning perception.

Sociodemographic variables and living conditions affected the warning perception and response as well.

- Females and older people were more likely to perceive a weather warning as threatening or relevant and to react to a weather warning.

Furthermore, **living conditions** were relevant.

- A higher warning perception and response were reported by participants that experienced material and/or physical damage because of high-impact weather events in the past compared to participants without such experiences.
- People living in rural areas stated a higher warning response.

How do Germans perceive weather forecasts and does it change over time?

In general, Germans perceive weather forecasts positively. But confidence and satisfaction are declining over time.

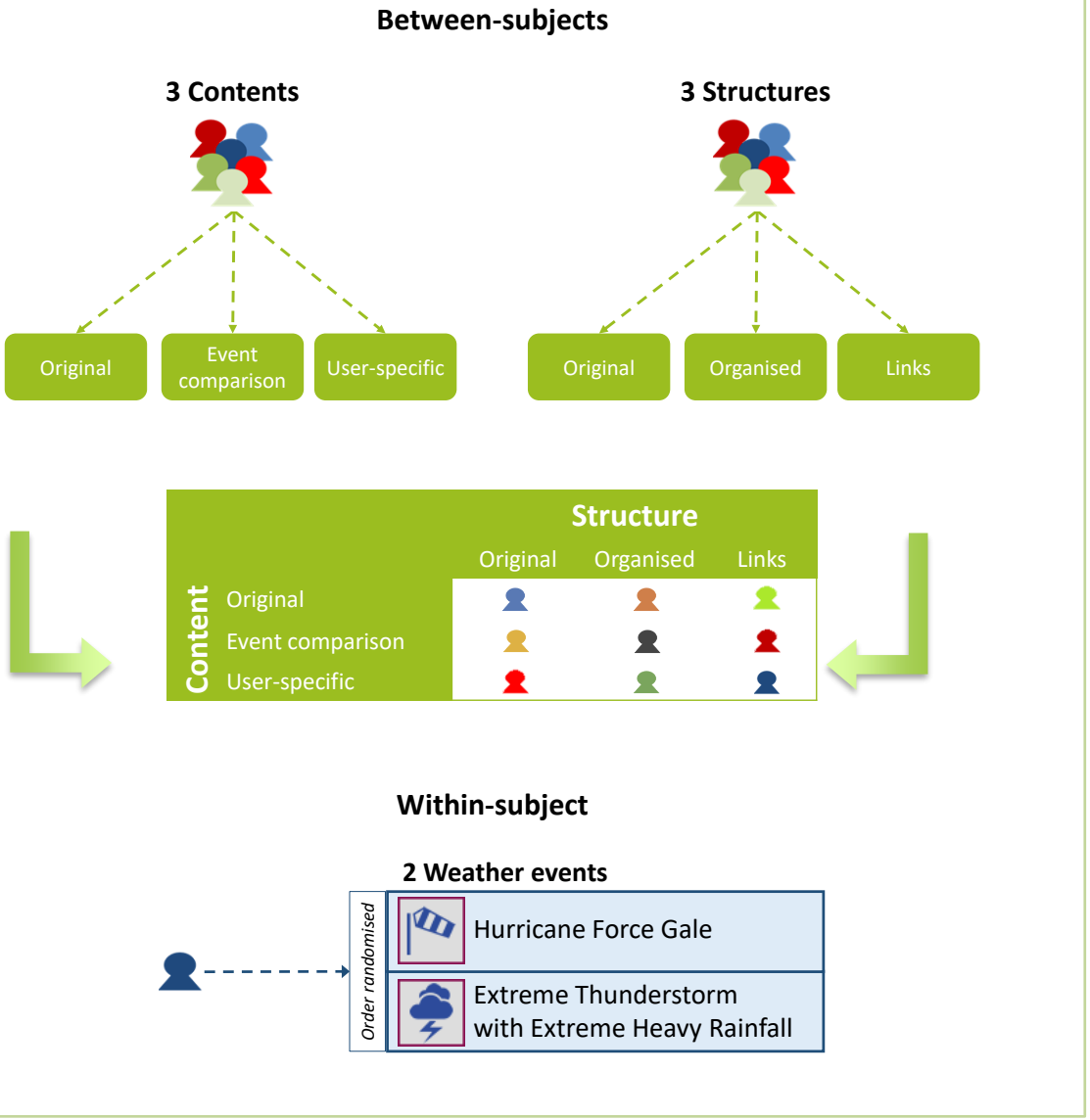
- Confidence in the reliability of weather forecasts was high. More than six out of ten stated to trust in the reliability of weather forecasts. But only less than one in ten Germans reported a very high level of confidence.
- The level of confidence declined sharply from spring 2021 to autumn 2021.
- More than half reported being satisfied with weather warnings received in Germany.
- We observed a sharp drop in reported satisfaction since the spring of 2021.
- Germans stated high interest in weather forecasts, but meteorological knowledge is truncated.
- Most (75 %) use weather forecasts regularly and consciously, but some (11 %) would not follow weather forecasts even in the event of a weather warning.

Experimental design

PARTICIPANTS WERE DIVIDED INTO NINE GROUPS: THEY SAW A WARNING IN ONE OF THREE STRUCTURES CONTAINING ONE OF THREE INFORMATION

- **Research Questions:** We conducted a randomised online experiment in Germany to address the following research questions:
  1. Can we improve currently used weather warnings by
     - a modified structure or
     - supplementary content?
  2. What is the most relevant information?

- **Experimental Design:** The experiment was based on a 3 (*Content*) × 3 (*Structure*) × 2 (*Event*) mixed experimental design.
- Among the three independent variables (IVs), *Content* and *Structure* were the between-subject factors.
- Meaning participants were divided into nine groups: each saw a warning containing one of three pieces of information arranged in one of three structures.
- The weather event was the within-subject factor. Each participant saw two warnings in randomised order: one concerning *Thunderstorms & Rainfall* and one describing *Hurricane Force Gale.*



We tested for three different kinds of warning content

- The independent variable *Content* contained three levels:
  - Original (including recommendation and impact)
  - Event comparison
  - User-specific
- **Original (including recommendation and impact):** Original referred to a warning message as the *Deutscher Wetterdienst* was using it at the time of the study. The warning contained information about the nature of the event, meteorological parameters, warning level, hazard information including impacts, recommendations for action, and publisher.
- **Event comparison:** The event comparison supplemented the information of the original warning. It compared the event with previous ones and includes climatology, the time of the previous event occurring, and resulting damages.
- **User-specific:** The user-specific warning message added to the original content specific information relevant for cyclists, car drivers, pedestrians, users of public transport, and home (Table A 1 and Table A 2 in the appendix).

Examples of warnings with different content and original structure

Original (including recommendation and impact)

Event comparison

User-specific

We tested for three different warning structures

- The independent variable *Structure* comprised of three levels:
  - Original
  - Organised
  - Links
- **Original:** Original referred to a warning message as the *Deutscher Wetterdienst* was using it at the time of the study. The warning consisted of a continuous text without formatting.
- **Organised:** The organised warning message provided the same content in the identical order as the original warning but in a structured way. Paragraphs and formatted headings separated different information.
- **Links:** The warning with links contained only links that corresponded to the headings of the structured warning. Clicking on the links showed equal information as the original and the structured warning.

Examples of warnings with different structure and original content

Original

Amtliche UNWETTERWARNUNG

ORKANBÖEN

ausgegeben vom Deutschen Wetterdienst

Es besteht die Gefahr des Auftretens von orkanartigen Böen (Stufe 3 von 4). Verbreitet werden ORKANBÖEN (Bft 12, um 120 km/h) erwartet.

ACHTUNG! Hinweis auf mögliche Gefahren:
Es können zum Beispiel Bäume entwurzelt und Dächer beschädigt werden. Achten Sie besonders auf herabstürzende Äste, Dachziegel oder Gegenstände. Schließen Sie alle Fenster und Türen! Sichern Sie Gegenstände im Freien! Halten Sie insbesondere Abstand von Gebäuden, Bäumen, Gerüsten und Hochspannungsleitungen. Vermeiden Sie möglichst den Aufenthalt im Freien!

Amtliche UNWETTERWARNUNG

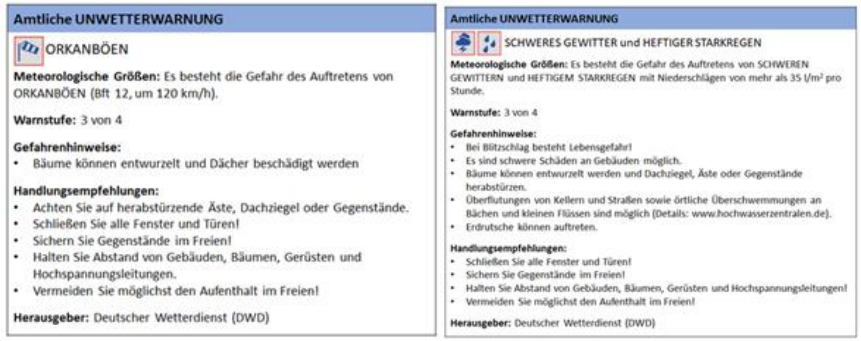
SCHWERES GEWITTER und HEFTIGER STARKREGEN

ausgegeben vom Deutschen Wetterdienst

Es besteht die Gefahr des Auftretens von schweren Gewittern und heftigem Starkregen (Stufe 3 von 4). Verbreitet werden schwere Gewitter und heftiger Starkregen mit Niederschlägen von mehr als 35 l/m² pro Stunde erwartet.

ACHTUNG! Hinweis auf mögliche Gefahren:
Bei Blitzschlag besteht Lebensgefahr! Es sind unter anderem verbreitet schwere Schäden an Gebäuden möglich. Bäume können entwurzelt werden und Dachziegel, Äste oder Gegenstände herabstürzen. Überflutungen von Kellern und Straßen sowie örtliche Überschwemmungen an Bächen und kleinen Flüssen sind möglich (Details: www.hochwasserzentralen.de). Es können zum Beispiel Erdrutsche auftreten. Schließen Sie alle Fenster und Türen! Sichern Sie Gegenstände im Freien! Halten Sie insbesondere Abstand von Gebäuden, Bäumen, Gerüsten und Hochspannungsleitungen! Vermeiden Sie möglichst den Aufenthalt im Freien!

Organised



Amtliche UNWETTERWARNUNG

ORKANBÖEN

Meteorologische Größen: Es besteht die Gefahr des Auftretens von ORKANBÖEN (Bft 12, um 120 km/h).

Warnstufe: 3 von 4

Gefahrenhinweise:
- Bäume können entwurzelt und Dächer beschädigt werden

Handlungsempfehlungen:
- Achten Sie auf herabstürzende Äste, Dachziegel oder Gegenstände.
- Schließen Sie alle Fenster und Türen!
- Sichern Sie Gegenstände im Freien!
- Halten Sie Abstand von Gebäuden, Bäumen, Gerüsten und Hochspannungsleitungen.
- Vermeiden Sie möglichst den Aufenthalt im Freien!

Herausgeber: Deutscher Wetterdienst (DWD)

Amtliche UNWETTERWARNUNG

SCHWERES GEWITTER und HEFTIGER STARKREGEN

Meteorologische Größen: Es besteht die Gefahr des Auftretens von SCHWEREN GEWITTERN und HEFTIGEM STARKREGEN mit Niederschlägen von mehr als 35 l/m² pro Stunde.

Warnstufe: 3 von 4

Gefahrenhinweise:
- Bei Blitzschlag besteht Lebensgefahr!
- Es sind schwere Schäden an Gebäuden möglich.
- Bäume können entwurzelt werden und Dachziegel, Äste oder Gegenstände herabstürzen.
- Überflutungen von Kellern und Straßen sowie örtliche Überschwemmungen an Bächen und kleinen Flüssen sind möglich (Details: www.hochwasserzentralen.de).
- Erdrutsche können auftreten.

Handlungsempfehlungen:
- Schließen Sie alle Fenster und Türen!
- Sichern Sie Gegenstände im Freien!
- Halten Sie Abstand von Gebäuden, Bäumen, Gerüsten und Hochspannungsleitungen!
- Vermeiden Sie möglichst den Aufenthalt im Freien!

Herausgeber: Deutscher Wetterdienst (DWD)

Links

Amtliche UNWETTERWARNUNG

ORKANBÖEN

Meteorologische Größen
Warnstufe
Gefahrenhinweise
Handlungsempfehlungen
Herausgeber

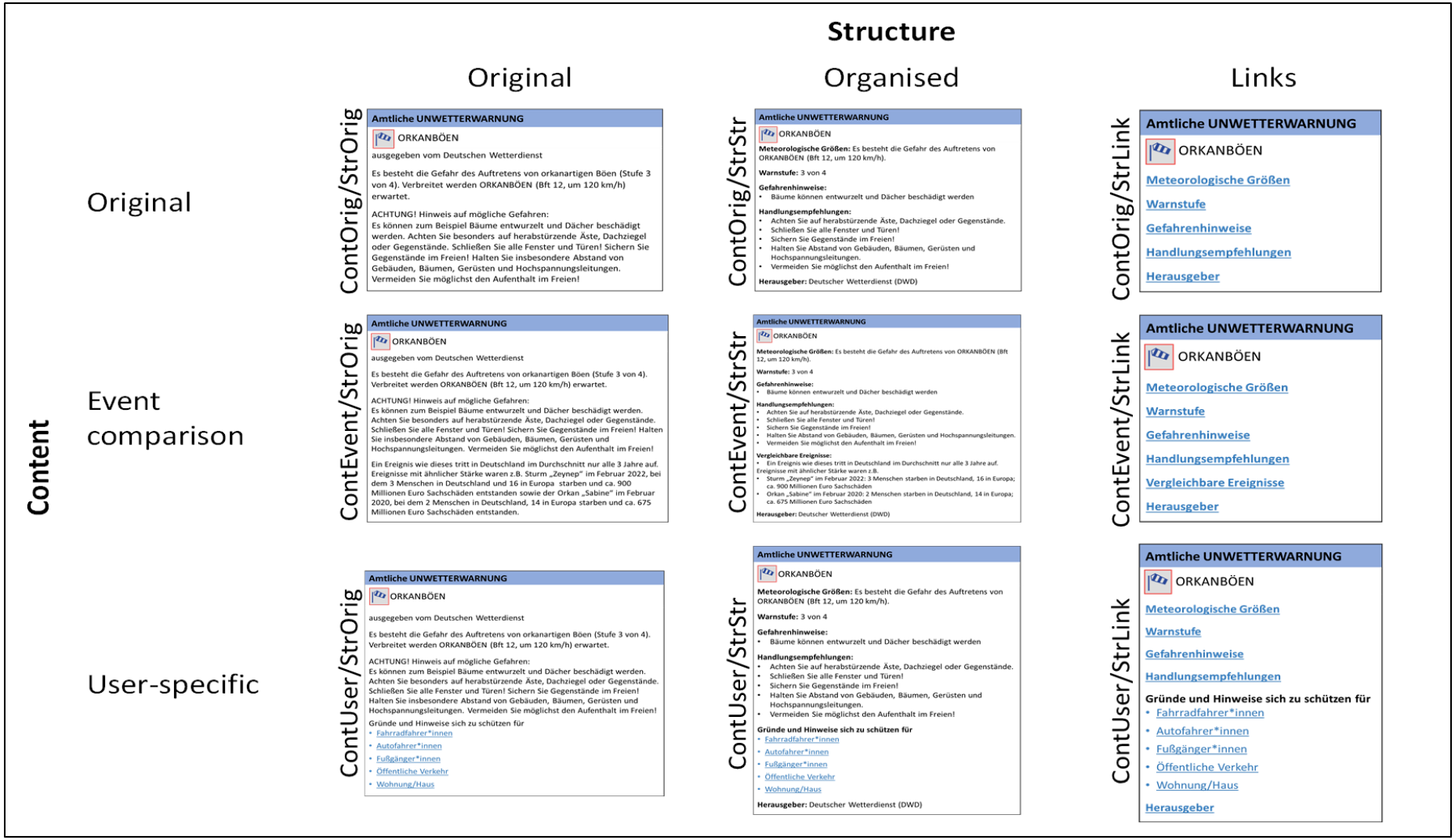
Amtliche UNWETTERWARNUNG

SCHWERES GEWITTER und HEFTIGER STARKREGEN

Meteorologische Größen
Warnstufe
Gefahrenhinweise
Handlungsempfehlungen
Herausgeber

Overview of all warning formats tested

Examples of tested warning formats

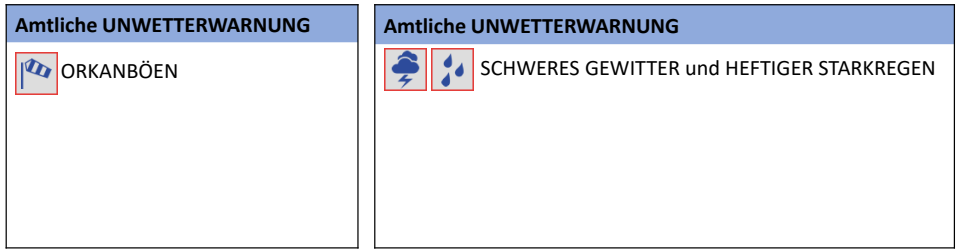


Participants evaluated each warning text

Dependent Variables: After presenting each warning, we measured a set of outcome variables to gauge how participants' responses might differ as a function of the various warning messages.

- We measured the impact of the nine different warning messages on
  - text evaluation (agitation, activeness, attention, text rating) and
  - warning evaluation (perception of the warning, reaction to the warning).
- **Text rating**: We assessed the warning texts with six bipolar items (e.g. incomprehensible – comprehensible; unclear – clear; meaningless – informative). The participants rated the items on scales ranging from 1 to 7 for two weather events.
- We computed the scale *Text rating* with twelve items (Cronbach's alpha = .942). Moreover, we calculated two subscales with six items for each weather scenario investigated, thunderstorm and rainfall (Cronbach's alpha = .913) and hurricane force gale (Cronbach's alpha = .911).

Warning messages

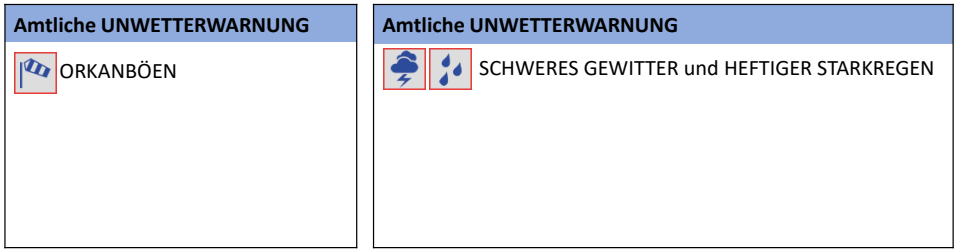


Text rating

Following each warning, participants were able to express their sentiments

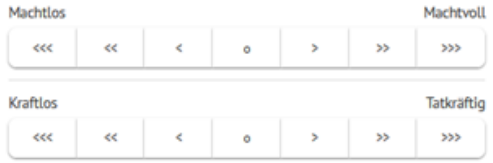
- Text evaluation also included sentiments such as agitation, activeness, and attention.
- **Agitation**: To measure the agitation after reading the warnings, we used one bipolar item (semantic differential) ranging from 1 to 7 (calm - excited).
- We created a scale *Agitation* with two items (one for each event; Cronbach's alpha = .771).
- **Activeness**: We evaluated whether the warnings activated the respondents by means of two bipolar items (powerless – powerful; impotent - energetic). The items ranged from 1 to 7.
- For each scenario, we calculated a subscale with two items (hurricane force gale: Cronbach's alpha = .622, thunderstorm and rainfall: Cronbach's alpha = .602). The four items formed the scale *Activeness* (Cronbach's alpha = .764).
- **Attention**: To investigate how attentive the respondents felt, we used two bipolar items (semantic differential) with scales ranging from 1 to 7 (disinterested – attentive; mindless – alert).
- We calculated the scale *Attention* with four items (Cronbach's alpha = .831). Additionally, we formed two subscales with two items addressing both weather scenarios (thunderstorm and rainfall: Cronbach's alpha = .767, hurricane force gale: Cronbach's alpha = .769).

Warning messages



Agitation

Activeness

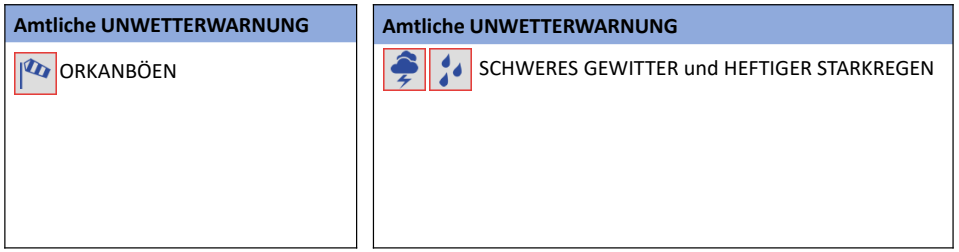


Attention

We measured the impact of the different warning messages on warning perception

- **Warning Perception**: After seeing the warning a second time, participants reported their warning perception with three items. The scales ranged from 1 to 7.
- We investigated how seriously, threateningly, and personally relevant they perceived the warnings.
- We computed the scale *Warning perception* with six items (Cronbach's alpha = .910). Moreover, we calculated two subscales for each weather scenario investigated, thunderstorm and rainfall (Cronbach's alpha = .878) and hurricane force gale (Cronbach's alpha = .871).

Warning messages

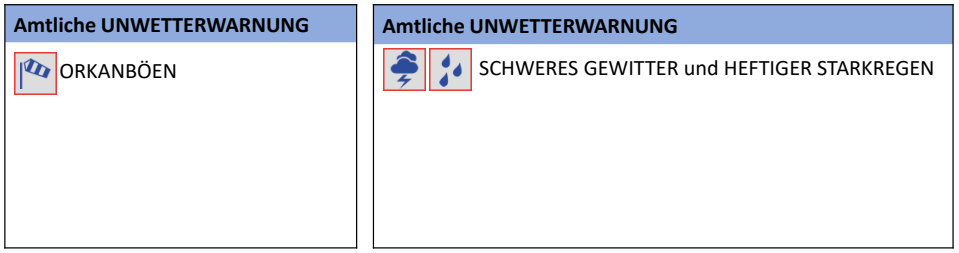


Warning perception

BEHAVIOURAL RESPONSE TO EACH WARNING WAS ASSESSED

- **Warning Response**: Following each warning and the assessment of warning perception, we examined the behavioural response using two items ranging from 1 to 7.
- We explored if participants would take preparatory measures and if they would change private or business plans.
- Four items formed the scale *Warning response* (Cronbach's alpha = .880). Additionally, we calculated two subscales for each weather scenario investigated (thunderstorm and rainfall: Cronbach's alpha = .828; hurricane force gale: Cronbach's alpha = .819).

Warning messages



Warning response

Analysis

Analyses without control variables

- We calculated linear mixed-effects (LME) models to examine differences in warning ratings by warning type and event.
- Individuals rated two warnings (one for each weather scenario). These ratings are correlated within individuals. Random intercepts adjusted for individual differences, e.g., that some participants would rank all warnings higher than average, whereas others would rank them lower.
- We estimated separate LME models for the text (agitation, activeness, attention, text assessment) and the warning evaluations (warning perception, warning response).
- Responses were regressed on the independent variables *Content* (three levels: original, event comparison, user-specific), *Structure* (three levels: original, structured, links) and *Event* (two levels: hurricane force gale, thunderstorm and rainfall).
- We examined their interactions separately, also (Content*Structure, Content*Event, Structure*Event). To compare the fit of the models, we used analyses of variance (ANOVA).
- Following, we report the model that fits best to the data.

Analyses with control variables

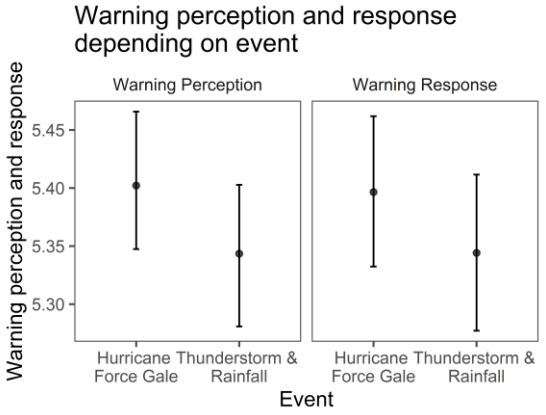
- We ran additional models to observe if these effects remained when participants' characteristics were considered (Table A 3 and Table A 4 in the appendix).
- Individual characteristics of interest were:
  - Gender
  - Age
  - Education level
  - Children living at home
  - Size of home town
  - The perceived vulnerability of home
  - Staying mainly indoors or outdoors
  - Experiencing physical and/or material damage due to high-impact weather events
  - Satisfaction with weather warnings
  - Confidence in the reliability of weather forecasts
  - Meteorological knowledge
  - Weather forecast attitudinal cluster (Figure A 1 and description in the appendix).
- To examine potential sociodemographic differences in the warning evaluation, each of the linear mixed effect models described above was repeated to test two-way interaction terms between warning type (*Content*, *Structure*) and participants' characteristics.

Do people react differently depending on the Weather event?

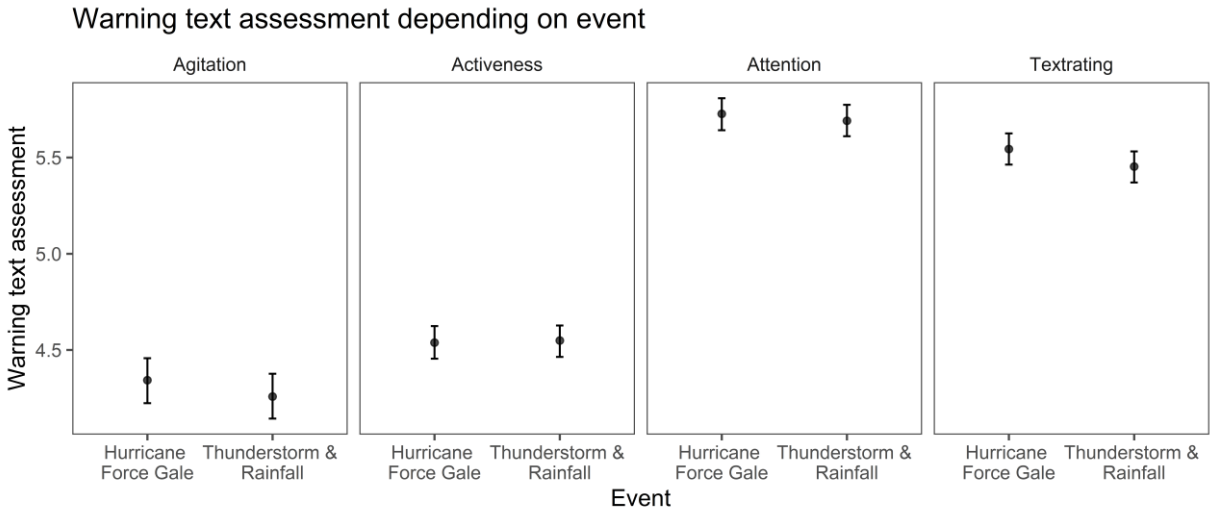
Multivariate Analysis

Storm warnings resulted in higher warning perception and protective behaviour than thunderstorm warnings

- To examine differences in warning evaluation by warning type and event, we estimated separate linear mixed effects models for *Warning perception* and *Warning response*.
- Participants rated warning perception and response for the hurricane force gale scenario significantly higher than for the thunderstorm and rainfall scenario (page 20).
- Germans perceived a hurricane force gale warning as more threatening and relevant than a thunderstorm and rainfall warning.
- Following a storm warning, they would take more protective action and change plans than following a thunderstorm warning.
- We found similar results in previous studies (Schulze and Voss, 2022a; Schulze et al. 2022).
- We did not find significant differences in *Agitation*, *Activeness*, *Attention*, and *Text rating* depending on the two weather scenarios (page 21).



Warning perception and response as mean over items with scale 1 to 7



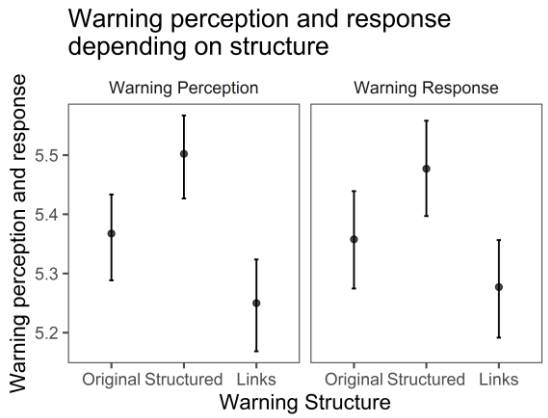
Warning text assessment as mean over items with scale 1 to 7

Can a modified structure improve weather warnings?

Multivariate Analysis

A WELL-STRUCTURED WEATHER WARNING ENHANCED WARNING PERCEPTION BUT NOT WARNING RESPONSE

- To examine differences in warning evaluation by warning type and event, we estimated separate linear mixed effects models for *Warning perception* and *Warning response*.
- Perception and response were highest for well-structured warnings.
- The differences between the well-structured and the original warnings were significant for *Warning perception* but not for *Warning response*.
- Warnings consisting only of links resulted in the lowest ratings for perception and response. The differences were significant.
- The findings suggest that a well-structured warning can enhance warning perception. Warnings consisting only of links should be used with caution.
- We did not find an interaction between *Structure* and *Content* or *Structure* and *Event*.

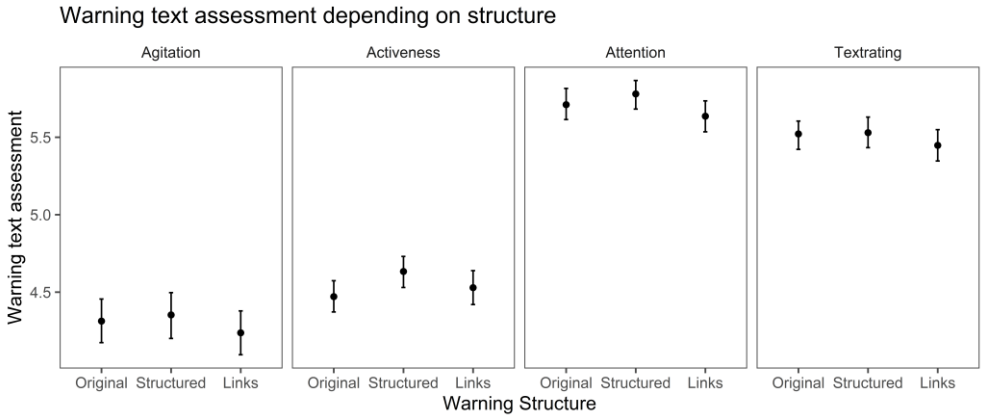


Warning perception and response as mean over items with scale 1 to 7

	Warning Perception					Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	5.42	0.04	5.33 – 5.51	-0.03 – 0.12	**<0.001**	5.42	0.03	5.31 – 5.52	-0.05 – 0.11	**<0.001**
Content: Original	*Reference*					*Reference*				
ContentContent: Event comparison:EventEvent: Thunderstorm & Rainfall	-0.05	-0.04	-0.12 – 0.03	-0.10 – 0.02	0.224	-0.04	-0.03	-0.13 – 0.04	-0.09 – 0.03	0.354
Content: Event comparison	0.00	0.00	-0.10 – 0.11	-0.08 – 0.09	0.957	0.04	0.03	-0.07 – 0.16	-0.05 – 0.12	0.451
Content: User- specific	-0.07	-0.06	-0.18 – 0.03	-0.15 – 0.03	0.163	-0.05	-0.04	-0.17 – 0.07	-0.13 – 0.05	0.397
ContentContent: User- specific:EventEvent: Thunderstorm & Rainfall	0.09	0.08	0.02 – 0.17	0.02 – 0.14	**0.015**	0.11	0.08	0.02 – 0.19	0.02 – 0.14	**0.015**
Structure: Original	*Reference*					*Reference*				
Structure: Structured	0.12	0.10	0.02 – 0.21	0.02 – 0.18	**0.015**	0.09	0.07	-0.02 – 0.20	-0.01 – 0.15	0.102
Structure: Links	-0.12	-0.10	-0.21 – -0.02	-0.18 – -0.02	**0.016**	-0.12	-0.09	-0.23 – -0.01	-0.17 – -0.01	**0.032**
Event: Hurricane Force Gale	*Reference*					*Reference*				
Event: Thunderstorm & Rainfall	-0.07	-0.06	-0.13 – -0.02	-0.11 – -0.02	**0.007**	-0.08	-0.06	-0.14 – -0.02	-0.10 – -0.01	**0.012**
Random Effects										
σ^2	0.38					0.48				
τ_{00}	1.00 $_{TN}$					1.30 $_{TN}$				
ICC	0.73					0.73				
N	3014 $_{TN}$					3014 $_{TN}$				
Observations	6028					6028				
Marginal R^2 / Conditional R^2	0.008 / 0.728					0.005 / 0.734				

THE STRUCTURE OF THE WARNING DID NOT AFFECT THE TEXT EVALUATION

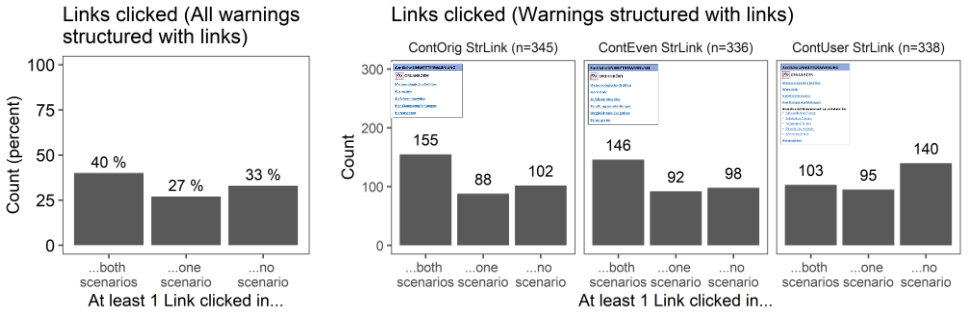
- We estimated separate linear mixed effects models for *Agitation*, *Activeness*, *Attention*, and *Text rating* to examine differences in warning evaluation by warning type, including message structure.
- The structure of the weather warnings did not affect the text evaluation significantly.
- We did not find an interaction between *Structure* and *Content* or *Structure* and *Event*.

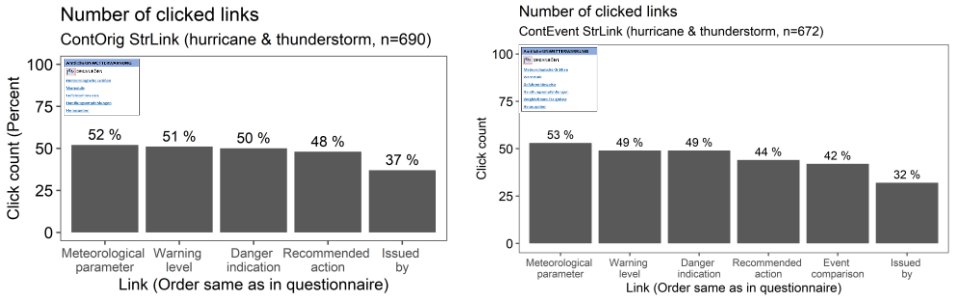


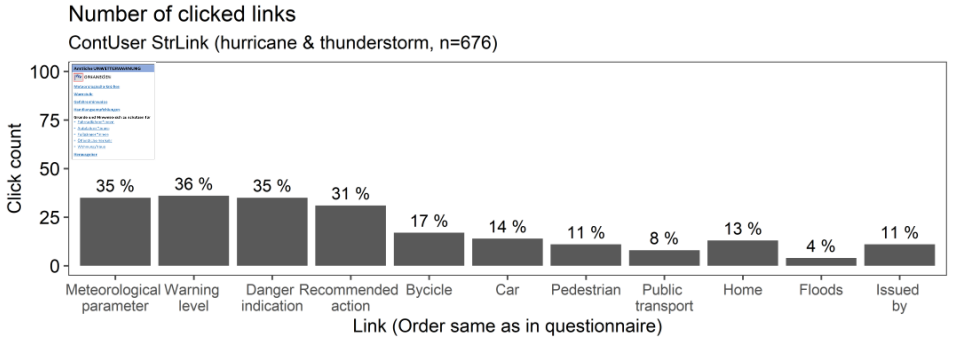
	Agitation			Activeness			Attention			Textratig		
Predictors	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*
(Intercept)	4.28 (-0.01)	-0.01 (-0.08 – 0.07)	**<0.001**	4.52 (0.00)	0.00 (-0.07 – 0.08)	**<0.001**	5.73 (0.04)	0.04 (-0.03 – 0.12)	**<0.001**	5.59 (0.03)	0.03 (-0.05 – 0.11)	**<0.001**
Content: Original	*Reference*			*Reference*			*Reference*			*Reference*		
Content: Event comparison	0.04 (0.02)	0.02 (-0.06 – 0.10)	0.574	-0.05 (-0.04)	-0.04 (-0.12 – 0.04)	0.306	-0.06 (-0.05)	-0.05 (-0.13 – 0.03)	0.192	-0.08 (-0.07)	-0.07 (-0.15 – 0.01)	0.086
Content: User- specific	0.00 (0.00)	0.00 (-0.08 – 0.08)	0.986	-0.03 (-0.02)	-0.02 (-0.10 – 0.06)	0.599	-0.04 (-0.03)	-0.03 (-0.11 – 0.04)	0.387	-0.07 (-0.06)	-0.06 (-0.15 – 0.02)	0.132
Structure: Original	*Reference*			*Reference*			*Reference*			*Reference*		
Structure: Structured	0.04 (0.02)	0.02 (-0.06 – 0.10)	0.581	0.03 (0.03)	0.03 (-0.05 – 0.10)	0.520	0.03 (0.03)	0.03 (-0.05 – 0.10)	0.531	0.09 (0.08)	0.08 (-0.00 – 0.16)	0.062
Structure: Links	-0.05 (-0.03)	-0.03 (-0.11 – 0.05)	0.466	0.02 (0.02)	0.02 (-0.06 – 0.10)	0.608	-0.08 (-0.07)	-0.07 (-0.15 – 0.01)	0.091	-0.02 (-0.02)	-0.02 (-0.10 – 0.06)	0.628
Event: Hurricane Force Gale	*Reference*			*Reference*			*Reference*			*Reference*		
Event: Thunderstorm & Rainfall	-0.00 (-0.00)	-0.00 (-0.03 – 0.03)	0.990	0.00 (0.00)	0.00 (-0.03 – 0.03)	0.860	-0.00 (-0.00)	-0.00 (-0.03 – 0.03)	0.869	-0.01 (-0.01)	-0.01 (-0.03 – 0.02)	0.464
Random Effects												
σ^2	0.98			0.54			0.50			0.29		
τ_{00}	1.66 $_{TN}$			0.88 $_{TN}$			0.86 $_{TN}$			0.92 $_{TN}$		
ICC	0.63			0.62			0.63			0.76		
N	3014 $_{TN}$			3014 $_{TN}$			3014 $_{TN}$			3014 $_{TN}$		
Observations	6028			6028			6028			6028		
Marginal R^2 / Conditional R^2	0.001 / 0.629			0.000 / 0.622			0.002 / 0.636			0.003 / 0.763		

PARTICIPANTS EITHER VIEWED ALL OF THE BASIC INFORMATION OR NONE

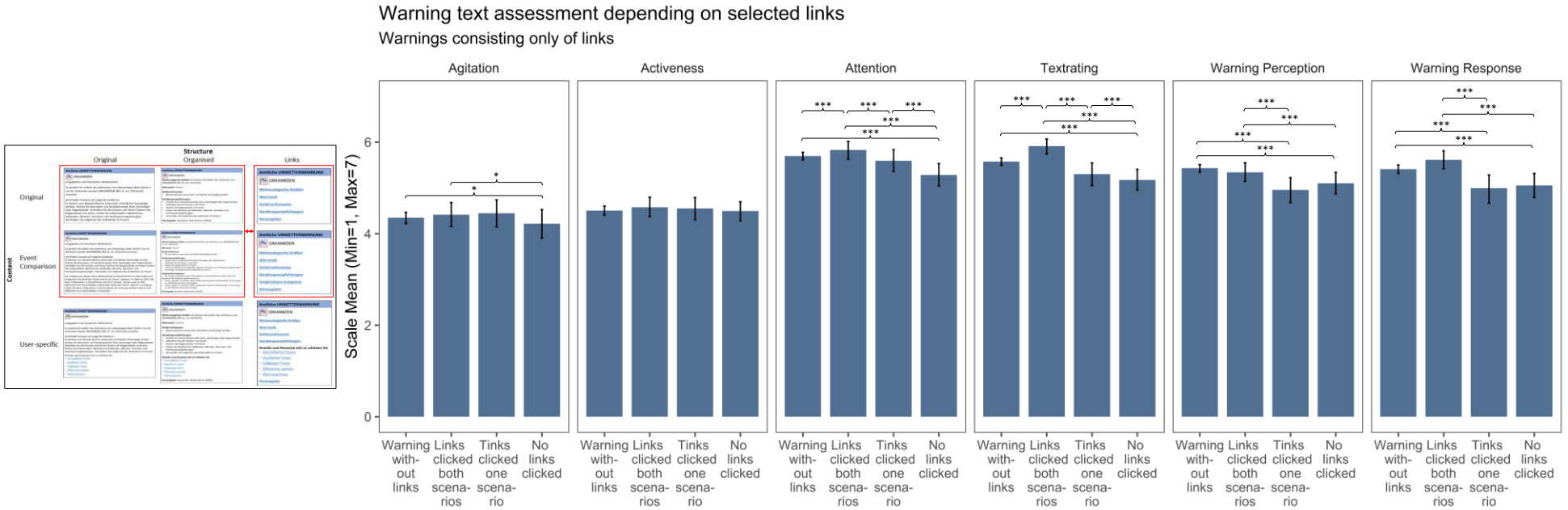
- To identify the most relevant pieces of information, three of the nine warning formats consisted of links (page 10).
- One-third (33 %) of the participants did not select any link. They assessed the warning messages without obtaining any information about the event. When offered ten or more links (ContUser/StrLink), four out of ten (41 %) respondents did not view any available information.
- Some people were not interested in specific information about the weather event. Too many links seemed to be an additional discouraging factor.
- Four out of ten (40 %) selected a link in both weather scenarios. 27 %, on the other hand, only clicked links in the first presented scenario. These people assessed the second hypothetical warning without obtaining further information. This might be due to artificial circumstances implementing experiments.
- Respondents usually checked out all links of warnings with basic information (ContOrig/StrLink; ContEvent/StrLink) or none at all.
- The participants viewed each basic (meteorological parameters, warning level, danger indication, recommendation) and event comparison information almost equally often and in order of presentation. User-specific information was selected less frequently.
- All basic information and event comparisons seemed equally relevant for the participants to assess the situation.







EVEN IF PEOPLE DID NOT VIEW BASIC INFORMATION, THEY OFTEN EVALUATED THE WARNINGS POSITIVELY BUT, ON AVERAGE LOWER THAN OTHER PARTICIPANTS



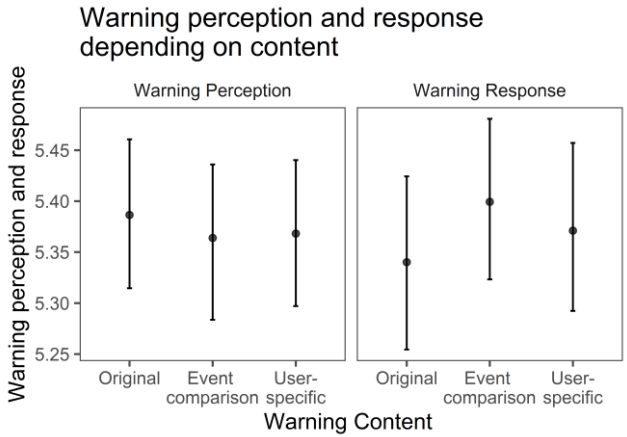
- Even though people did not obtain detailed information about the event in one or both scenarios, they reported high warning perception and response. They also would feel agitated, active, and attentive.
- Comparing the warning scores of people who received warnings without links (ContOrig/StrOrig; ContOrig/StrStr; ContEven/StrOrig; ContEven/StrStr) and those who selected a link for none, for one or both warning scenarios (warning ContOrigStrLink; ContEven/StrLink), differences became apparent.
- Participants who selected links in both scenarios stated a similar warning perception and response as people receiving a warning without links. But they reported higher attention and text ratings.
- The assessments of people obtaining no information were significantly lower compared to people receiving or viewing this information.

Can supplement information improve weather warnings?

Multivariate analysis

THE CONTENT DID NOT IMPACT THE WARNING PERCEPTION OR RESPONSE SIGNIFICANTLY

- We estimated separate linear mixed effects models for *Warning perception* and *Warning response* to examine differences in warning evaluation by warning type, including message content.
- Overall, we did not find significant differences in perception or response depending on the three message contents.

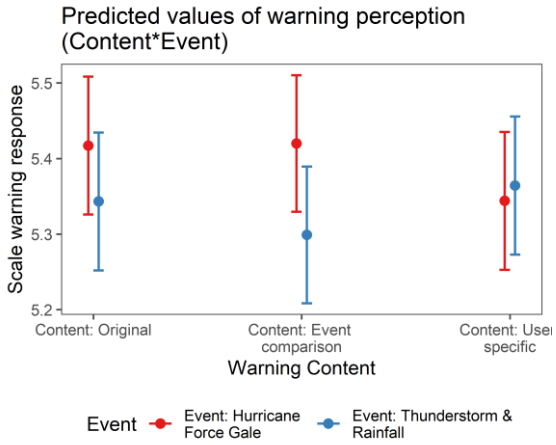


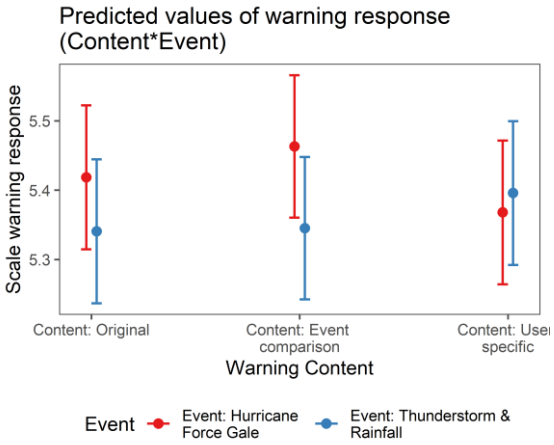
Warning perception and response as mean over items with scale 1 to 7

	Warning Perception					Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	5.42	0.04	5.33 – 5.51	-0.03 – 0.12	**<0.001**	5.42	0.03	5.31 – 5.52	-0.05 – 0.11	**<0.001**
Content: Original	*Reference*					*Reference*				
ContentContent: Event comparison:EventEvent: Thunderstorm & Rainfall	-0.05	-0.04	-0.12 – 0.03	-0.10 – 0.02	0.224	-0.04	-0.03	-0.13 – 0.04	-0.09 – 0.03	0.354
Content: Event comparison	0.00	0.00	-0.10 – 0.11	-0.08 – 0.09	0.957	0.04	0.03	-0.07 – 0.16	-0.05 – 0.12	0.451
Content: User- specific	-0.07	-0.06	-0.18 – 0.03	-0.15 – 0.03	0.163	-0.05	-0.04	-0.17 – 0.07	-0.13 – 0.05	0.397
ContentContent: User- specific:EventEvent: Thunderstorm & Rainfall	0.09	0.08	0.02 – 0.17	0.02 – 0.14	**0.015**	0.11	0.08	0.02 – 0.19	0.02 – 0.14	**0.015**
Structure: Original	*Reference*					*Reference*				
Structure: Structured	0.12	0.10	0.02 – 0.21	0.02 – 0.18	**0.015**	0.09	0.07	-0.02 – 0.20	-0.01 – 0.15	0.102
Structure: Links	-0.12	-0.10	-0.21 – -0.02	-0.18 – -0.02	**0.016**	-0.12	-0.09	-0.23 – -0.01	-0.17 – -0.01	**0.032**
Event: Hurricane Force Gale	*Reference*					*Reference*				
Event: Thunderstorm & Rainfall	-0.07	-0.06	-0.13 – -0.02	-0.11 – -0.02	**0.007**	-0.08	-0.06	-0.14 – -0.02	-0.10 – -0.01	**0.012**
Random Effects										
σ^2	0.38					0.48				
τ_{00}	1.00 $_{TN}$					1.30 $_{TN}$				
ICC	0.73					0.73				
N	3014 $_{TN}$					3014 $_{TN}$				
Observations	6028					6028				
Marginal R^2 / Conditional R^2	0.008 / 0.728					0.005 / 0.734				

User-specific information included in thunderstorm warnings enhanced warning perception and warning response

- We examined the interactions of *Content*, *Structure*, and *Event* separately (Content*Structure, Content*Event).
- We found a significant interaction between warning content and weather scenario.
- As shown before (page 18), storm warnings resulted in higher warning perception and response than thunderstorm warnings.
- While we found this difference for the original and event comparison warning, we did not detect it for the user-specific warning.
- The findings suggest that thunderstorm and rainfall warnings with user-specific information might enhance warning perception and response.
- Thunderstorm warnings, including user-specific information, should be used with caution.

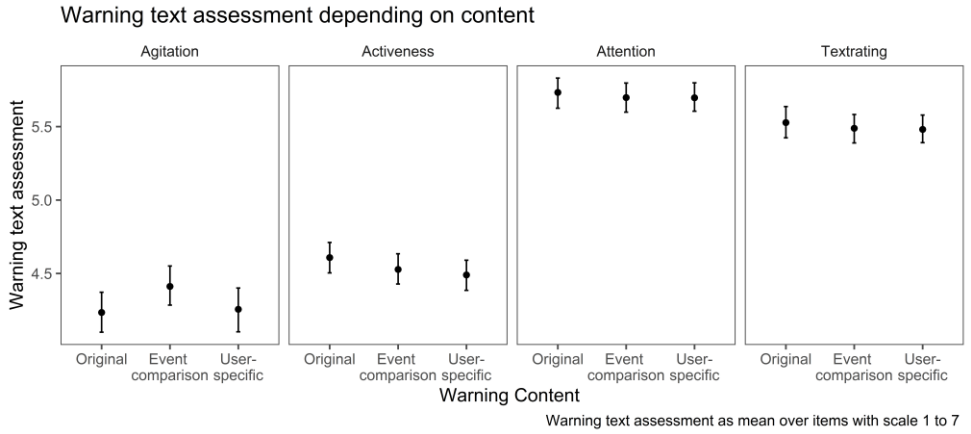




	Warning Perception					Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	5.42	0.04	5.33 – 5.51	-0.03 – 0.12	**<0.001**	5.42	0.03	5.31 – 5.52	-0.05 – 0.11	**<0.001**
Content: Original	*Reference*					*Reference*				
ContentContent: Event comparison:EventEvent: Thunderstorm & Rainfall	-0.05	-0.04	-0.12 – 0.03	-0.10 – 0.02	0.224	-0.04	-0.03	-0.13 – 0.04	-0.09 – 0.03	0.354
Content: Event comparison	0.00	0.00	-0.10 – 0.11	-0.08 – 0.09	0.957	0.04	0.03	-0.07 – 0.16	-0.05 – 0.12	0.451
Content: User- specific	-0.07	-0.06	-0.18 – 0.03	-0.15 – 0.03	0.163	-0.05	-0.04	-0.17 – 0.07	-0.13 – 0.05	0.397
ContentContent: User- specific:EventEvent: Thunderstorm & Rainfall	0.09	0.08	0.02 – 0.17	0.02 – 0.14	**0.015**	0.11	0.08	0.02 – 0.19	0.02 – 0.14	**0.015**
Structure: Original	*Reference*					*Reference*				
Structure: Structured	0.12	0.10	0.02 – 0.21	0.02 – 0.18	**0.015**	0.09	0.07	-0.02 – 0.20	-0.01 – 0.15	0.102
Structure: Links	-0.12	-0.10	-0.21 – -0.02	-0.18 – -0.02	**0.016**	-0.12	-0.09	-0.23 – -0.01	-0.17 – -0.01	**0.032**
Event: Hurricane Force Gale	*Reference*					*Reference*				
Event: Thunderstorm & Rainfall	-0.07	-0.06	-0.13 – -0.02	-0.11 – -0.02	**0.007**	-0.08	-0.06	-0.14 – -0.02	-0.10 – -0.01	**0.012**
Random Effects										
σ^2	0.38					0.48				
τ_{00}	1.00 $_{TN}$					1.30 $_{TN}$				
ICC	0.73					0.73				
N	3014 $_{TN}$					3014 $_{TN}$				
Observations	6028					6028				
Marginal R^2 / Conditional R^2	0.008 / 0.728					0.005 / 0.734				

THE CONTENT OF THE WARNING DID NOT AFFECT THE TEXT EVALUATION

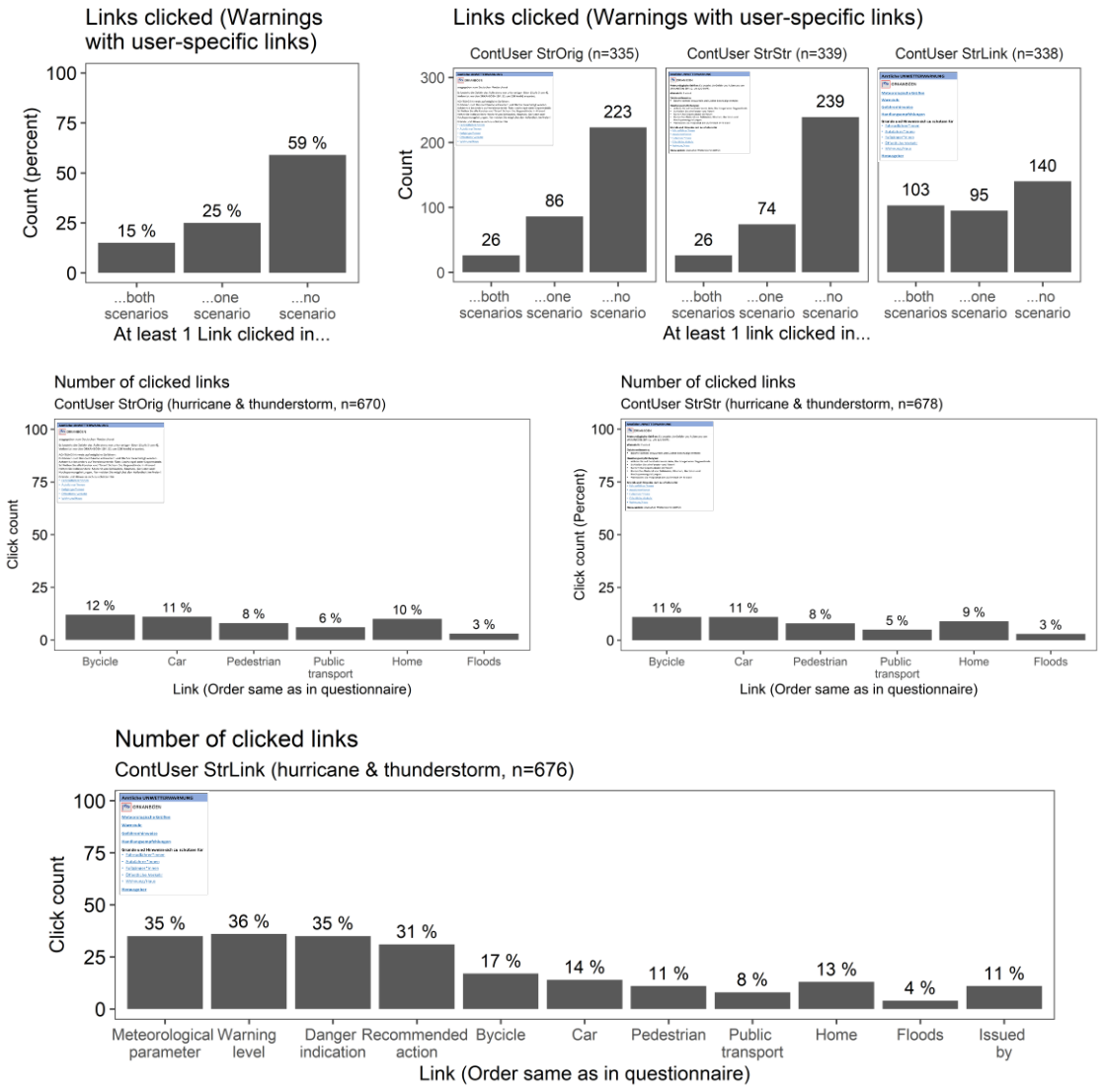
- We estimated separate linear mixed effects models for *Agitation*, *Activeness*, *Attention* and *Text rating* to examine differences in warning evaluation by warning type, including message content.
- Additional information about the event or user-specific recommendations did not result in significant different text evaluation.
- We did not find an interaction between *Structure* and *Content* or *Structure* and *Event*.



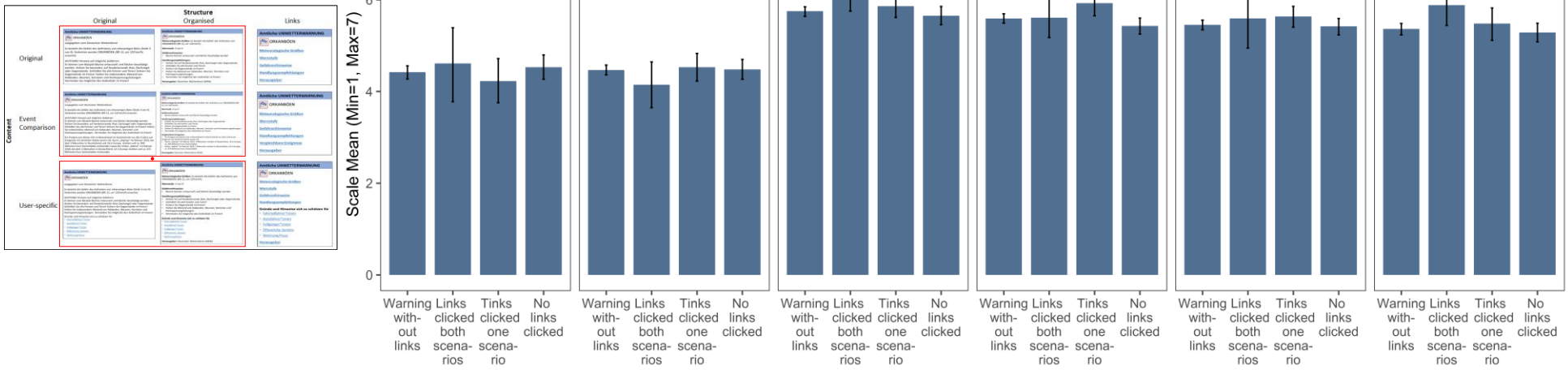
	Agitation			Activeness			Attention			Textratig		
Predictors	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*	*Estimates*	*std. Beta*	*p*
(Intercept)	4.28 (-0.01)	-0.01 (-0.08 – 0.07)	**<0.001**	4.52 (0.00)	0.00 (-0.07 – 0.08)	**<0.001**	5.59 (0.03)	0.03 (-0.05 – 0.11)	**<0.001**	5.59 (0.03)	0.03 (-0.05 – 0.11)	**<0.001**
Content: Original	*Reference*			*Reference*			*Reference*			*Reference*		
Content: Event comparison	0.04 (0.02)	0.02 (-0.06 – 0.10)	0.574	-0.05 (-0.04)	-0.04 (-0.12 – 0.04)	0.306	-0.08 (-0.07)	-0.07 (-0.15 – 0.01)	0.086	-0.08 (-0.07)	-0.07 (-0.15 – 0.01)	0.086
Content: User- specific	0.00 (0.00)	0.00 (-0.08 – 0.08)	0.986	-0.03 (-0.02)	-0.02 (-0.10 – 0.06)	0.599	-0.07 (-0.06)	-0.06 (-0.15 – 0.02)	0.132	-0.07 (-0.06)	-0.06 (-0.15 – 0.02)	0.132
Structure: Original	*Reference*			*Reference*			*Reference*			*Reference*		
Structure: Structured	0.04 (0.02)	0.02 (-0.06 – 0.10)	0.581	0.03 (0.03)	0.03 (-0.05 – 0.10)	0.520	0.09 (0.08)	0.08 (-0.00 – 0.16)	0.062	0.09 (0.08)	0.08 (-0.00 – 0.16)	0.062
Structure: Links	-0.05 (-0.03)	-0.03 (-0.11 – 0.05)	0.466	0.02 (0.02)	0.02 (-0.06 – 0.10)	0.608	-0.02 (-0.02)	-0.02 (-0.10 – 0.06)	0.628	-0.02 (-0.02)	-0.02 (-0.10 – 0.06)	0.628
Event: Hurricane Force Gale	*Reference*			*Reference*			*Reference*			*Reference*		
Event: Thunderstorm & Rainfall	-0.00 (-0.00)	-0.00 (-0.03 – 0.03)	0.990	0.00 (0.00)	0.00 (-0.03 – 0.03)	0.860	-0.01 (-0.01)	-0.01 (-0.03 – 0.02)	0.464	-0.01 (-0.01)	-0.01 (-0.03 – 0.02)	0.464
Random Effects												
σ^2	0.98			0.54			0.29			0.29		
τ_{00}	1.66 $_{TN}$			0.88 $_{TN}$			0.92 $_{TN}$			0.92 $_{TN}$		
ICC	0.63			0.62			0.76			0.76		
N	3014 $_{TN}$			3014 $_{TN}$			3014 $_{TN}$			3014 $_{TN}$		
Observations	6028			6028			6028			6028		
Marginal R^2 / Conditional R^2	0.001 / 0.629			0.000 / 0.622			0.003 / 0.763			0.003 / 0.763		

User-specific recommendations were less in demand

- Three warning formats offered user-specific information. It could be obtained by selecting links (page 11).
- Four out of ten (40 %) participants retrieved this additional information. More than half (59 %) did not view this material in both scenarios.
- If traditional warning information was visible and links provided supplementary user-specific recommendations for action, participants selected these links less frequently than links with basic information (page 22).
- Only a few respondents checked out all links with additional user-specific information.
- Participants clicked on links with additional user-specific information with varying frequency. The most frequently viewed information was for cyclists, car drivers, and the home.
- Participants selected the links according to their interests (e.g. cyclists select information for bicycle, car drivers for cars and pedestrians for pedestrians (Table A 6 in the appendix).



If participants obtained user-specific information or not did not significantly impact the warning perception or response



- If participants obtained user-specific information or not did not significantly impact the warning perception or response.
- Participants who selected links in both scenarios stated higher attention as people receiving a warning without links or people who did not obtain information in one or both scenarios.
- Respondents retrieving user-specific information in one or both scenarios reported the highest text rating values.

Can narratives improve weather warnings?

Multivariate Analysis

We investigated the effect of two narratives on warning perception and response

- We investigated whether narratives as a supplement to weather warnings impacted the behavioural response.
- To this end, we re-evaluated the interviews conducted in the second HErZ phase and generated customized warning narratives for selected behavioural clusters and weather scenarios.
- After the storm warning, participants saw a narrative describing a person who usually reacts to weather warnings but assesses the current situation as not dangerous and is surprised by the sudden storm.
- After the thunderstorm and rain warning, participants viewed a narrative describing a person who is disinterested in weather forecasts and warnings, misjudged the danger of heavy rainfall in the city, and was swept away by the water.
- We measured the perception of the warning and the reaction to it with the same items used to assess the warning.

Hurricane force gale

Stellen Sie sich vor, Sie hören oder lesen folgenden Erfahrungsbericht über einen Sturm mit vergleichbarer Stärke wie der, vor dem eben gewarnt wurde:

„Ich gehe bei schlechtem Wetter nicht raus, wenn ich nicht muss. Ich habe auch in den Nachrichten gehört, dass es Wind und Sturm geben soll, aber hier passiert das ja eigentlich nicht und als ich morgens aus dem Fenster geschaut habe, war es nicht windig und ich musste auch einkaufen gehen. Also bin ich losgegangen... Aber als ich dann aus dem Geschäft kam und auf dem Weg nach Hause war, da ging es ganz plötzlich los, auf einmal flog alles Mögliche rum, Dachziegel, Äste, Papier, was weiß ich, Bäume knackten und dann war da der Schmerz; irgendwas hat mich wohl getroffen. Ich war vier Wochen im Krankenhaus..."

Wie bewerten Sie folgende Fragen?

Thunderstorm and rainfall

Stellen Sie sich vor, Sie hören oder lesen folgenden Erfahrungsbericht über ein Gewitter mit Starkregen mit vergleichbarer Stärke wie dem vor dem eben gewarnt wurde:

„Wetter spielt für mich eigentlich nicht so eine große Rolle. Deshalb interessieren mich Wettervorhersagen nicht wirklich. Den Wetterbericht kriege ich meistens nur so nebenbei mit. Die Warnung habe ich dann zwar auch gehört, also dass es hier viel regnen soll und es Hochwasser geben kann, aber wir haben hier keinen Fluss oder See. Da dachte ich mir, ist halt nur Regen und ich musste sowieso zur Arbeit. Also bin ich los. Und es hat wirklich stark geregnet. Das Wasser ging mir ungefähr bis zum Knöchel und ist die Straße runtergelaufen, muss wohl ein Gulli oder so verstopft gewesen sein. Ich wusste nicht, dass man da nicht durchgehen soll; war ja nicht so hoch und ich bin noch nicht so alt und fit ... Aber plötzlich hat es mich von den Füßen gerissen und mitgezogen, einfach so und ich kam nicht mehr hoch. Ich weiß nicht, ob da irgendwas im Wasser war oder so. Als ich dann im Krankenhaus zu mir kam, hatte ich überall Schürf- oder Schnittwunden oder so, auch am Kopf..."

Wie bewerten Sie folgende Fragen?

Warning perception

Wie ernst nehmen Sie diese Informationen?

1	2	3	4	5	6	7

Gar nicht ernst — Sehr ernst

Wie bedrohlich empfinden Sie diese Schilderungen für sich persönlich?

1	2	3	4	5	6	7

Gar nicht bedrohlich — Sehr bedrohlich

Wie relevant sind diese Schilderungen für Sie persönlich?

1	2	3	4	5	6	7

Gar nicht relevant — Sehr relevant

Warning response

Würden Sie aufgrund dieser Informationen private und/oder berufliche Pläne ändern?

1	2	3	4	5	6	7

Auf gar keinen Fall — Auf jeden Fall

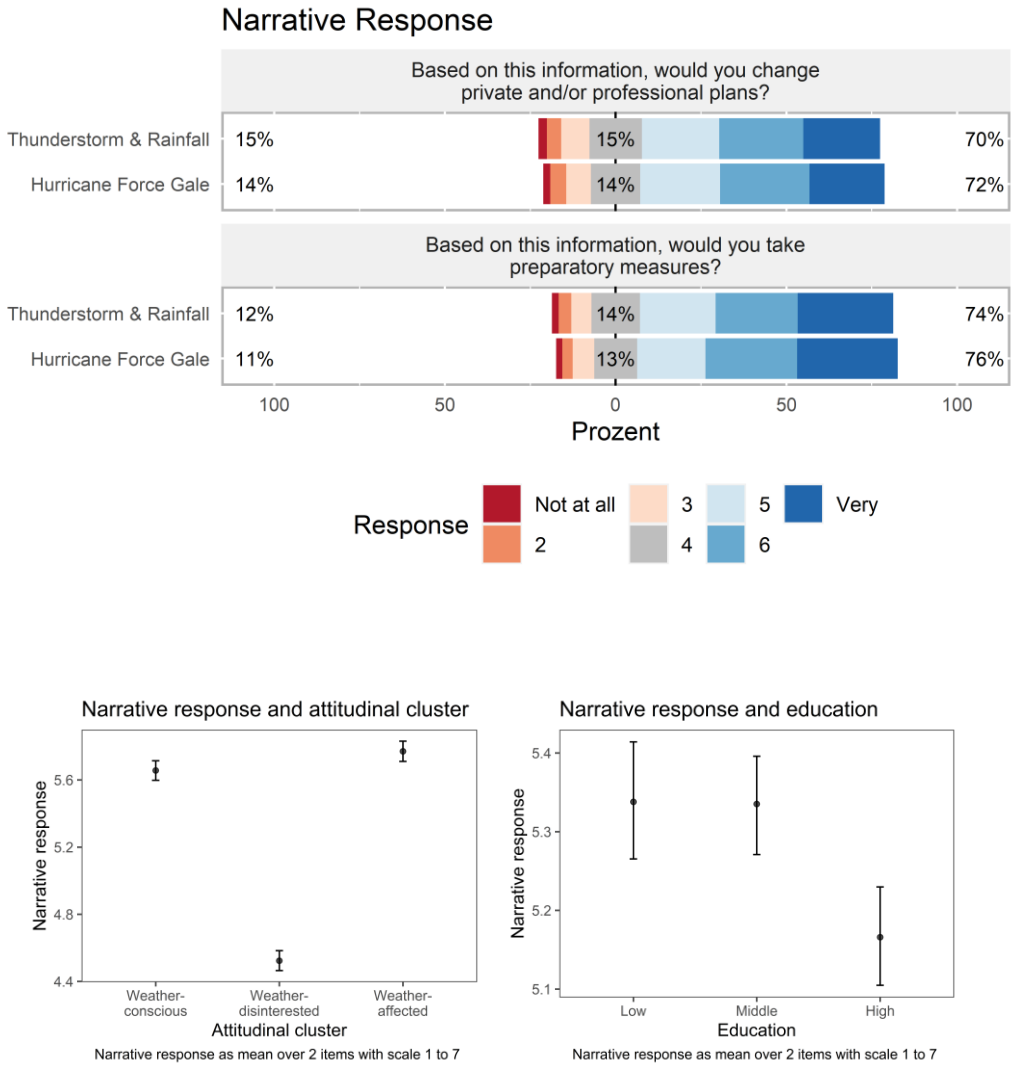
Würden Sie aufgrund dieser Informationen vorbereitende Maßnahmen (z. B. vorsorglich zu Hause bleiben oder Sichern von Gegenständen) treffen?

1	2	3	4	5	6	7

Auf gar keinen Fall — Auf jeden Fall

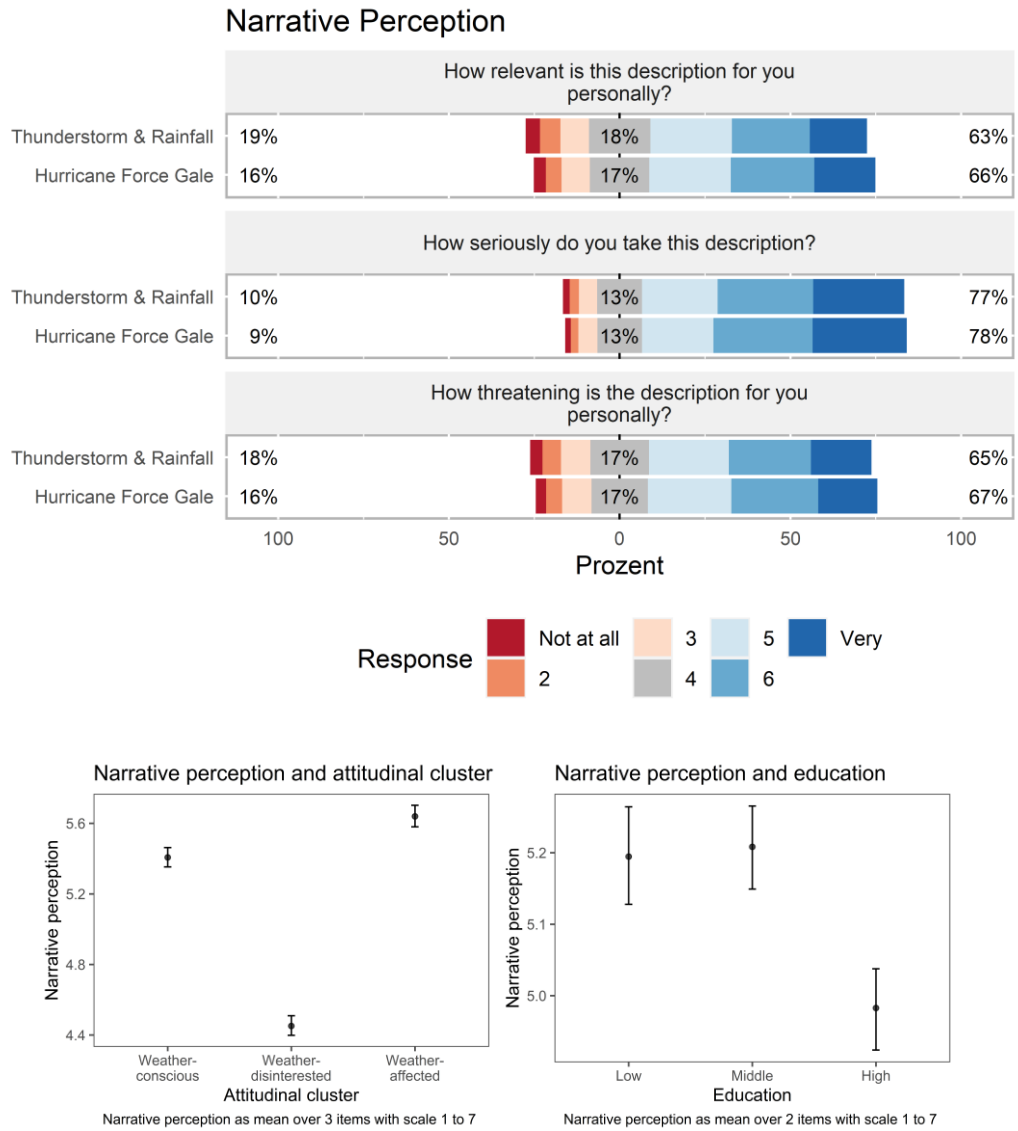
The narratives resulted in a similar willingness to act as the weather warnings

- The majority of respondents would adapt their behaviour after reading the narratives.
- Three-quarters (74 % and 76 %, respectively) would take preparatory measures after seeing the thunderstorm or hurricane narrative. Seven out of ten (70 % and 72 %, respectively) would change their plans.
- Thus, the narratives resulted in a similar willingness to act as the weather warnings (page 40).
- We estimated a linear mixed effect model to examine the impact of the event and sociodemographic variables on narrative response (Table A 7 in the appendix).
- Similar variables affected the reaction to narratives and warnings (page 45). We found two differences. The narratives resulted in a higher warning response for
    - weather-affected people compared to weather-conscious and weather-disinterested people and
    - people with low or medium compared to a high education level.



The narratives resulted in a similar warning perception as the weather warnings

- More than three fourths (77 % and 78 %, respectively) took the narratives seriously.
- About two third (65 % and 67 %, respectively) perceived the descriptions as threatening.
- Most (63 % and 66 %, respectively) described the narratives as personally relevant.
- Thus, the narratives resulted in a similar warning perception as the weather warnings (page 41).
- We estimated a linear mixed effect model to examine the impact of *Event* and sociodemographic variables on narrative perception (Table A 8 in the appendix).
- Similar variables affected the assessment of narratives and warnings (page 46). We found two differences. As with warning response, the descriptions resulted in a higher warning perception for
    - weather-affected people compared to weather-conscious and weather-disinterested people and
    - people with low or medium compared to a high education level.

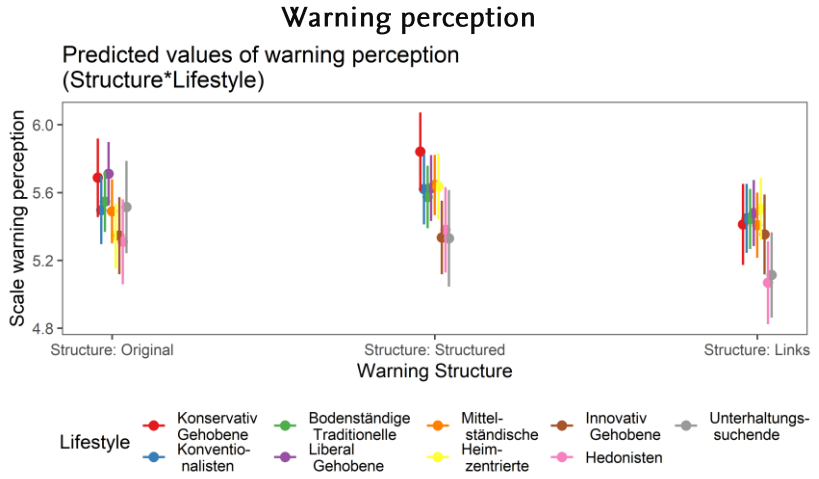


Do different weather warning formats address specific user groups better than others?

Multivariate Analysis

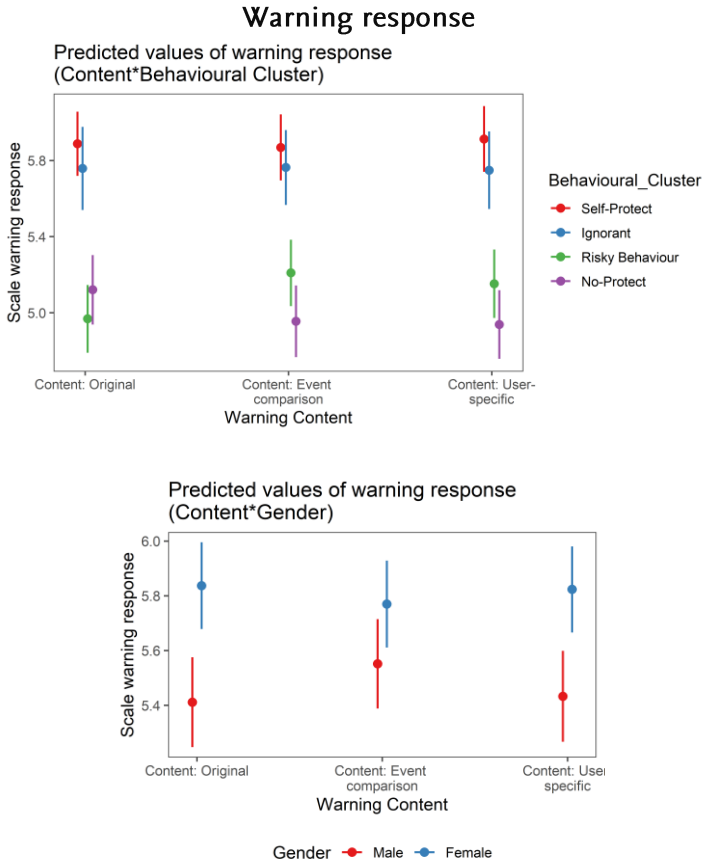
WARNINGS WITH DIFFERENT STRUCTURES DID NOT ADDRESS SPECIFIC USER GROUPS BETTER THAN OTHERS

- To explore whether particular warnings address different subgroups better, we tested for interactions between *Structure* and 1) attitudinal types (Figure A 1 in the appendix), 2) behavioural types (Figure A 2 in the appendix), 3) lifestyles (Table A 5 in the appendix), 4) sociodemographic variables and living conditions such as gender, age, education level, size of home town, and experiencing damage due to high-impact weather events.
- **Warning response**: We did not find a significant interaction. Thus, the effect of warning structure on warning response was independent of the attitudinal (Table A 17 in the appendix) and the behavioural cluster (Table A 18 in the appendix), the lifestyle (Table A 19 in the appendix), and the sociodemographic variables (Table A 20 - Table A 24 in the appendix).
- **Warning perception**: The warning structure had an effect on warning perception independently of the attitudinal cluster (Table A 25 in the appendix), the behavioural cluster (Table A 26 in the appendix), and the sociodemographic variables (Table A 28 - Table A 32 in the appendix).
- The effect of structure on perception was dependent of lifestyle (Table A 27 in the appendix). For *Heimzentrierte,* providing warnings with links increased the perception of warnings to a stronger degree than for *Konservativ Gehobene*.
- Overall, warnings with different structures did not address specific user groups better than others.



Event comparisons increased the warning response for males and people showing risky behaviour

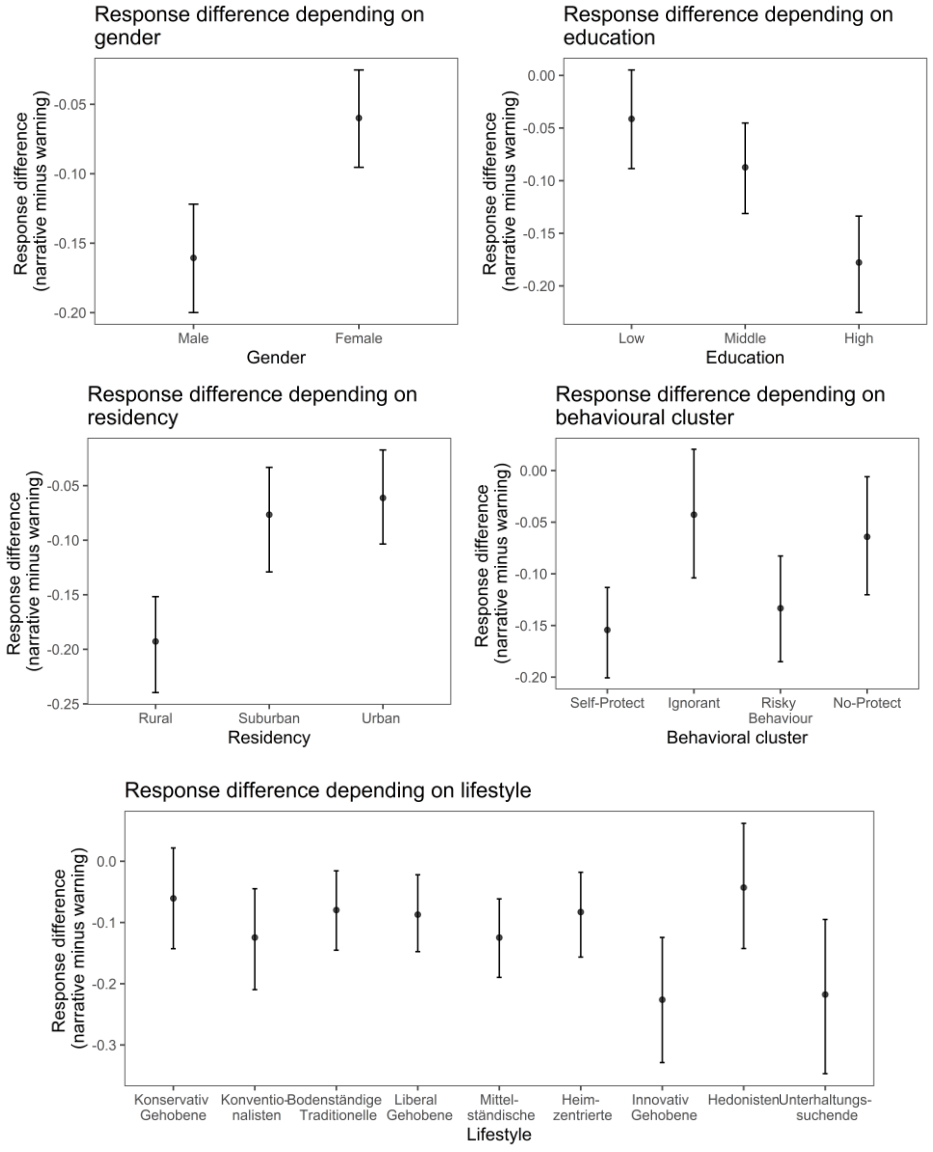
- To explore whether particular warnings address different subgroups better, we tested for interactions between *Content* and 1) attitudinal types (Figure A 1 in the appendix), 2) behavioural types (Figure A 2 in the appendix), 3) lifestyles (Table A 5 in the appendix), 4) sociodemographic variables and living conditions such as gender, age, education level, size of home town, and experiencing damage due to high-impact weather events.
- **Warning response**: The effect of warning content on warning response was independent of the attitudinal cluster (Table A 33 in the appendix), the lifestyle (Table A 35 in the appendix), and most sociodemographic variables (Table A 36 - Table A 40 in the appendix).
- But the impact depended on the behavioural cluster (Table A 34 in the appendix) and gender (Table A 36 in the appendix). For people showing risky behaviour and for males, event comparisons increased the behavioural response to a greater degree than for other behavioural clusters or females.
- **Warning perception**: The warning content affected warning perception independently of the attitudinal cluster (Table A 41 in the appendix), the behavioural cluster (Table A 42 in the appendix), and the sociodemographic variables (Table A 44 - Table A 48 in the appendix).
- The effect of content on perception was dependent on lifestyle (Table A 43 in the appendix). For *Konservativ Gehobene,* providing user-specific information increased the perception of warnings to a stronger degree than for *Bodenständig Traditionelle*.



Narratives increased the behavioural response for women, people with lower education, people living in suburban and urban areas and people who would usually show no self-protecting behaviour

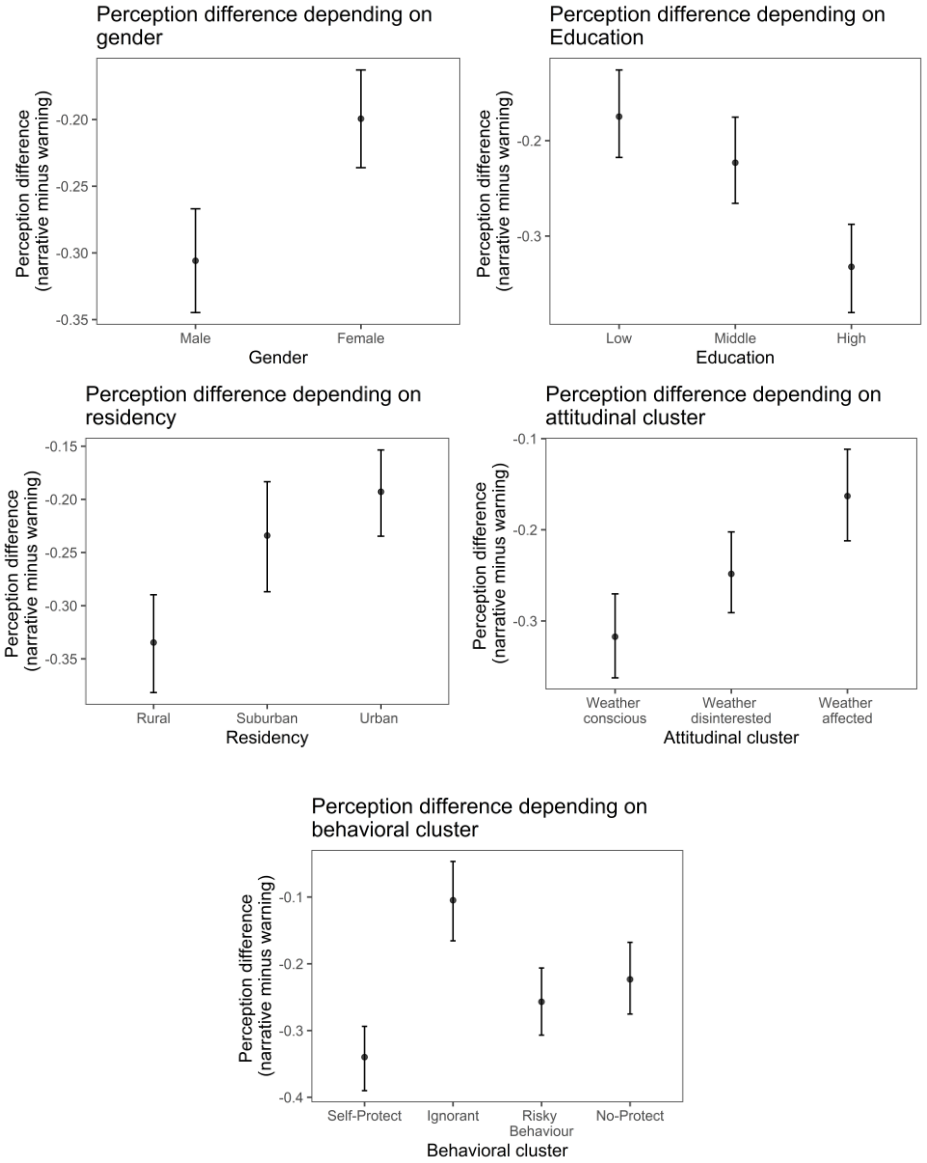
- To explore whether narratives addressed different subgroups better than other warnings, we calculated the difference in warning response after reading a narrative and a waring. Afterwards, we ran a mixed-effect model for the difference (Table A 15 in the appendix).
- The narratives resulted in a higher behavioural response than another weather warning especially for
  - women,
  - people with lower compared education,
  - people living in suburban and urban areas,
  - people belonging to the *Ignorant*[1] and *No-Protect* behavioural cluster and
  - *Konservativ Gehobene* compared to *Unterhaltungssuchende* (Table A 5 in the appendix).

[1] failed to reach significance



Narrative increased the perception for women, people with lower education, people living in suburban and urban areas, weather-affected people, weather-ignorant people and people who would usually show no self-protecting behaviour

- To explore whether narratives addressed different subgroups better than other warnings, we calculated the difference in warning perception after reading a narrative and a warning. Afterwards, we ran a mixed-effect model for the difference (Table A 16 in the appendix).
- The narratives resulted in a higher perception than another weather warning especially for
  - women,
  - people with lower education,
  - people living in suburban and urban areas,
  - *weather-affected* people (Figure A 1 in the appendix) and
  - people belonging to the *Ignorant* and *No-Protect* behavioural cluster (Figure A 2 in the appendix).

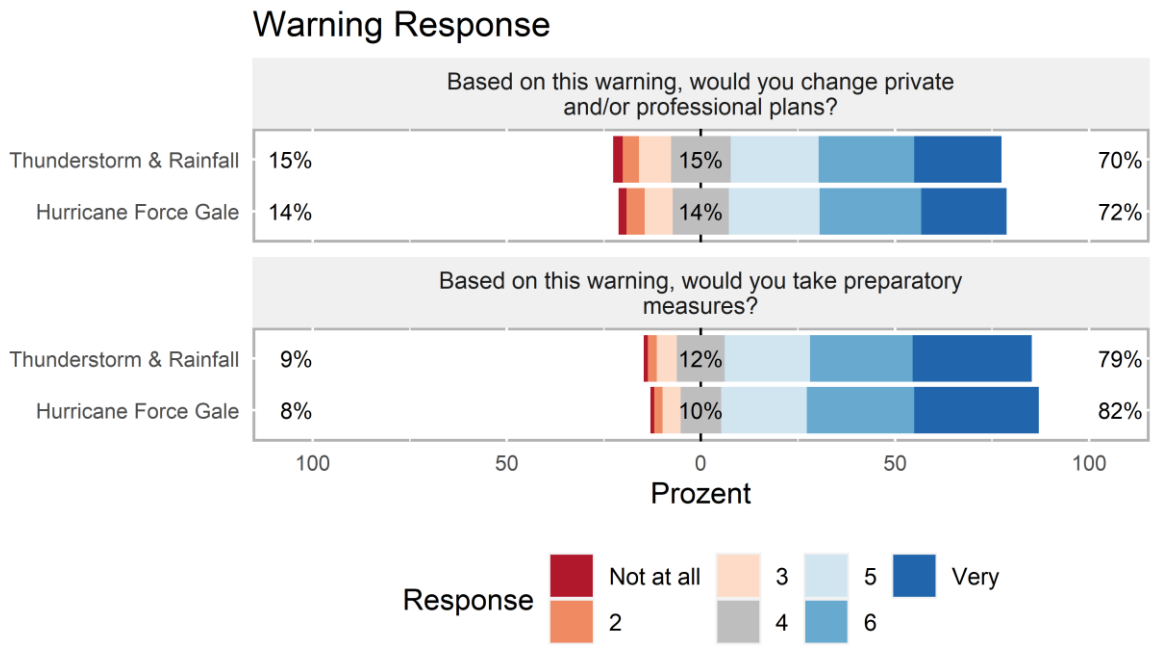


How would people respond to weather warnings?

Descriptive Analysis

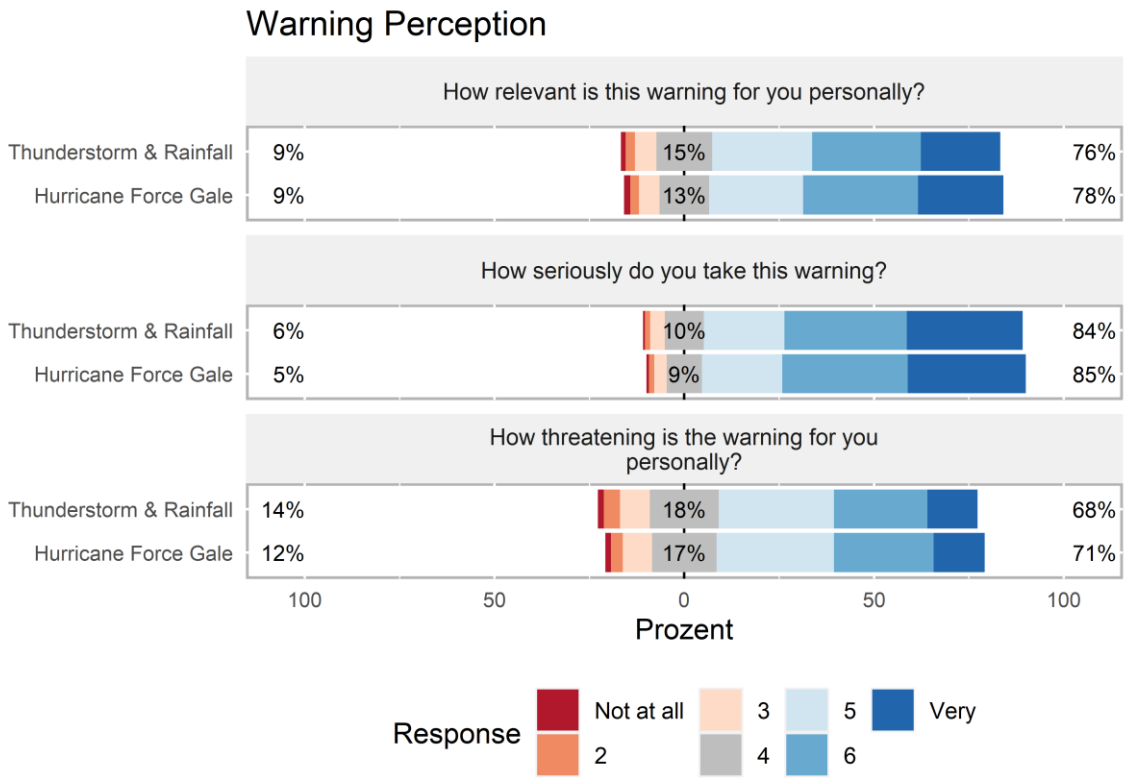
THE MAJORITY WOULD ADAPT THEIR BEHAVIOUR AFTER RECEIVING A WEATHER WARNING

- The following is a descriptive presentation of the reactions to the various weather warnings.
- The majority of respondents would adapt their behaviour after receiving a weather warning.
- Eight out of ten (79 % and 82 %, respectively) stated they would take preparatory measures after receiving a thunderstorm or hurricane warning.
- Seven out of ten (70 % and 72 %, respectively) would change private or professional plans.



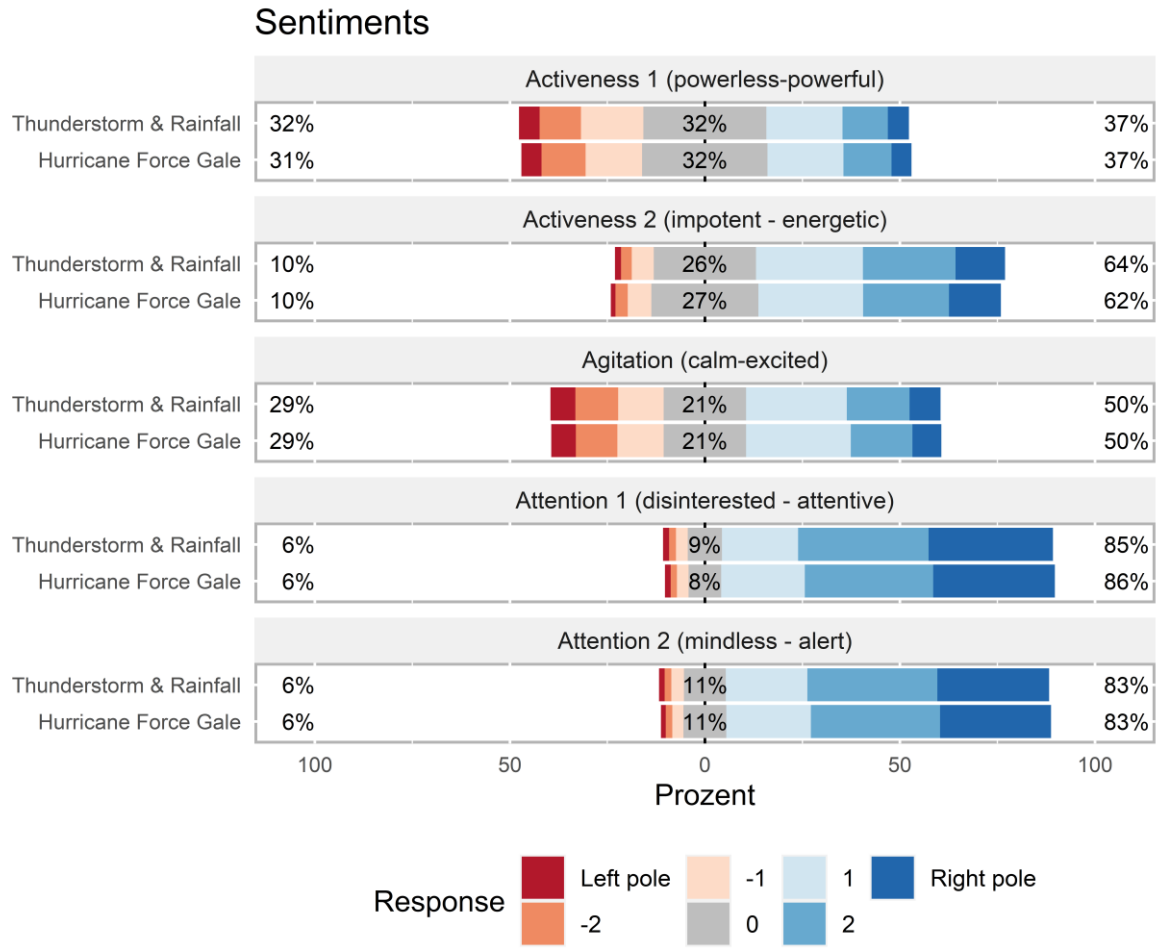
THE MAJORITY PERCEIVED WEATHER WARNINGS AS RELEVANT AND THREATENING

- More than three-fourths (76 % and 78 %, respectively) described the received warnings as personally relevant. This was not true for one out of ten (9 %).
- More than eight out of ten people (84 % and 85 %, respectively) reported taking the warning seriously.
- About seven out of ten (68 % and 71 %, respectively) participants perceived the weather warnings as threatening.



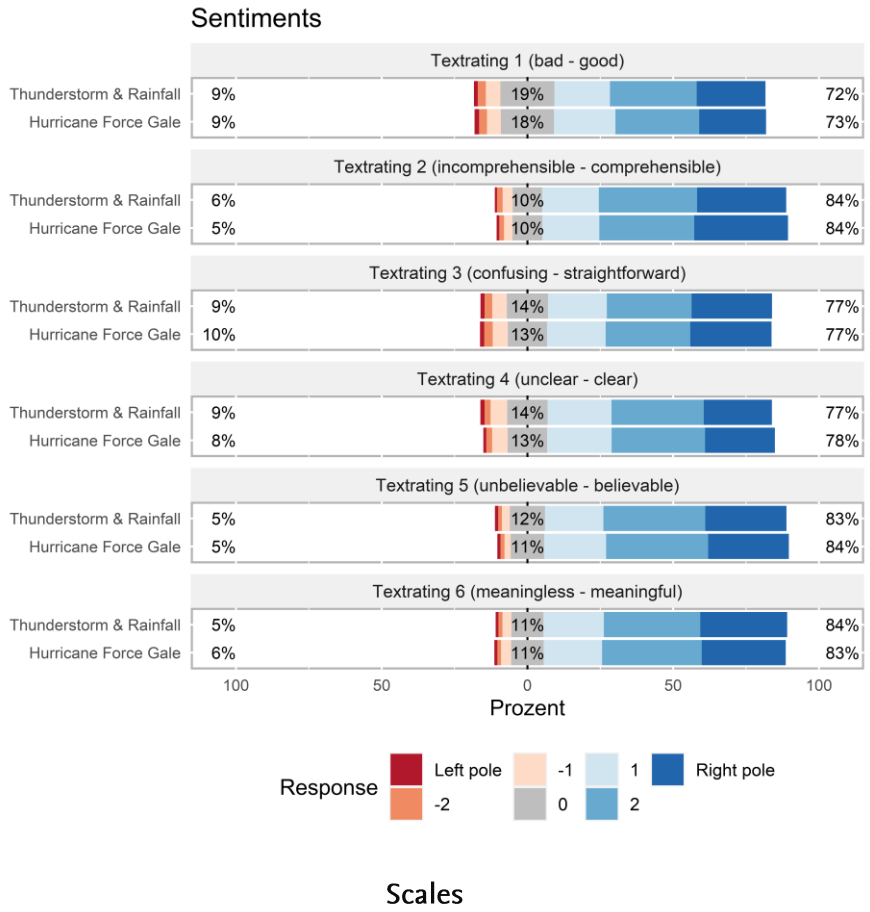
Most respondents would be attentive after reading the weather warnings

- **Activeness.** More than one-third (37 % and 37 %, respectively) stated to feel powerful; less than one-third (32 % and 31 %, respectively) were powerless. Nearly two third (64 % and 62 %, respectively) felt energetic; one out of ten (10 % and 10 %, respectively) impotent.
- **Agitation.** Half (50 % and 50 %, respectively) reported excitement after reading the warning; three out of ten (29 % and 29 %) were calm.
- **Attention.** More than eight out of ten were attentive (85 % and 86 %, respectively) and on alert (83 % and 83 %, respectively). Less than one out of ten were disinterested (6 % and 6 %, respectively) and mindless (6 % and 6 %, respectively).



THE WARNING TEXTS WERE POSITIVELY PERCEIVED

- The warning texts were positively perceived. Between seven and eight out of ten evaluated the warnings as good (72 % and 73 %, respectively), comprehensible (84 % and 84 %, respectively), straightforward (77 % and 77 %, respectively), clear (77 % and 78 %, respectively), believable (83 % and 84 %, respectively), and meaningful (84 % and 83 %, respectively).
- Less than one out of ten rated the warnings opposite as bad (9 % and 9 %, respectively), incomprehensible (6 % and 5 %, respectively), confusing (9 % and 10 %, respectively), unclear (9 % and 8 %, respectively), unbelievable (5 % and 5 %, respectively), and meaningless (5 % and 6 %, respectively).

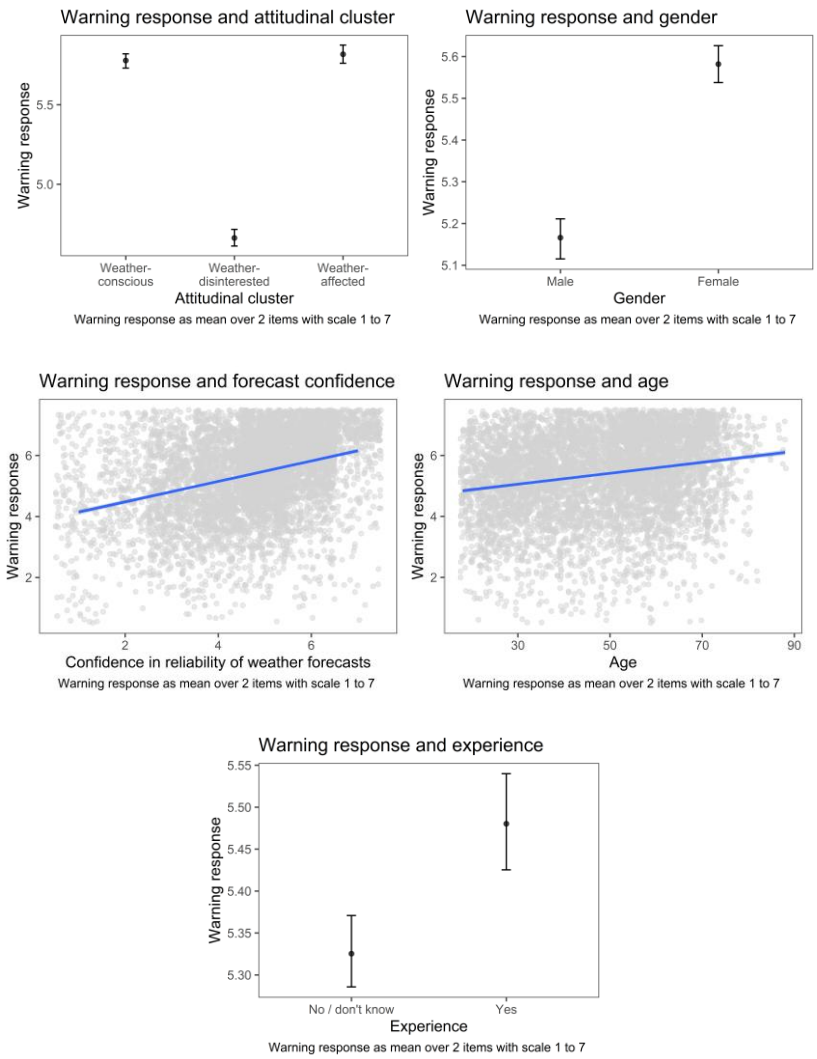


What impacts the assessment of warning messages?

Multivariate analysis of influencing factors on warning response and perception, sentiments and text rating

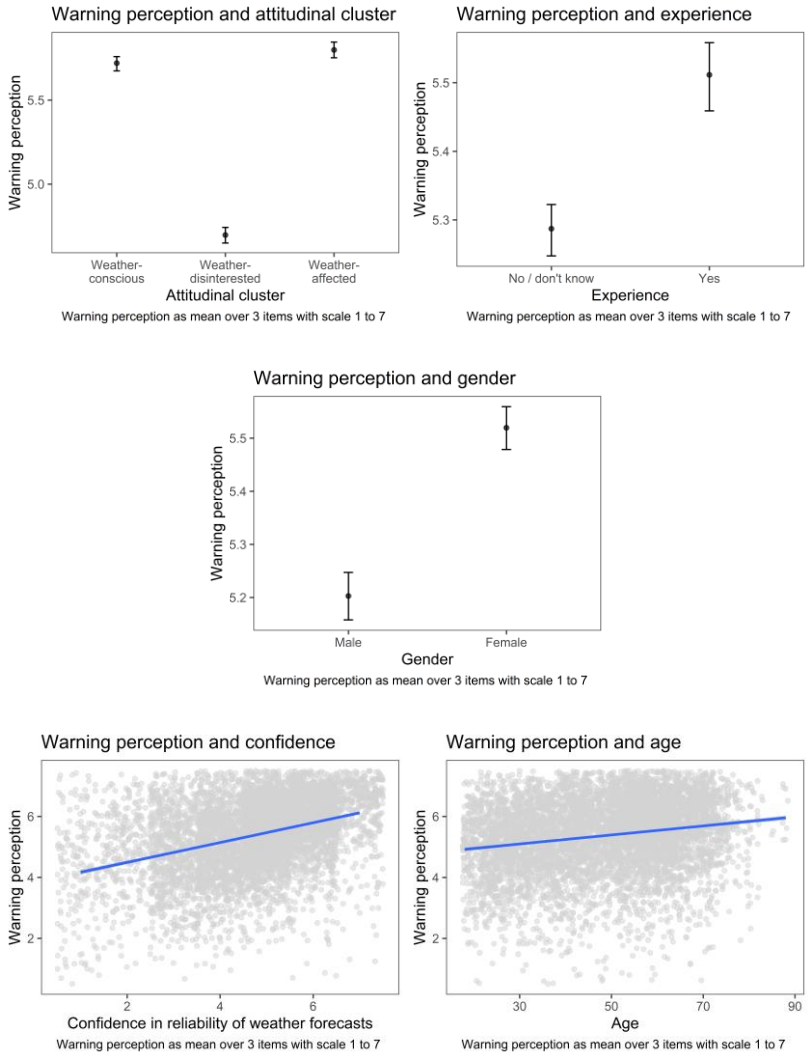
Attitudes towards weather forecasts were the strongest predictor of behavioural warning response

- We ran additional models to observe if the effects of *Content* and *Structure* remained when participants' characteristics were taken into account.
- Our models explained a relatively high proportion of the variance in warning reaction (74 %), most of which was attributed to individual differences (64 %) (Table A 9 in the appendix). Considering participants' characteristics, the differences in warning types were less relevant for the behavioural response.
- **Attitudes:** Attitudes toward weather forecasts had the greatest impact on behavioural warning response.
  - Weather-disinterested people (Figure A 1 in the appendix) were significantly less likely to take protective action or change plans following a weather warning than weather-conscious or weather-affected participants. Being disinterested in weather forecasts seemed to be the strongest predictor.
  - Furthermore, the more people reported confidence in the reliability of weather forecasts, the more likely they were to show a behavioural response to a weather warning.
- **Sociodemographic variables** and living conditions affected the warning response as well. More likely to react to a weather warning were
  - females compared to males and
  - older compared to younger individuals.
- **Living conditions:** A higher warning response reported
  - participants that experienced material and/or physical damage because of high-impact weather events compared to participants without such experiences,
  - people living in rural areas compared to urban areas, and
  - people feeling less exposed to high-impact weather events.



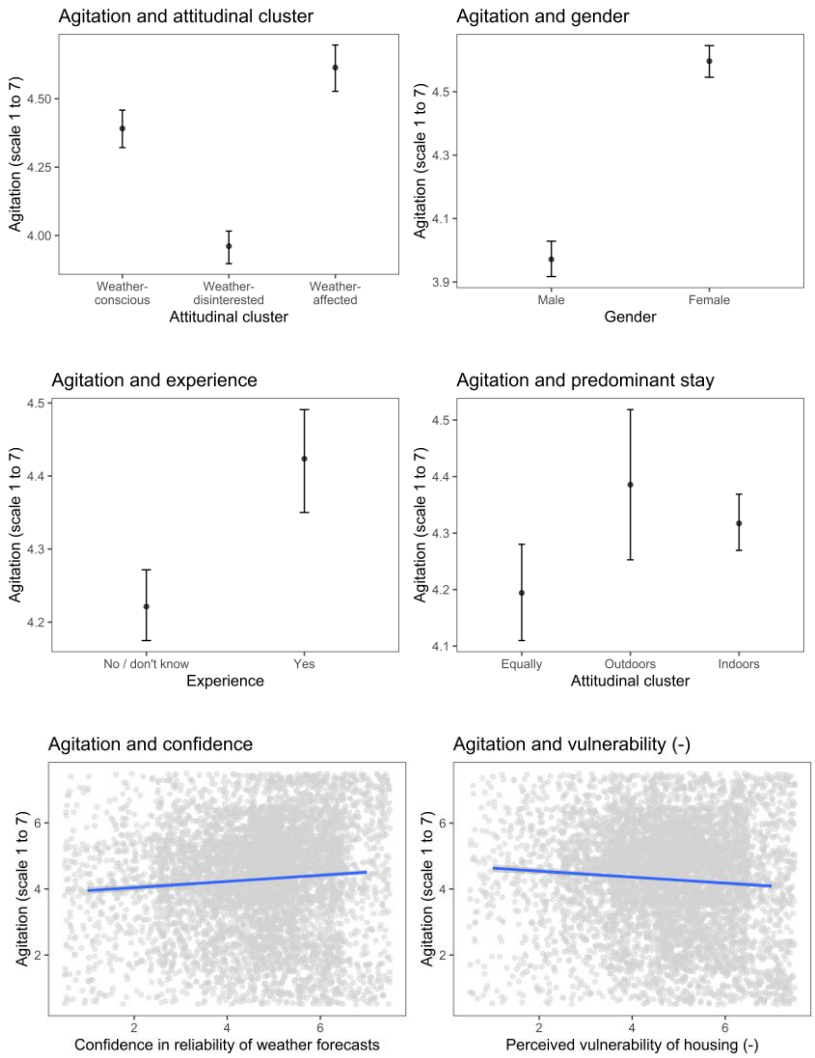
The strongest predictor for warning perception were attitudes toward weather forecasts

- We ran additional models to observe if the effects of *Content* and *Structure* remained when participants' characteristics were taken into account.
- Our models explained a relatively high proportion of the variance in warning perception (73 %), most of which was attributed to individual differences (61 %) (Table A 10 in the appendix). Considering participants' characteristics, the differences in warning types were less relevant.
- **Attitudes:** The greatest impact on warning perception had attitudes towards weather forecasts.
  - Weather-disinterested people (Figure A 1 in the appendix) stated the lowest perceived threat, relevance, and seriousness following the weather warnings.
  - Furthermore, the more people reported confidence in the reliability of weather forecasts, the higher they rated warning perception.
- **Sociodemographic variables** and living conditions affected the warning response as well. More likely to perceive a weather warning as threatening or relevant were
  - females compared to males and
  - older compared to younger individuals.
- **Living conditions:** A higher warning perception reported
  - participants that experienced material and/or physical damage because of high-impact weather events compared to participants without such experiences.



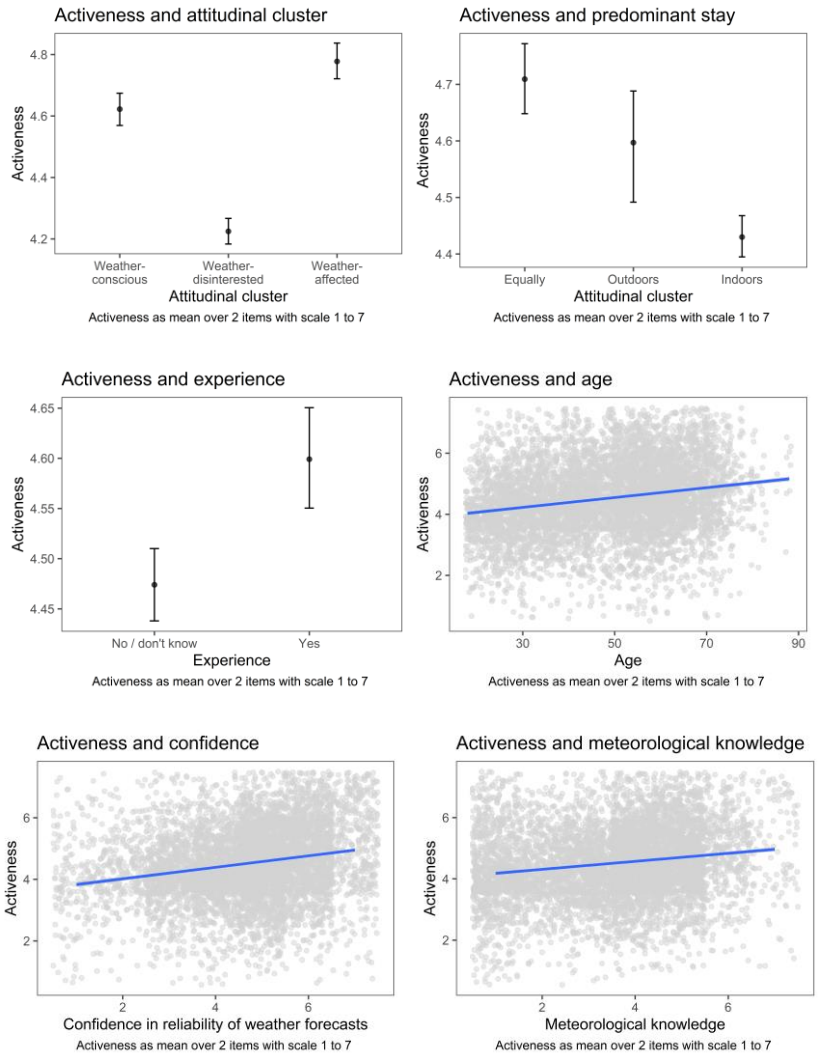
Males and weather-disinterested people stated to be calmer than others after reading the weather warnings

- We ran additional models to observe the impacts of participants' characteristics on agitation.
- While warning types did not impact agitation, participants' characteristics were relevant (Table A 11 in the appendix).
- The greatest impact on agitation had attitudes towards weather forecasts and gender.
- **Attitudes:** More agitation after reading the warnings stated
  - weather-affected compared to weather-conscious or weather-disinterested people (Figure A 1 in the appendix),
  - weather-conscious compared to weather-disinterested people (Figure A 1 in the appendix) and
  - people with high confidence in the reliability of weather forecasts.
- **Sociodemographic variables:** More likely to assess the weather warning as exciting were
  - females compared to males,
  - younger compared to older people,
  - people being mainly outdoors and people being mainly indoors compared to being equally outdoors and indoors.
- **Living conditions:** A higher agitation reported
  - participants that experienced material and/or physical damage because of high-impact weather events compared to participants without such experiences,
  - people perceiving their homes as vulnerable to weather impacts and
  - people reporting lower satisfaction with weather warnings.



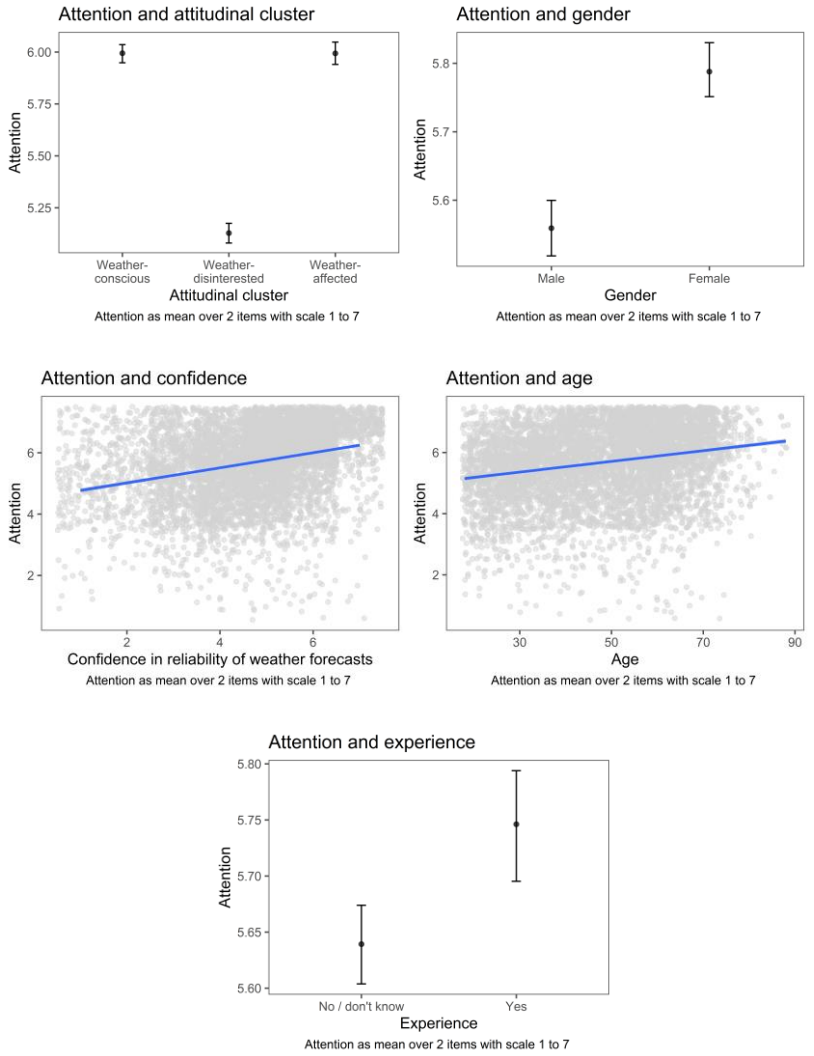
Younger and weather-disinterested people stated to be less activated after reading the weather warnings

- We ran additional models to observe the impacts of participants' characteristics on activeness.
- Warning types did not impact activeness, but participants' characteristics were relevant for agitation (Table A 12 in the appendix).
- The strongest impact on agitation had weather attitudes and age.
- **Attitudes:** Less activeness after reading the warnings stated
  - weather-conscious and weather-disinterested compared to weather-affected people (Figure A 1 in the appendix),
  - weather-disinterested compared to weather-conscious people,
  - people with little self-reported meteorological knowledge,
  - people with low confidence in the reliability of weather forecasts and
  - people reporting lower satisfaction with weather warnings.
- **Sociodemographic variables:** More likely to feel powerful and energetic after reading the weather warning were
  - older compared to younger individuals,
  - males compared to females and
  - people being mainly indoors compared to people who spend an equal amount of time indoors and outdoors.
- **Living conditions:** A higher activeness reported
  - people living together with children 11 years of age or younger,
  - participants perceiving their home as not much exposed to weather impacts and
  - people that experienced material and/or physical damage because of high-impact weather events compared to people without such experiences.



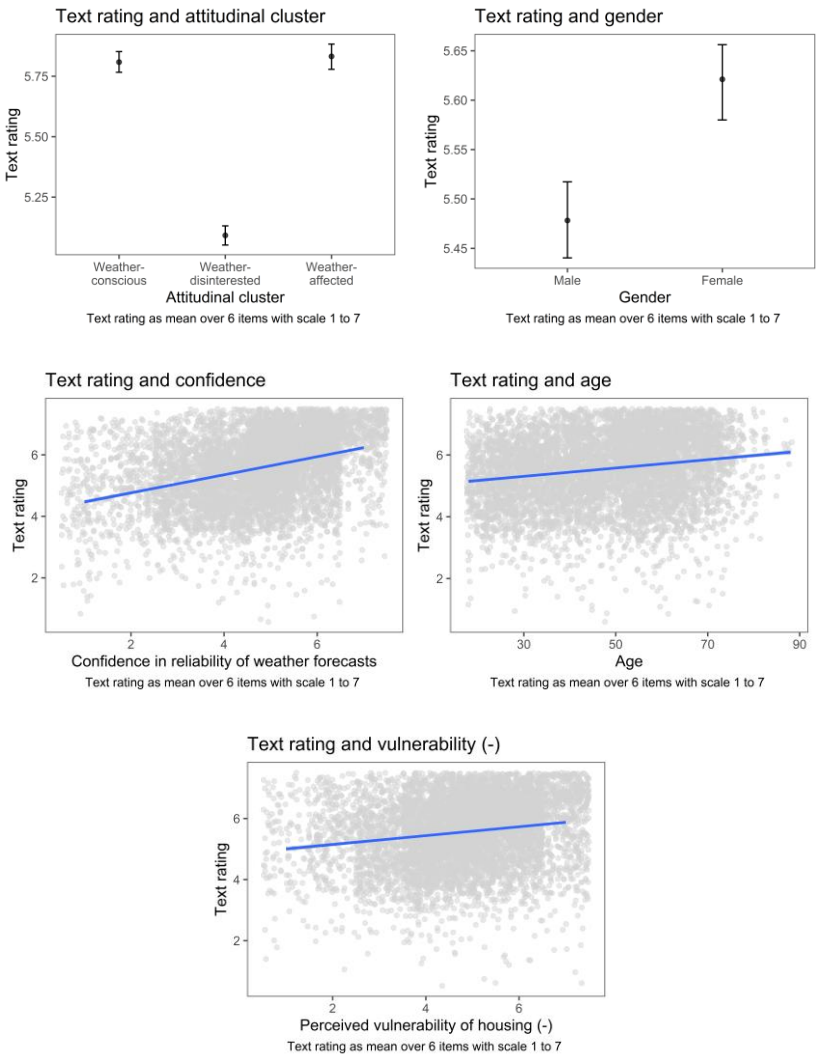
Weather-disinterested people were least alerted after reading the weather warnings

- We ran additional models to observe the impacts of participants' characteristics on attention.
- Warning types did not impact attention, but participants' characteristics were relevant (Table A 13 in the appendix).
- The strongest impact had attitudes toward weather forecasts.
- **Attitudes:** The lowest attention after reading the warnings stated
  - weather-disinterested people (Figure A 1 in the appendix) and
  - people with low confidence in the reliability of weather forecasts.
- **Sociodemographic variables:** More likely to feel attentive after reading the weather warning were
  - older compared to younger individuals and
  - females compared to males.
- **Living conditions:** A higher attention reported
  - participants that experienced material and/or physical damage because of high-impact weather events compared to participants without such experiences and
  - people who perceive their home as protected from weather influences.



Weather-disinterested people assessed the text of the different weather warnings as more negative than other people

- We ran additional models to observe the impacts of participants' characteristics on text evaluation.
- Warning types did not impact the ratings of the text, but participants' characteristics were relevant (Table A 14 in the appendix).
- The strongest impact on the assessment of the text had attitudes towards weather forecasts.
- **Attitudes:** The text ratings were lowest for
  - weather-disinterested compared to weather-conscious people (Figure A 1 in the appendix),
  - people with low confidence in the reliability of weather forecasts and
  - people that report low satisfaction with weather warnings.
- **Sociodemographic variables:** The warning text was more positively rated by
  - older compared to younger individuals and
  - females compared to males.
- **Living conditions:** A higher text rating reported
  - people perceiving their homes as less vulnerable to weather impacts.

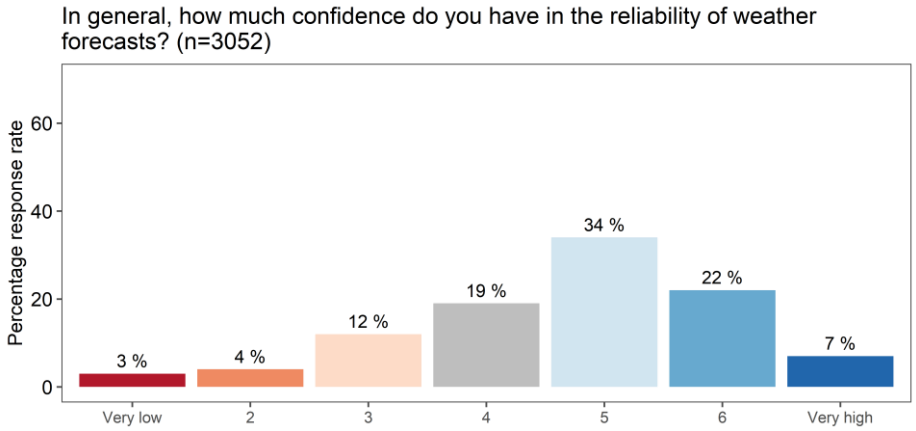


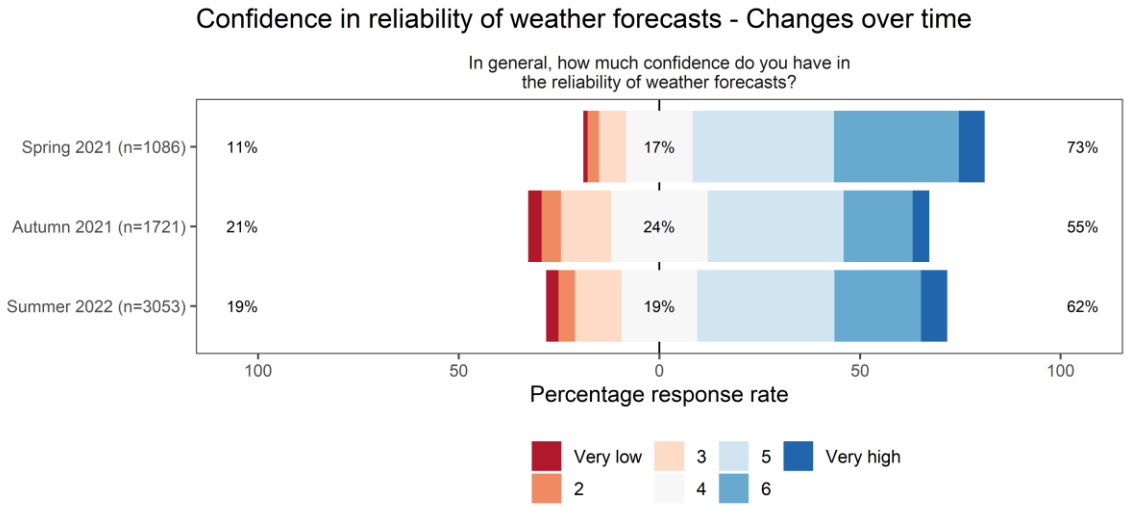
How do Germans perceive weather forecasts? Does the perception change over time?

Descriptive analysis and comparative results of three panel surveys

People reported confidence in the reliability of weather forecasts, but it declined over time

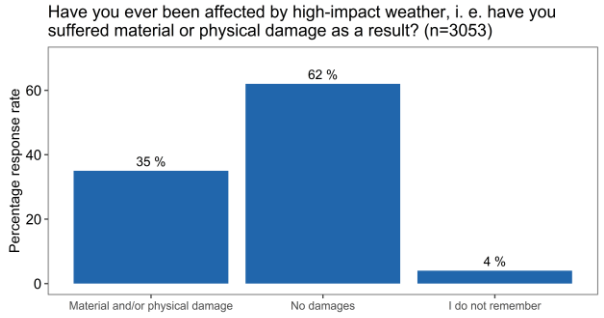
- Confidence in the reliability of weather forecasts was high. More than six out of ten stated to trust in the reliability of weather forecasts. Nearly one-fifth (19 %) do not. Only a few Germans reported a very high level of confidence (7 %).
- The level of confidence changed over time. While 75 % trusted the reliability of weather forecasts in spring 2021, only 55 % did so in autumn 2021 and 62 % in summer 2022 (Schulze and Voss 2022a).
- The reasons for this can only be conjectured.
- Continuous monitoring is advisable to detect such changes as well as their reasons and effects.

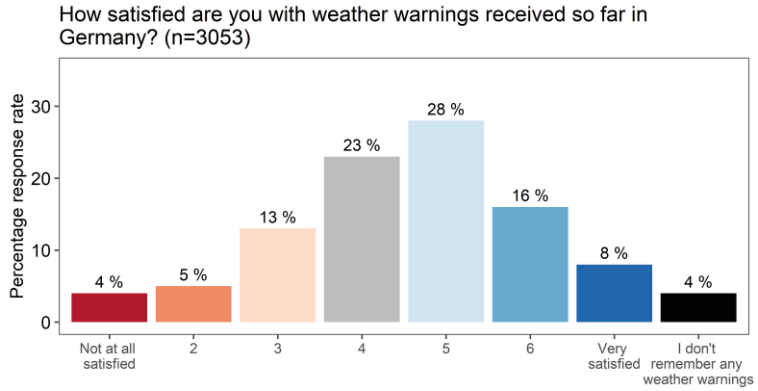


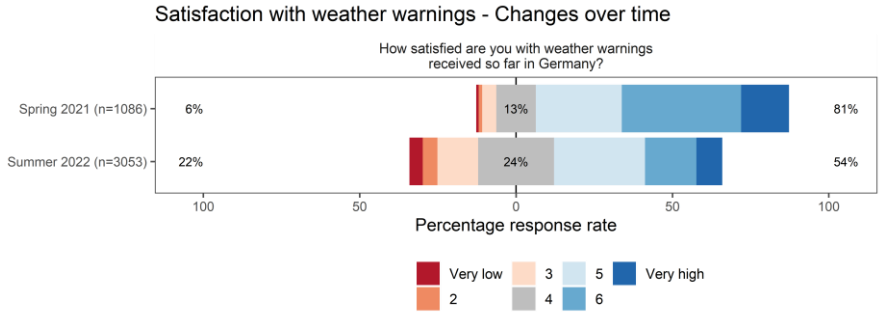


Satisfaction with weather warnings has dropped drastically since the spring of 2021

- More than one-third (35 %) of Germans reported material and/or physical damage due to the impacts of high-impact weather events.
- More than six out of ten (62 %) did not experience damage because of weather effects.
- These results compare to another study conducted in the spring of 2021 (Schulze and Voss 2022a).
- More than half (52 %) reported being satisfied with weather warnings received in Germany; more than one-fifth (22 %) were not.
- We observed a sharp drop in reported satisfaction since the spring of 2021 when over 80 % were still satisfied.

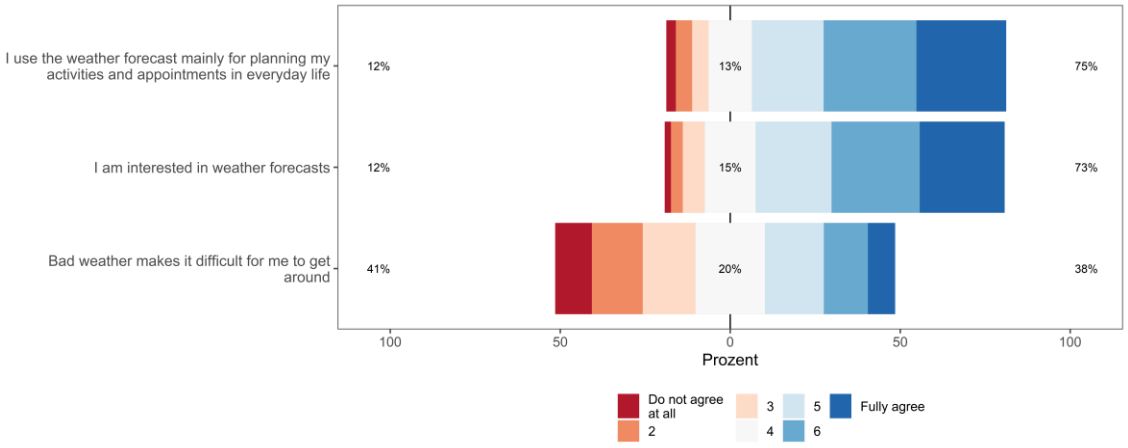


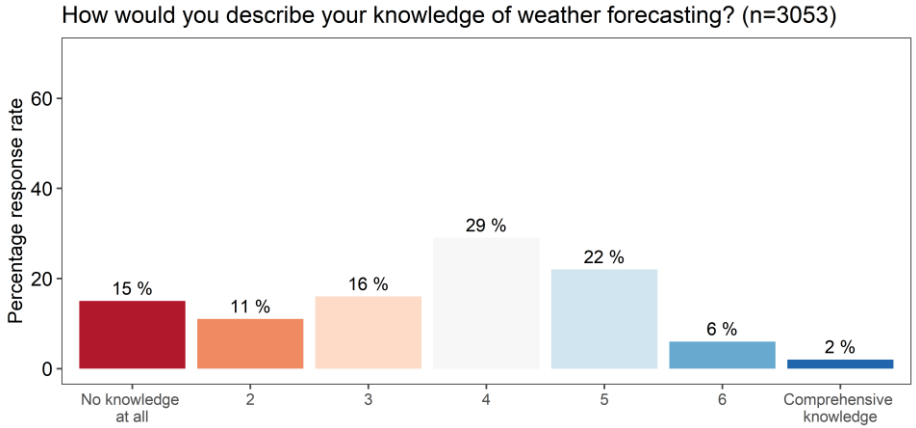




Germans stated high interest in weather forecasts, but meteorological knowledge was truncated

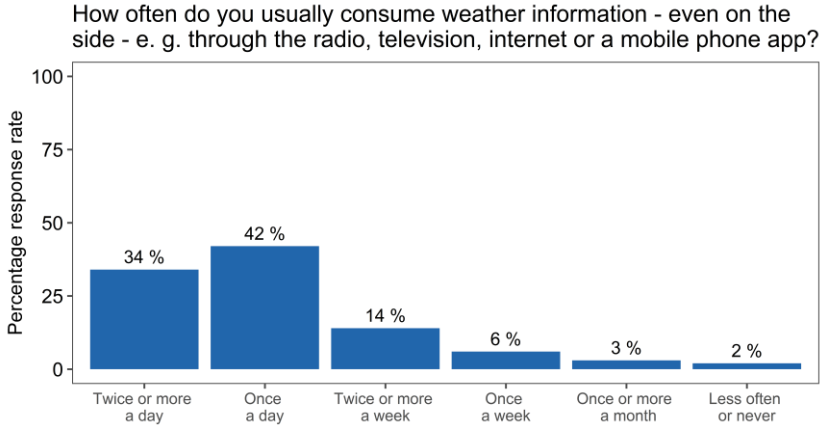
- Three-quarters (75 %) of Germans used weather forecasts to plan their everyday activities.
- Nearly as many (73 %) stated being interested in weather forecasts.
- About one-third (38 %) reported that severe weather affects them, and bad weather makes it difficult for them to get around.
- Meteorological knowledge was low, according to the respondent's assessment.
- Four out of ten (42 %) reported not knowing weather forecasting. 15 % stated not to have meteorological knowledge at all.
- A minority (8 %) had comprehensive or good meteorological knowledge. 22 % had some knowledge.

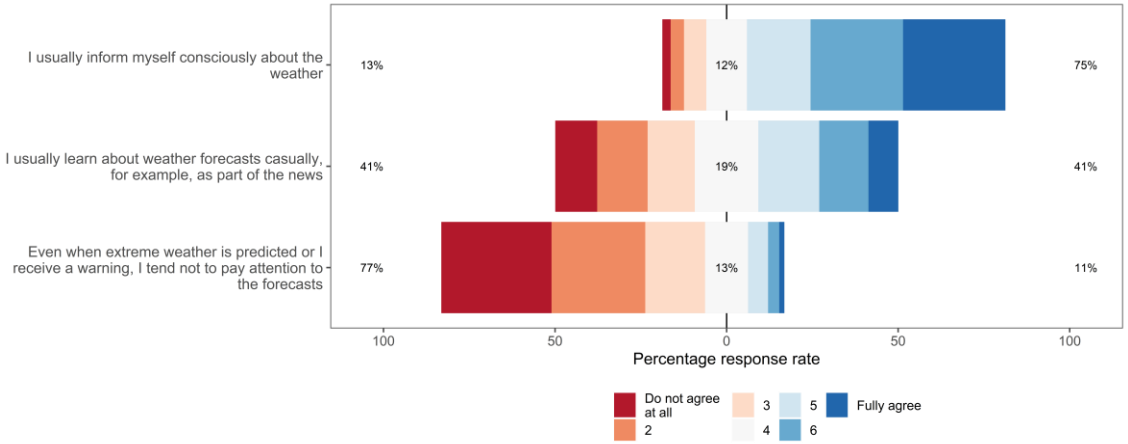




Most used weather forecasts regularly and consciously. Some would not follow weather forecasts even in the event of a weather warning

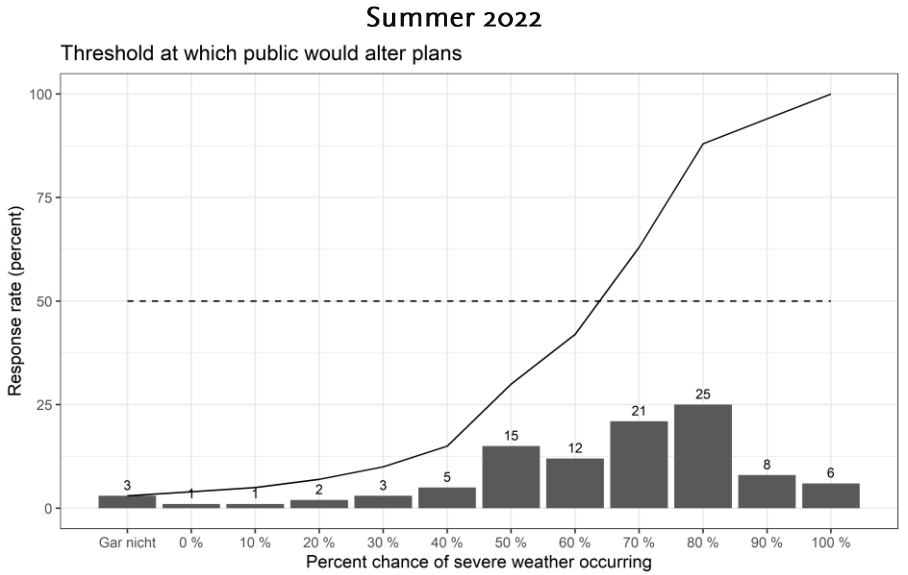
- Three-quarters (76 %) of Germans obtained weather information daily, and one-fifth (20 %) weekly. We found similar results in spring 2021 (Schulze and Voss 2022a).
- Three-quarters (75 %) of Germans deliberately obtained weather forecasts.
- Four out of ten (41 %) reported learning about weather forecasts casually (e.g. as part of the news).
- One in ten (11 %) would not pay attention to weather forecasts even if there is a weather warning.
- This data did not differ substantially from the participants' statements provided in a study in the spring of 2021 (Schulze and Voss 2022a).

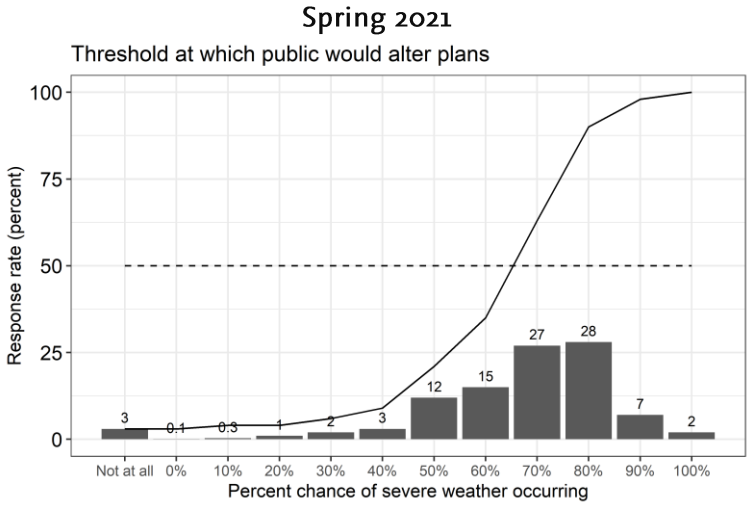




People seemed to perceive uncertainties as a coin flip

- Only one out of ten (12 %) would alter their plans if the chance of severe weather occurring is below 50 %.
- 3 % would not adapt their plans whatsoever.
- Six out of ten (60 %) would alter their plans if the chance of severe weather occurring would be 70 % or higher.
- We could observe a slight shift in the threshold. In the spring 2021 survey, 6 % of the people would adjust their plans if the probability of occurrence was below 50 %.





Appendix

User-specific information

Table A 1. User-specific information for the thunderstorm and rainfall scenario

Fahrradfahrer*innen
• Fahren Sie nicht mit dem Fahrrad. Verschieben Sie Ihre Fahrt oder nutzen Sie ein anderes Transportmittel. Wenn Sie bei Regen bzw. Gewitter unterwegs sind: • Starkregen führt oft zu schlechter Sicht. Schalten Sie Ihr Licht ein. • Seien Sie besonders vorsichtig. Straßen sind rutschiger als sonst. Achten Sie auf Spritzwasser und Oberflächenwasser. Pfützen können Schlaglöcher verbergen. • Bei Blitzschlag besteht Lebensgefahr! Wenn Sie Donner hören und/oder Blitze sehen, halten Sie an, steigen Sie ab, lassen Sie Ihr Fahrrad stehen, verlassen Sie erhöhte Punkte wie Hügel, Berge und suchen Sie einen Unterschlupf bevorzugt in einem vollständig geschlossenen Gebäude oder Auto. Halten Sie sich auch von Metallstangen, Zäunen und anderen Gegenständen fern. • Überflutungen können auftreten. Halten Sie sich von Wasser fern. Fahren Sie nicht durch Überschwemmungen bzw. bewegtes Wasser. Auch seichtes, knöchelhohes Wasser kann Sie vom Fahrrad bzw. den Füßen reißen und birgt versteckte Gefahren wie schwere Trümmer, scharfe Gegenstände, offene Gullideckel, Abwasser und Chemikalien.
Autofahrer*innen

• Fahren Sie nicht mit dem Auto. Verschieben Sie Ihre Fahrt oder nutzen Sie ein anderes Transportmittel.
• Parken Sie ggf. Ihr Auto rechtzeitig um. Tiefgaragen können bei Hochwassergefahr zu tödlichen Fallen werden.
Wenn Sie unterwegs sind:
• Benutzen Sie das Abblendlicht, wenn die Sicht stark eingeschränkt ist.
• Straßen sind rutschiger als sonst. Vergrößern Sie Ihren Abstand zum vorausfahrenden Verkehr um frühestens nach 4 Sekunden die gleiche Stelle zu passieren.
• Auch andere Verkehrsteilnehmende sind betroffen. Stellen Sie sich auf deren Verhalten ein.
• Überflutungen können auftreten. Wählen Sie bevorzugt Hauptstraßen bzw. Straßen, auf denen die Gefahr von Überschwemmungen geringer ist.
• Wenn die Straße überflutet ist, drehen Sie um und suchen Sie eine andere Route. Fahren Sie nicht durchs tiefe Wasser. Die häufigste Todesursache bei Überschwemmungen ist das Durchfahren von Hochwasser.
  • Bereits 30 cm (Wadenhöhe) bewegtes Wasser kann Ihr Auto aufschwemmen und es in tieferes Wasser bringen.
  • Schon ein Eierbecher Wasser, der in den Motor Ihres Fahrzeugs gesaugt wird, kann zu schweren Schäden am Fahrzeug führen.
• Sind Sie in einen überfluteten Straßenabschnitt eingefahren, versuchen Sie, im Rückwärtsgang den Bereich zu verlassen.
• Bei Blitzschlag besteht Lebensgefahr! Bei Gewitter sind Sie im Auto sicher. Bleiben Sie im Fahrzeug, aber berühren Sie keine blanken Metallteile.

Fußgänger*innen
• Bleiben Sie zu Hause! Wenn Sie unterwegs sind: • Bei Blitzschlag besteht Lebensgefahr! Suchen Sie Schutz in einem Gebäude oder Auto. Wenn kein schützendes Gebäude in Sicht ist, gehen Sie mit eng zusammenstehenden Füßen, möglichst in einer Mulde, auf den Fußballen in die Hocke. • Meiden Sie offenes Gelände, Berggipfel, Bäume, Türme, Masten und Antennen.

- Vermeiden Sie die Berührung von Gegenständen mit Metallteilen wie Regenschirme, Fahrräder, Metallstangen oder Zäune.
- Halten Sie zu Überlandleitungen einen Mindestabstand von 50 Metern ein.
- Bei Starkregen besteht die Gefahr von Hochwasser auch außerhalb von Gewässernähe.
    - Laufen Sie nicht durch Hochwasser, über überflutete Straßen oder Uferbereiche. Sie könnten unterspült sein.
    - Auch kann selbst seichtes, knöchelhohes Wasser Sie von den Füßen reißen und birgt versteckte Gefahren wie schwere Trümmer, scharfe Gegenstände, offene Gullideckel, Abwasser und Chemikalien.
- Halten Sie insbesondere Kinder und Haustiere vom Hochwasser fern.

Öffentlicher Verkehr

- Bei schlechtem Wetter ist der öffentliche Verkehr oft stärker ausgelastet.
- Es kann zu Unterbrechungen, Fahrplanänderungen oder Ausfällen kommen.
- Verschieben Sie, wenn möglich, Ihre Fahrt bzw. Reise.
- Informieren Sie sich regelmäßig bei den Betreibenden über mögliche Änderungen.
- Planen Sie mehr Zeit ein. Nehmen Sie ausreichend Wasser und Snacks für den Fall einer Verzögerung mit.

Wohnung/Haus

- Bleiben Sie zu Hause.
- Suchen Sie einen innen liegenden Raum im Erdgeschoß auf.
- Nehmen Sie empfindliche Geräte vom Netz oder verwenden Sie einen Überspannungsschutz.
- Überflutungen können auftreten. Meiden Sie Kellerräume, da diese sehr schnell von Wasser geflutet und zu lebensbedrohlichen Fallen werden können. Wenn der Hausanschlusskasten im Keller untergebracht ist, besteht die Gefahr eines Stromschlags. Dieses Fehlverhalten zählt zu einer der meisten Unfallursachen, meist mit Todesfolge.
- Vermeiden Sie das Betreten von Räumen/Bereichen, in denen das Hochwasser bereits hineingelaufen ist. Türen lassen sich häufig durch den hohen Wasserdruck nicht mehr öffnen – Sie sitzen in einer lebensbedrohlichen Falle!

Überschwemmungen

- Hochwasser ist gefährlich und kann sehr schnell auftreten, auch außerhalb von Gewässernähe.
- Halten Sie sich von angeschwollenen Flüssen und Bächen fern.
- Laufen oder fahren Sie nicht durch Hochwasser. Bereits knöchelhohes Wasser kann Sie von den Füßen reißen. 30 cm (Wadenhöhe) bewegtes Wasser kann Ihr Auto aufschwemmen und es in tieferes Wasser bringen.
- Prüfen Sie, ob Sie überschwemmungsgefährdet sind: https://www.hochwasserzentralen.de und auf den Hochwassergefahrenkarten Ihrer Region.

Wenn Sie überschwemmungsgefährdet sind:

- Schalten Sie die Strom- und ggf. Gaszufuhr ab.
- Bringen Sie wichtige Dinge an einen sicheren Ort - denken Sie an Haustiere, Auto, Möbel, Wertsachen, Dokumente. Parken Sie Ihr Auto um.
- Bereiten Sie eine Notfallausrüstung vor, inkl. Versicherungsunterlagen, Liste mit Kontaktnummern, Taschenlampe, Ersatzbatterien, Erste-Hilfe-Kasten, verschreibungspflichtigen Medikamenten, warme und wasserdichte Kleidung, Decken, Wasser in Flaschen und Lebensmittel, batteriebetriebenes oder aufziehbares Radio, Hilfsmittel für Ihr Baby oder Ihr Haustier.

Verfolgen Sie die aktuellen Wettermeldungen und Hochwasserwarnungen. Informieren Sie andere.

Table A 2. User-specific information for the hurricane force gale scenario

Fußgänger*innen

• Bleiben Sie zu Hause.
Wenn Sie unterwegs sind:
• Suchen Sie Schutz in einem Gebäude.
• Meiden Sie ungeschützte Orte, an denen Sie von vom Sturm mitgerissenen Gegenständen getroffen werden könnten.
• Gehen Sie nicht zu nah an Mauern, Gebäuden und Bäumen entlang – es besteht Ein- bzw. Umsturzgefahr.
  • Suchen Sie dort keinen Schutz.
  • Halten Sie sich insbesondere von der Windgeschützten Seite fern: wenn die Strukturen versagen, werden sie auf dieser Seite einstürzen.
• Besonders gefährlich sind die bei Stürmen auftretenden Böen, die leicht kleine Kinder oder Kinderwagen erfassen können und diese z.B. vor ein Auto wehen können. Gehen Sie während des Sturms nicht mit Kindern aus dem Haus.
• Achten Sie nach dem Sturm darauf, dass Sie keine Strom-/Telefonkabel berühren, die heruntergeweht wurden oder noch hängen.

Autofahrer*innen
• Lassen Sie Ihr Auto stehen. Verschieben Sie Ihre Fahrt oder nutzen Sie alternative Transportmittel. • Parken Sie Ihr Fahrzeug nicht in der Nähe von Häusern oder hohen Bäumen. Stellen Sie es, wenn möglich, in der Garage ab. Wenn Sie beim Sturm unterwegs sind: • Nutzen Sie bevorzugt Hauptstraßen, auf denen die Gefahr von herabgefallenen Ästen und Trümmern geringer ist. Fahren Sie nicht durch bewaldetes Gebiet. • Fahren Sie langsam. • Windböen können Fahrzeuge leicht aus der Bahn bringen - halten Sie das Lenkrad mit beiden Händen fest. • Vorsicht beim Überholen von Lastwagen und Bussen: Gefahr von Seitenwinden. • Achten Sie auf Lücken zwischen Bäumen, Gebäuden oder Brücken – Gefahr von Seitenwinden. Lassen Sie auf beiden Seiten Ihres PKWs genügend Platz, falls Ihr Auto zur Seite geweht wird. • Auch andere Verkehrsteilnehmende sind betroffen. Stellen Sie sich auf deren Verhalten ein. Lassen Sie anderen mehr Patz, auch Radfahrer*innen, Motorradfahrer*innen und Fußgänger*innen. Es besteht die Gefahr, dass sie von Seitenwinden umhergeweht werden.
Fahrradfahrer*innen
• Das Fahrrad kann umhergeweht werden. Äste, Dachziegel und andere Gegenstände können herabfallen. • Fahren Sie nicht mit dem Fahrrad. Verschieben Sie Ihre Fahrt oder nutzen Sie ein anderes Transportmittel. Wenn Sie beim Sturm unterwegs sind: • Seien Sie besonders vorsichtig. Nutzen Sie Straßen, auf denen die Gefahr von herabgefallenen Ästen und Trümmern geringer ist. • Fahren Sie nicht durch bewaldetes Gebiet. • Achten Sie auf Seitenwinde, z.B. bei Lücken zwischen Bäumen, Gebäuden oder Brücken.
Öffentliche Verkehrsmittel
• Bei schlechtem Wetter ist der öffentliche Verkehr oft stärker ausgelastet. • Es kann zu Unterbrechungen, Fahrplanänderungen oder Ausfällen kommen. • Verschieben Sie, wenn möglich, Ihre Fahrt bzw. Reise. • Informieren Sie sich regelmäßig bei den Betreibern über mögliche Änderungen. • Planen Sie mehr Zeit ein. Nehmen Sie ausreichend Wasser und Snacks für den Fall einer Verzögerung mit.

Wohnung/Haus
Vor dem Sturm: • Sichern Sie vor dem Sturm lose Gegenstände wie Leitern, Gartenmöbel, Blumenkästen, Mülltonnen, Trampoline etc. • Schließen und verriegeln Sie alle Türen und Fenster, insbesondere auf der Windseite des Hauses. Schließen und sichern Sie auch Garagen-, Lauben-, Gartentüren sowie Dachbodenklappen. • Parken Sie Fahrzeuge, wenn möglich, in einer Garage. Halten Sie sie ansonsten von Gebäuden, Bäumen, Mauern und Zäunen fern. • Bereiten Sie sich auch auf einen möglichen Ausfall des Stroms und/oder Telefons vor, indem Sie Kerzen, Streichhölzer, Taschenlampe und Ersatzbatterien vorhalten und den Akku für das Handy laden. Während des Sturms: • Bleiben Sie während des Sturms im Gebäude und halten Sie sich von Fenstern fern (Gefährdung durch umherfliegende Gegenstände und Splitterwirkung). Suchen Sie einen innen liegenden Raum auf bzw. meiden Sie Räume, die von umstürzenden Bäumen geschädigt werden können. Meiden Sie Räume unmittelbar unter dem Dachstuhl. • Gehen Sie nicht nach draußen, um Schäden zu reparieren, solange der Sturm andauert. • Schalten Sie Radio und Fernseher ein, um weitere Informationen zu erhalten. • Achten Sie nach dem Sturm darauf, dass Sie keine Strom-/Telefonkabel berühren, die heruntergeweht wurden oder noch hängen.

Sociodemographic Variables

Table A 3. Descriptive analysis for sociodemographic variables (Part I)

	Absolute frequency	Percentage
Gender		
Male	1486	48.7%
Female	1561	51.1%
Divers	6	0.2%
Missing	0	0,0%
Total	3053	100%
Age		
18 to 29 years	485	15.9%
30 to 39 years	507	16.6%
40 to 49 years	512	16.8%
50 to 59 years	722	23.6%
60 years or older	827	27.1%
Total	3053	100%
Education level		
Low	857	28.1%
Middle	1015	33.2%
High	1181	38.7%
Total	3053	100%
Residency		
Urban	1165	38.2%
Suburban	871	28.5%
Rural	1007	33,0%
I don't know	10	0.3%
Total	3053	100%
Children at home		
No children younger than 12 years living at home	2609	85.5%
Children 11 or younger living at home	444	14.5%
Total	3053	100%
Experienced damage		
No damage / don't know	1998	65.4%
Material and/or physical damage	1055	34.6%
Total	3053	100%
Satisfaction with weather warnings		
1 = Not at all satisfied	124	4.1%
2	139	4.6%
3	383	12.5%
4	715	23.4%
5	857	28.1%
6	485	15.9%
7 = Very satisfied	243	8,0%
I don't remember any weather warnings	107	3.5%
Total	3053	100%
Confidence in weather forecasts		
1 = Very low	94	3.1%
2	126	4.1%
3	353	11.6%
4	577	18.9%
5	1044	34.2%
6	658	21.6%
7 = Very high	201	6.6%
Total	3053	100%

Table A 4. Descriptive analysis for sociodemographic variables (Part II)

	Absolute frequency	Percentage
Knowledge weather forecasts		
1 = No knowledge at all	459	15,0%
2	323	10.6%
3	476	15.6%
4	887	29.1%
5	664	21.7%
6	191	6.3%
7 = Comprehensive knowledge	53	1.7%
Total	3053	100%
Staying mainly indoors or outdoors		
Mainly indoors	1992	65.2%
Mainly outdoors	273	8.9%
Both equally	788	25.8%
Total	3053	100%
Vulnerability (N)		
1 = Very vulnerable	63	2.1%
2	130	4.3%
3	306	10,0%
4	688	22.5%
5	919	30.1%
6	663	21.7%
7 = Not vulnerable	283	9.3%
Missing	1	0,0%
Total	3053	100%
Attitudinal Cluster		
Weather-conscious	1130	37,0%
Weather-disinterested	1122	36.8%
Weather-affected	801	26.2%
Total	3053	100%
Behavioural Cluster		
Self-Protect	969	31.7%
Ignorant	467	15.3%
Risky Behaviour	865	28.3%
No-protect	751	24.6%
Missing	1	0,0%
Total	3053	100%
Lifestyle		
Konservativ Gehobene	233	7.6%
Konventionalisten	350	11.5%
Bodenständig Traditionelle	504	16.5%
Liberal Gehobene	440	14.4%
Mittelständische	465	15.2%
Heimzentrierte	419	13.7%
Innovativ Gehobene	261	8.5%
Hedonisten	193	6.3%
Unterhaltungssuchende	167	5.5%
Missing	21	0.7%
Total	3053	100%

ATTITUDINAL CLUSTER

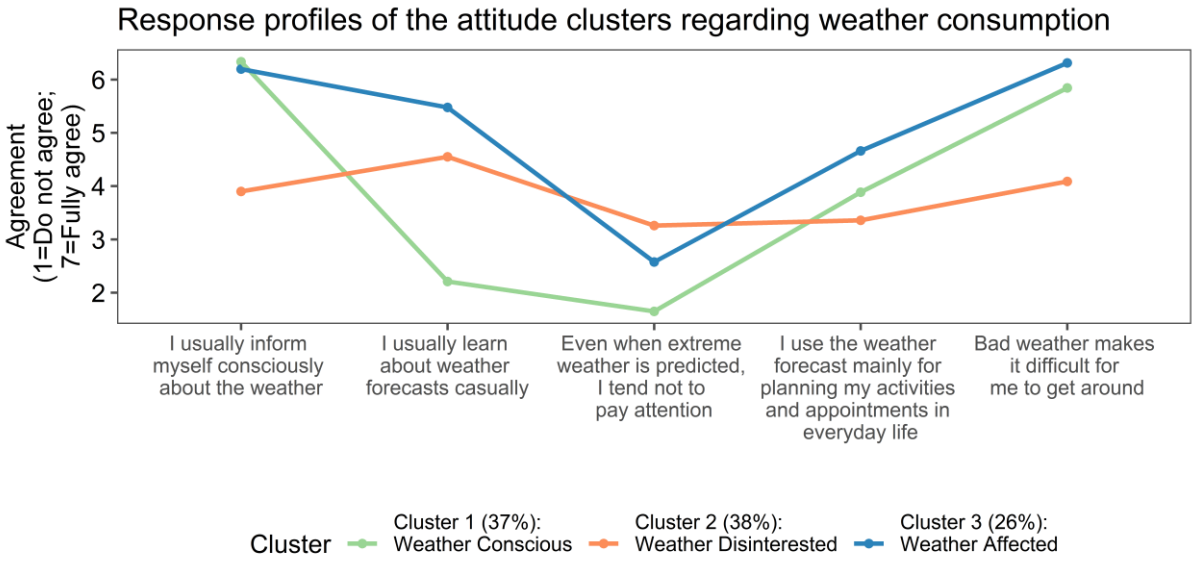


Figure A 1. Attitudinal cluster

Method

The aim was to detect replicable clusters in terms of weather attitudes and habits. To identify attitude patterns, we performed a two-step cluster analysis with fives variables identified in previous surveys (Schulze and Voss 2022a). As in prior studies, we set the clustering number k as 3.

Cluster description

Cluster 1 (37 %; Weather-Conscious) consists of people informing themselves about the weather consciously and when they have something planned. They use weather forecasts for planning their activities. Bad weather makes it hard for them to get around.

In contrast, cluster 3 (26 %; Weather-Affected) comprises people strongly affected by the weather. Bad weather makes it difficult for them to get around. People belonging to cluster 3 use weather forecasts to plan their activities. They inform themselves consciously and casually, e.g., when they have something planned. Some would not pay attention to the forecasts even if severe weather is warned.

People belonging to cluster 2 (38 %; Weather-Disinterested) are not interested in or affected by weather and weather forecasts. They do not inform themselves consciously about the weather but casually. They would not pay attention to a weather warning.

The clusters extracted in previous studies look similar (Schulze and Voss 2022a).

BEHAVIOURAL CLUSTER

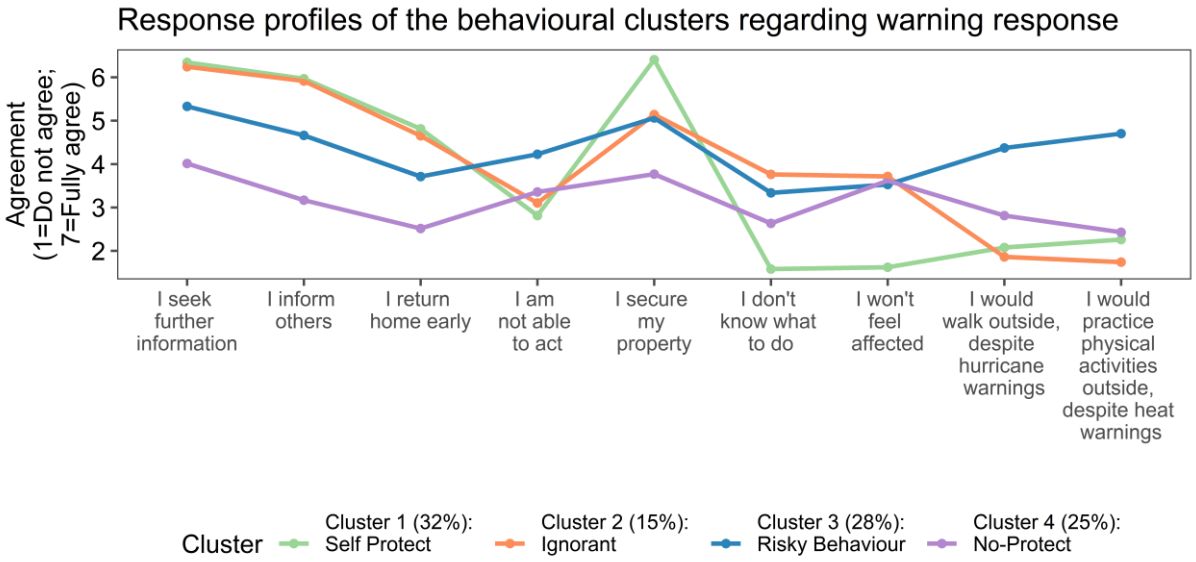


Figure A 2. Behavioural cluster

Method

The aim was to identify replicable clusters in terms of response to weather warnings. Therefore, we also surveyed how the respondents would behave when receiving a weather warning. We performed a two-step cluster analysis with nine variables. As in earlier studies we found a four cluster solution, we set the number of clusters to 4.

Cluster description

Cluster 1 (32 %; Self-Protect) consists of people responding to a weather warning with protective action. They would seek information, secure property, inform others, and return home early. They would feel affected, know what to do, and not show risky behaviour.

Cluster 2 (15 %; Ignorant) stated to a high degree that they would not know what to do after receiving a weather warning. Nevertheless, they would seek further information, inform others, and secure their property. At the same time, they would not engage in risk-taking behaviour.

Opposite to these two clusters, cluster 3 (28 %; Risky behaviour) would more likely show risk-taking behaviour. They also state that they could not respond due to responsibilities, would not know what to do, or feel affected. They are less likely to show protective action than the first two clusters.

Cluster 4 (25 %; No-Protect), on the other hand, would not engage in self-protecting action, such as securing property or returning home early. They would also not exchange information and would not feel affected. But at the same time, people belonging to this cluster would not show risky behaviour.

The analysis of behavioural clusters in earlier studies resulted in similar but slightly different clusters (Schulze and Voss 2022a).

LIFESTYLE

We administered the integrative, theory-driven, lifestyle-typology developed by Otte (2005). Two dimensions, namely material level and modernity/biographical perspective are used for the index-based construction of nine differential lifestyles. For a detailed description of the types and their formation, see Otte (2005).

Table A 5. Otte's typology (sample frequency)

		Modernity/biographical perspective		
		Traditional	*Semi-modern*	*Modern*
Material level	*High*	Konservativ Gehobene (7.6 %)	Liberal Gehobene (14.4 %)	Innovativ Gehobene (8.5 %)
	Middle	Konventionalisten (11.5 %)	Mittelständische (15.2 %)	Hedonisten (6.3 %)
	Low	Bodenständig Traditionelle (16.5 %)	Heimzentrierte (13.7 %)	Unterhaltungssuchende (5.5 %)

Obtaining user specific information and means of transport

Table A 6. Pearson-Chi-Square test on the independence of selecting user-specific information and means of transport used in daily life. * p<0.05 **p<0.01 *** p<0.001

				Means of transport								
				Car		Pearson-Chi-Square	Bicycle		Pearson-Chi- Square	Foot		Pearson-Chi-Square
				no	yes		no	yes		no	yes	
User-specific information	Car	no	observed	266	553	**p<.001*** **	579	240	p=.529	444	375	p=.263
			expected	247	572		575	244		437	382	
		yes	observed	39	154		132	61		96	97	
			expected	58	135		136	57		103	90	
	Bicycle	no	observed	239	554	p=1.000	576	217	**p=.002****	432	361	p=.175
			expected	239	554		557	236		423	370	
		yes	observed	66	153		135	84		108	111	
			expected	66	153		154	65		117	102	
	Pedestrian	no	observed	253	614	p=0.105	605	262	p=.418	478	389	**p=.006****
			expected	261	606		609	258		463	404	
		yes	observed	52	93		106	39		62	83	
			expected	44	101		102	43		77	68	

Results of Mixed effect regression analyses

Table A 7. Mixed effects regression analysis on the effect of event and sociodemographic on narrative response. * p<0.05 **p<0.01 *** p<0.001

	Narrative Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.89	0.13	3.57 – 4.21	0.02 – 0.23	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.06 – 0.13	**<0.001**
Vulnerability (N)	0.01	0.01	-0.02 – 0.04	-0.02 – 0.04	0.428
Satisfaction with weather warnings	-0.02	-0.02	-0.05 – 0.02	-0.05 – 0.02	0.306
Confidence in weather forecasts	0.25	0.23	0.21 – 0.28	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.03	0.709
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.07	-0.05	-0.10 – -0.03	-0.07 – -0.02	**<0.001**
Gender: Male	*Reference*				
Gender: Female	0.42	0.29	0.33 – 0.51	0.23 – 0.35	**<0.001**
Education: Low	*Reference*				
Education: Middle	-0.05	-0.03	-0.16 – 0.06	-0.11 – 0.04	0.368
Education: High	-0.11	-0.08	-0.22 – -0.01	-0.15 – -0.00	**0.040**
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	0.00	0.00	-0.12 – 0.13	-0.08 – 0.09	0.975
Residence: Urban	*Reference*				
Residence: Suburban	0.06	0.04	-0.05 – 0.16	-0.03 – 0.11	0.286
Residence: Rural	-0.05	-0.04	-0.16 – 0.05	-0.11 – 0.03	0.295
Stay: Equally	*Reference*				
Stay: Outdoors	-0.12	-0.08	-0.29 – 0.04	-0.20 – 0.03	0.151
Stay: Indoors	-0.06	-0.04	-0.17 – 0.04	-0.11 – 0.03	0.226
Damage: No / don't know	*Reference*				
Damage: Yes	0.09	0.06	-0.00 – 0.18	-0.00 – 0.13	0.052
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.87	-0.60	-0.98 – -0.77	-0.67 – -0.52	**<0.001**
Cluster: Weather affected	0.11	0.07	-0.00 – 0.21	-0.00 – 0.15	0.057
Random Effects					
σ^2	0.49				
$\tau_{00\ TN}$	1.13				
ICC	0.70				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.242 / 0.772				

Table A 8. Mixed effects regression analysis on the effect of event and sociodemographic on narrative perception. * p<0.05 **p<0.01 *** p<0.001

	Narrative Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.90	0.05	3.59 – 4.21	-0.05 – 0.16	**<0.001**
Age	0.01	0.07	0.00 – 0.01	0.03 – 0.10	**<0.001**
Vulnerability (N)	-0.02	-0.02	-0.05 – 0.01	-0.05 – 0.01	0.168
Satisfaction with weather warnings	-0.00	-0.00	-0.03 – 0.03	-0.03 – 0.03	0.950
Confidence in weather forecasts	0.23	0.23	0.20 – 0.27	0.19 – 0.26	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.02 – 0.04	-0.02 – 0.04	0.495
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.08	-0.06	-0.11 – -0.05	-0.08 – -0.03	**<0.001**
Gender: Male	*Reference*				
Gender: Female	0.34	0.25	0.26 – 0.43	0.19 – 0.31	**<0.001**
Education: Low	*Reference*				
Education: Middle	-0.03	-0.02	-0.13 – 0.08	-0.10 – 0.06	0.623
Education: High	-0.18	-0.13	-0.29 – -0.08	-0.21 – -0.05	**0.001**
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	-0.03	-0.02	-0.15 – 0.10	-0.11 – 0.07	0.671
Residence: Rural	*Reference*				
Residence: Suburban	0.09	0.06	-0.02 – 0.19	-0.01 – 0.14	0.106
Residence: Urban	0.08	0.06	-0.02 – 0.18	-0.01 – 0.13	0.111
Stay: Equally	*Reference*				
Stay: Outdoors	-0.02	-0.02	-0.18 – 0.14	-0.13 – 0.10	0.797
Stay: Indoors	-0.05	-0.04	-0.15 – 0.05	-0.11 – 0.04	0.336
Damage: No / don't know	*Reference*				
Damage: Yes	0.13	0.10	0.04 – 0.22	0.03 – 0.16	**0.003**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.71	-0.51	-0.81 – -0.61	-0.58 – -0.44	**<0.001**
Cluster: Weather affected	0.22	0.16	0.12 – 0.33	0.08 – 0.24	**<0.001**
Random Effects					
σ^2	0.43				
$\tau_{00\ TN}$	1.09				
ICC	0.72				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.216 / 0.778				

Table A 9. Mixed effects regression analysis on the effect of warning structure and content on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.73	0.06	3.44 – 4.02	-0.06 – 0.17	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.045**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.655
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.332
Content: Original	*Reference*				
Content: Event comparison	0.03	0.03	-0.06 – 0.13	-0.04 – 0.10	0.464
Content: User- specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.931
Structure: Original	*Reference*				
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.394
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.020**
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Male	*Reference*				
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**
Education: Low	*Reference*				
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.795
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.819
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	0.01	0.01	-0.10 – 0.13	-0.07 – 0.09	0.800
Residence: Urban	*Reference*				
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.132
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.098
Stay: Equally	*Reference*				
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.570
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.857
Damage: No / don't know	*Reference*				
Damage: Yes	0.11	0.08	0.02 – 0.19	0.02 – 0.14	**0.010**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Cluster: Weather affected	0.05	0.04	-0.05 – 0.14	-0.04 – 0.11	0.331
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.265 / 0.738				

Table A 10. Mixed effects regression analysis on the effect of warning structure and content on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.98	0.10	3.73 – 4.23	-0.01 – 0.21	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.544
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.692
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.059
Content: Original	*Reference*				
Content: Event comparison	-0.02	-0.01	-0.09 – 0.06	-0.08 – 0.05	0.699
Content: User- specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.395
Structure: Original	*Reference*				
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.082
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Male	*Reference*				
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Education: Low	*Reference*				
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.06 – 0.08	0.859
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.391
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.698
Residence: Urban	*Reference*				
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.293
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.135
Stay: Equally	*Reference*				
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.11 – 0.11	0.965
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.451
Damage: No / don't know	*Reference*				
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.76	-0.65	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.057
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 11. Mixed effects regression analysis on the effect of warning structure and content on Agitation. * p<0.05 **p<0.01 *** p<0.001

	Agitation (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.35	-0.24	3.96 – 4.74	-0.36 – -0.11	**<0.001**
Age	-0.01	-0.05	-0.01 – -0.00	-0.09 – -0.02	**0.002**
Vulnerability (N)	-0.08	-0.07	-0.12 – -0.04	-0.10 – -0.03	**<0.001**
Satisfaction with weather warnings	-0.05	-0.04	-0.09 – -0.01	-0.08 – -0.01	**0.016**
Confidence in weather forecasts	0.09	0.07	0.05 – 0.13	0.04 – 0.11	**<0.001**
Knowledge weather forecasts	0.00	0.00	-0.03 – 0.04	-0.03 – 0.04	0.784
Content: Original	*Reference*				
Content: Event comparison	0.02	0.01	-0.11 – 0.14	-0.07 – 0.09	0.770
Content: User- specific	-0.03	-0.02	-0.15 – 0.10	-0.09 – 0.06	0.690
Structure: Original	*Reference*				
Structure: Structured	0.03	0.02	-0.09 – 0.16	-0.06 – 0.10	0.593
Structure: Links	-0.04	-0.02	-0.16 – 0.09	-0.10 – 0.05	0.553
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	0.01	0.00	-0.04 – 0.06	-0.03 – 0.04	0.792
Gender: Male	*Reference*				
Gender: Female	0.58	0.36	0.48 – 0.69	0.29 – 0.42	**<0.001**
Education: Low	*Reference*				
Education: Middle	-0.05	-0.03	-0.18 – 0.08	-0.11 – 0.05	0.461
Education: High	-0.08	-0.05	-0.21 – 0.05	-0.13 – 0.03	0.219
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	-0.04	-0.03	-0.19 – 0.11	-0.12 – 0.07	0.591
Residence: Urban	*Reference*				
Residence: Suburban	0.05	0.03	-0.07 – 0.18	-0.04 – 0.11	0.401
Residence: Rural	0.07	0.04	-0.05 – 0.19	-0.03 – 0.12	0.246
Stay: Equally	*Reference*				
Stay: Outdoors	0.23	0.14	0.03 – 0.42	0.02 – 0.26	**0.026**
Stay: Indoors	0.16	0.10	0.04 – 0.28	0.02 – 0.17	**0.011**
Damage: No / don't know	*Reference*				
Damage: Yes	0.15	0.09	0.04 – 0.26	0.02 – 0.16	**0.008**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.38	-0.23	-0.50 – -0.25	-0.31 – -0.16	**<0.001**
Cluster: Weather affected	0.23	0.14	0.10 – 0.36	0.06 – 0.22	**0.001**
Random Effects					
σ^2	0.99				
$\tau_{00\ TN}$	1.44				
ICC	0.59				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.078 / 0.624				

Table A 12. Mixed effects regression analysis on the effect of warning structure and content on Activeness. * p<0.05 **p<0.01 *** p<0.001

	Activeness (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	2.86	0.09	2.58 – 3.14	-0.03 – 0.22	**<0.001**
Age	0.01	0.16	0.01 – 0.01	0.13 – 0.19	**<0.001**
Vulnerability (N)	0.05	0.05	0.02 – 0.07	0.02 – 0.08	**0.001**
Satisfaction with weather warnings	0.04	0.05	0.02 – 0.07	0.02 – 0.09	**0.001**
Confidence in weather forecasts	0.10	0.11	0.07 – 0.13	0.08 – 0.15	**<0.001**
Knowledge weather forecasts	0.08	0.11	0.06 – 0.11	0.08 – 0.14	**<0.001**
Content: Original	*Reference*				
Content: Event comparison	-0.05	-0.04	-0.14 – 0.04	-0.12 – 0.03	0.263
Content: User- specific	-0.03	-0.03	-0.12 – 0.06	-0.10 – 0.05	0.474
Structure: Original	*Reference*				
Structure: Structured	-0.00	-0.00	-0.09 – 0.09	-0.08 – 0.07	0.978
Structure: Links	0.00	0.00	-0.09 – 0.09	-0.07 – 0.08	0.942
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	0.00	0.00	-0.04 – 0.04	-0.03 – 0.03	0.950
Gender: Male	*Reference*				
Gender: Female	-0.08	-0.07	-0.16 – -0.01	-0.13 – -0.01	**0.027**
Education: Low	*Reference*				
Education: Middle	0.01	0.01	-0.08 – 0.11	-0.07 – 0.09	0.794
Education: High	-0.01	-0.01	-0.10 – 0.08	-0.09 – 0.07	0.804
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	0.12	0.10	0.02 – 0.23	0.01 – 0.19	**0.024**
Residence: Urban	*Reference*				
Residence: Suburban	0.05	0.04	-0.04 – 0.14	-0.04 – 0.11	0.309
Residence: Rural	0.05	0.04	-0.04 – 0.13	-0.03 – 0.11	0.296
Stay: Equally	*Reference*				
Stay: Outdoors	0.00	0.00	-0.14 – 0.15	-0.11 – 0.12	0.949
Stay: Indoors	-0.15	-0.12	-0.23 – -0.06	-0.19 – -0.05	**0.001**
Damage: No / don't know	*Reference*				
Damage: Yes	0.09	0.08	0.02 – 0.17	0.01 – 0.14	**0.018**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.19	-0.16	-0.28 – -0.10	-0.23 – -0.08	**<0.001**
Cluster: Weather affected	0.15	0.13	0.06 – 0.25	0.05 – 0.21	**0.001**
Random Effects					
σ^2	0.54				
$\tau_{00\ TN}$	0.72				
ICC	0.57				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.121 / 0.625				

Table A 13. Mixed effects regression analysis on the effect of warning structure and content on Attention. * p<0.05 **p<0.01 *** p<0.001

	Attention (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.38	0.21	4.12 – 4.64	0.10 – 0.33	**<0.001**
Age	0.01	0.14	0.01 – 0.01	0.11 – 0.17	**<0.001**
Vulnerability (N)	0.05	0.06	0.02 – 0.07	0.03 – 0.09	**<0.001**
Satisfaction with weather warnings	-0.00	-0.00	-0.03 – 0.02	-0.03 – 0.03	0.877
Confidence in weather forecasts	0.16	0.18	0.13 – 0.18	0.15 – 0.22	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.076
Content: Original	*Reference*				
Content: Event comparison	-0.04	-0.04	-0.13 – 0.04	-0.11 – 0.03	0.295
Content: User- specific	-0.04	-0.03	-0.12 – 0.04	-0.10 – 0.04	0.340
Structure: Original	*Reference*				
Structure: Structured	-0.02	-0.02	-0.10 – 0.06	-0.09 – 0.05	0.616
Structure: Links	-0.07	-0.06	-0.16 – 0.01	-0.13 – 0.01	0.071
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.00	-0.00	-0.04 – 0.03	-0.03 – 0.03	0.874
Gender: Male	*Reference*				
Gender: Female	0.18	0.15	0.11 – 0.24	0.09 – 0.21	**<0.001**
Education: Low	*Reference*				
Education: Middle	0.00	0.00	-0.09 – 0.09	-0.07 – 0.07	0.993
Education: High	-0.06	-0.05	-0.14 – 0.03	-0.12 – 0.02	0.184
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	0.00	0.00	-0.10 – 0.10	-0.08 – 0.08	0.996
Residence: Urban	*Reference*				
Residence: Suburban	0.01	0.01	-0.07 – 0.09	-0.06 – 0.08	0.800
Residence: Rural	0.00	0.00	-0.08 – 0.08	-0.07 – 0.07	0.983
Stay: Equally	*Reference*				
Stay: Outdoors	-0.09	-0.07	-0.22 – 0.05	-0.19 – 0.04	0.200
Stay: Indoors	-0.08	-0.07	-0.16 – 0.00	-0.14 – 0.00	0.050
Damage: No / don't know	*Reference*				
Damage: Yes	0.08	0.07	0.01 – 0.16	0.01 – 0.13	**0.021**
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.64	-0.55	-0.72 – -0.56	-0.62 – -0.48	**<0.001**
Cluster: Weather affected	0.00	0.00	-0.08 – 0.09	-0.07 – 0.07	0.951
Random Effects					
σ^2	0.50				
$\tau_{00\ TN}$	0.59				
ICC	0.54				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.203 / 0.635				

Table A 14. Mixed effects regression analysis on the effect of warning structure and content on text rating. * p<0.05 **p<0.01 *** p<0.001

	Text rating (including control variables)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.75	0.18	3.50 – 4.00	0.06 – 0.30	**<0.001**
Age	0.01	0.09	0.00 – 0.01	0.05 – 0.12	**<0.001**
Vulnerability (N)	0.09	0.11	0.06 – 0.11	0.08 – 0.14	**<0.001**
Satisfaction with weather warnings	0.08	0.11	0.06 – 0.10	0.07 – 0.14	**<0.001**
Confidence in weather forecasts	0.19	0.24	0.16 – 0.22	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.03	-0.02 – 0.04	0.459
Content: Original	*Reference*				
Content: Event comparison	-0.05	-0.05	-0.13 – 0.03	-0.12 – 0.03	0.212
Content: User- specific	-0.05	-0.05	-0.13 – 0.03	-0.12 – 0.02	0.189
Structure: Original	*Reference*				
Structure: Structured	0.04	0.03	-0.04 – 0.11	-0.04 – 0.10	0.389
Structure: Links	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.441
Event: Hurricane Force Gale	*Reference*				
Event: Thunderstorm & Rainfall	-0.01	-0.01	-0.04 – 0.02	-0.03 – 0.02	0.570
Gender: Male	*Reference*				
Gender: Female	0.09	0.08	0.02 – 0.16	0.02 – 0.14	**0.009**
Education: Low	*Reference*				
Education: Middle	0.06	0.05	-0.02 – 0.14	-0.02 – 0.13	0.167
Education: High	-0.02	-0.02	-0.11 – 0.06	-0.10 – 0.05	0.558
Children: No children younger than 12 at home	*Reference*				
Children: Children younger 11 or younger at home	-0.03	-0.02	-0.12 – 0.07	-0.11 – 0.06	0.604
Residence: Urban	*Reference*				
Residence: Suburban	-0.01	-0.01	-0.09 – 0.07	-0.09 – 0.06	0.742
Residence: Rural	-0.05	-0.05	-0.13 – 0.03	-0.12 – 0.02	0.189
Stay: Equally	*Reference*				
Stay: Outdoors	-0.08	-0.07	-0.20 – 0.05	-0.19 – 0.05	0.237
Stay: Indoors	-0.05	-0.05	-0.13 – 0.03	-0.12 – 0.03	0.212
Damage: No / don't know	*Reference*				
Damage: Yes	0.06	0.05	-0.01 – 0.13	-0.01 – 0.11	0.111
Cluster: Weather conscious	*Reference*				
Cluster: Weather disinterested	-0.48	-0.44	-0.56 – -0.40	-0.51 – -0.36	**<0.001**
Cluster: Weather affected	0.01	0.01	-0.07 – 0.09	-0.07 – 0.08	0.820
Random Effects					
σ^2	0.29				
$\tau_{00\ TN}$	0.65				
ICC	0.69				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.228 / 0.762				

Table A 15. Mixed effects regression analysis on the effect of narratives on warning response (difference narrative-warning). * p<0.05 **p<0.01 *** p<0.001

	Difference in response (Narrative-Warning)				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	0.06	0.01	-0.20 – 0.32	-0.15 – 0.16	0.655
Event: Thunderstorm & Rainfall	-0.02	-0.02	-0.06 – 0.02	-0.06 – 0.02	0.380
Gender: Female	0.07	0.07	0.01 – 0.14	0.01 – 0.13	**0.017**
Age	-0.00	-0.02	-0.00 – 0.00	-0.05 – 0.01	0.230
Education: Middle	-0.04	-0.04	-0.12 – 0.03	-0.12 – 0.03	0.273
Education: High	-0.13	-0.13	-0.21 – -0.05	-0.20 – -0.05	**0.001**
Children: Children 11 or younger at home	-0.02	-0.02	-0.10 – 0.07	-0.10 – 0.07	0.729
Residence: Suburban	0.12	0.12	0.05 – 0.20	0.04 – 0.19	**0.002**
Residence: Urban	0.13	0.13	0.06 – 0.20	0.06 – 0.20	**<0.001**
Vulnerability (N)	-0.02	-0.02	-0.04 – 0.01	-0.05 – 0.01	0.170
Stay: Outdoors	-0.07	-0.07	-0.19 – 0.04	-0.19 – 0.04	0.204
Stay: Indoors	-0.06	-0.05	-0.13 – 0.01	-0.12 – 0.01	0.120
Damage: Yes	-0.01	-0.01	-0.07 – 0.05	-0.07 – 0.05	0.748
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.01	-0.05 – 0.02	0.361
Confidence in weather forecasts	0.02	0.03	-0.01 – 0.04	-0.01 – 0.06	0.129
Knowledge weather forecasts	-0.02	-0.03	-0.04 – 0.00	-0.06 – 0.00	0.077
Attitudinal_Cluster: Weather disinterested	-0.04	-0.04	-0.11 – 0.04	-0.11 – 0.04	0.343
Attitudinal_Cluster: Weather affected	0.05	0.05	-0.02 – 0.13	-0.02 – 0.12	0.186
Behavioural_Cluster: Ignorant	0.09	0.09	-0.00 – 0.18	-0.00 – 0.18	0.051
Behavioural_Cluster: Risky Behaviour	0.05	0.05	-0.03 – 0.14	-0.03 – 0.13	0.206
Behavioural_Cluster: No-Protect	0.11	0.11	0.03 – 0.20	0.03 – 0.19	**0.010**
Lifestyle: Konventionalisten	-0.08	-0.08	-0.22 – 0.05	-0.22 – 0.05	0.235
Lifestyle: Bodenständige Traditionelle	-0.07	-0.07	-0.20 – 0.06	-0.20 – 0.06	0.289
Lifestyle: Liberal Gehobene	-0.01	-0.01	-0.14 – 0.12	-0.14 – 0.12	0.850
Lifestyle: Mittelständische	-0.07	-0.07	-0.20 – 0.06	-0.20 – 0.06	0.283
Lifestyle: Heimzentrierte	-0.06	-0.06	-0.19 – 0.08	-0.19 – 0.08	0.410
Lifestyle: Innovativ Gehobene	-0.14	-0.14	-0.29 – 0.00	-0.29 – 0.00	0.055
Lifestyle: Hedonisten	0.00	0.00	-0.15 – 0.16	-0.15 – 0.16	0.954
Lifestyle: Unterhaltungssuchende	-0.21	-0.21	-0.38 – -0.04	-0.37 – -0.04	**0.015**
Random Effects					
σ^2	0.74				
$\tau_{00\ TN}$	0.28				
ICC	0.27				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.016 / 0.285				

Table A 16. Mixed effects regression analysis on the effect of narratives on warning perception (difference narrative-warning). * p<0.05 **p<0.01 *** p<0.001

	Difference in perception (Narratives-Warning				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	-0.17	-0.12	-0.45 – 0.11	-0.28 – 0.04	0.234
Event: Thunderstorm & Rainfall	-0.02	-0.02	-0.07 – 0.02	-0.06 – 0.02	0.240
Gender: Female	0.09	0.08	0.02 – 0.15	0.02 – 0.15	**0.010**
Age	-0.00	-0.03	-0.00 – 0.00	-0.06 – 0.01	0.101
Education: Middle	-0.04	-0.03	-0.12 – 0.05	-0.11 – 0.04	0.390
Education: High	-0.14	-0.14	-0.23 – -0.06	-0.22 – -0.06	**0.001**
Children: Children 11 or younger at home	-0.05	-0.05	-0.14 – 0.04	-0.14 – 0.04	0.274
Residence: Suburban	0.10	0.10	0.02 – 0.18	0.02 – 0.18	**0.012**
Residence: Urban	0.14	0.13	0.06 – 0.21	0.06 – 0.21	**<0.001**
Vulnerability (N)	-0.01	-0.02	-0.04 – 0.01	-0.05 – 0.01	0.302
Stay: Outdoors	-0.02	-0.02	-0.14 – 0.10	-0.14 – 0.10	0.727
Stay: Indoors	-0.02	-0.02	-0.10 – 0.05	-0.09 – 0.05	0.583
Damage: Yes	-0.03	-0.02	-0.09 – 0.04	-0.09 – 0.04	0.463
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.03	0.678
Confidence in weather forecasts	0.00	0.00	-0.02 – 0.03	-0.03 – 0.04	0.855
Knowledge weather forecasts	-0.01	-0.02	-0.03 – 0.01	-0.05 – 0.02	0.304
Attitudinal_Cluster: Weather disinterested	0.03	0.03	-0.05 – 0.11	-0.04 – 0.11	0.395
Attitudinal_Cluster: Weather affected	0.13	0.13	0.05 – 0.21	0.05 – 0.21	**0.001**
Behavioural_Cluster: Ignorant	0.20	0.19	0.10 – 0.30	0.10 – 0.29	**<0.001**
Behavioural_Cluster: Risky Behaviour	0.08	0.08	-0.01 – 0.17	-0.01 – 0.16	0.071
Behavioural_Cluster: No-Protect	0.11	0.10	0.01 – 0.20	0.01 – 0.19	**0.023**
Lifestyle: Konventio-nalisten	-0.07	-0.07	-0.22 – 0.07	-0.21 – 0.07	0.318
Lifestyle: Bodenständige Traditionelle	0.03	0.03	-0.11 – 0.17	-0.10 – 0.16	0.663
Lifestyle: Liberal Gehobene	0.04	0.04	-0.10 – 0.17	-0.10 – 0.17	0.603
Lifestyle: Mittel-ständische	0.01	0.01	-0.12 – 0.15	-0.12 – 0.15	0.852
Lifestyle: Heim-zentrierte	-0.04	-0.04	-0.18 – 0.10	-0.18 – 0.10	0.569
Lifestyle: Innovativ Gehobene	-0.08	-0.08	-0.24 – 0.07	-0.23 – 0.07	0.302
Lifestyle: Hedonisten	-0.00	-0.00	-0.17 – 0.17	-0.16 – 0.16	0.994
Lifestyle: Unterhaltungs-suchende	-0.14	-0.13	-0.32 – 0.04	-0.31 – 0.04	0.130
Random Effects					
σ^2	0.63				
$\tau_{00\ TN}$	0.42				
ICC	0.40				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.022 / 0.414				

Table A 17. Mixed effects regression analysis testing for the interaction effect between structure and attitudinal cluster on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.75	0.06	3.44 – 4.05	-0.06 – 0.19	**<0.001**
Content: Event comparison	0.03	0.02	-0.06 – 0.13	-0.04 – 0.09	0.481
Content: User-specific	0.01	0.00	-0.09 – 0.10	-0.07 – 0.07	0.910
Structure: Structured	0.08	0.06	-0.07 – 0.23	-0.05 – 0.17	0.299
Structure: Links	-0.18	-0.13	-0.33 – -0.03	-0.25 – -0.02	**0.022**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.31	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.02	-0.01	-0.11 – 0.08	-0.09 – 0.06	0.733
Education: High	0.01	0.01	-0.09 – 0.10	-0.07 – 0.08	0.859
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.13	-0.07 – 0.09	0.802
Residence: Suburban	0.07	0.05	-0.02 – 0.16	-0.02 – 0.12	0.141
Residence: Rural	0.08	0.06	-0.02 – 0.17	-0.01 – 0.12	0.106
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.046**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.596
Stay: Indoors	-0.01	-0.00	-0.10 – 0.08	-0.07 – 0.06	0.893
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.009**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.613
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.314
Attitudinal_Cluster: Weather disinterested	-0.84	-0.63	-0.99 – -0.68	-0.74 – -0.51	**<0.001**
Attitudinal_Cluster: Weather affected	-0.00	-0.00	-0.17 – 0.16	-0.13 – 0.12	0.979
StructureStructured:Attitudinal_ClusterWeather disinterested	-0.08	-0.06	-0.30 – 0.13	-0.22 – 0.10	0.453
StructureLinks:Attitudinal_ClusterWeather disinterested	0.04	0.03	-0.17 – 0.26	-0.13 – 0.19	0.689
StructureStructured:Attitudinal_ClusterWeather affected	-0.04	-0.03	-0.28 – 0.19	-0.21 – 0.14	0.712
StructureLinks:Attitudinal_ClusterWeather affected	0.20	0.15	-0.03 – 0.44	-0.03 – 0.33	0.095
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 18. Mixed effects regression analysis testing for the interaction effect between structure and behavioural cluster on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.54	0.40	4.25 – 4.84	0.27 – 0.52	**<0.001**
Content: Event comparison	0.03	0.02	-0.06 – 0.12	-0.04 – 0.09	0.519
Content: User-specific	0.01	0.01	-0.07 – 0.10	-0.06 – 0.08	0.757
Structure: Structured	0.01	0.00	-0.15 – 0.16	-0.11 – 0.12	0.942
Structure: Links	-0.15	-0.11	-0.31 – 0.00	-0.23 – 0.00	0.056
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.26	0.19	0.19 – 0.33	0.14 – 0.25	**<0.001**
Age	0.01	0.07	0.00 – 0.01	0.04 – 0.10	**<0.001**
Education: Middle	0.00	0.00	-0.09 – 0.09	-0.07 – 0.07	0.946
Education: High	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.388
Children: Children 11 or younger at home	0.04	0.03	-0.07 – 0.14	-0.05 – 0.11	0.461
Residence: Suburban	0.03	0.02	-0.06 – 0.11	-0.05 – 0.08	0.577
Residence: Rural	0.03	0.02	-0.06 – 0.11	-0.04 – 0.08	0.552
Vulnerability (N)	0.03	0.03	0.00 – 0.05	0.00 – 0.06	**0.039**
Stay: Outdoors	-0.02	-0.02	-0.16 – 0.12	-0.12 – 0.09	0.733
Stay: Indoors	-0.01	-0.01	-0.10 – 0.07	-0.07 – 0.05	0.752
Damage: Yes	0.06	0.04	-0.02 – 0.14	-0.01 – 0.10	0.139
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.577
Confidence in weather forecasts	0.19	0.19	0.16 – 0.22	0.16 – 0.23	**<0.001**
Knowledge weather forecasts	0.00	0.00	-0.02 – 0.03	-0.02 – 0.03	0.782
Attitudinal_Cluster: Weather disinterested	-0.61	-0.46	-0.70 – -0.52	-0.53 – -0.39	**<0.001**
Attitudinal_Cluster: Weather affected	0.11	0.08	0.01 – 0.20	0.01 – 0.15	**0.023**
clust_verhalt_4_SPSS_f: clust_verhalt_4_SPSS_f2	-0.12	-0.09	-0.31 – 0.07	-0.24 – 0.05	0.212
clust_verhalt_4_SPSS_f: clust_verhalt_4_SPSS_f3	-0.86	-0.64	-1.02 – -0.70	-0.77 – -0.52	**<0.001**
clust_verhalt_4_SPSS_f: clust_verhalt_4_SPSS_f4	-0.90	-0.67	-1.07 – -0.73	-0.80 – -0.55	**<0.001**
StructureStructured:clust_verhalt_4_SPSS_f2	0.03	0.03	-0.24 – 0.31	-0.18 – 0.23	0.810
StructureLinks:clust_verhalt_4_SPSS_f2	-0.06	-0.05	-0.33 – 0.21	-0.25 – 0.16	0.659
StructureStructured:clust_verhalt_4_SPSS_f3	0.09	0.07	-0.13 – 0.31	-0.10 – 0.23	0.432
StructureLinks:clust_verhalt_4_SPSS_f3	0.16	0.12	-0.07 – 0.39	-0.05 – 0.29	0.165
StructureStructured:clust_verhalt_4_SPSS_f4	0.01	0.01	-0.22 – 0.25	-0.17 – 0.19	0.913
StructureLinks:clust_verhalt_4_SPSS_f4	0.03	0.02	-0.21 – 0.26	-0.16 – 0.20	0.820
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.71				
ICC	0.60				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.337 / 0.738				

Table A 19. Mixed effects regression analysis testing for the interaction effect between structure and lifestyle on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.91	0.13	3.52 – 4.29	-0.08 – 0.33	**<0.001**
Content: Event comparison	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.402
Content: User-specific	0.01	0.00	-0.09 – 0.10	-0.07 – 0.07	0.913
Structure: Structured	0.18	0.13	-0.14 – 0.50	-0.11 – 0.38	0.275
Structure: Links	-0.17	-0.13	-0.50 – 0.16	-0.37 – 0.12	0.305
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.33	0.25	0.25 – 0.41	0.19 – 0.31	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	-0.01	-0.00	-0.10 – 0.09	-0.08 – 0.07	0.911
Education: High	0.04	0.03	-0.06 – 0.14	-0.04 – 0.10	0.443
Children: Children 11 or younger at home	-0.00	-0.00	-0.11 – 0.11	-0.09 – 0.08	0.947
Residence: Suburban	0.06	0.05	-0.03 – 0.16	-0.02 – 0.12	0.186
Residence: Rural	0.06	0.05	-0.03 – 0.15	-0.02 – 0.12	0.173
Vulnerability (N)	0.03	0.03	-0.00 – 0.06	-0.00 – 0.06	0.055
Stay: Outdoors	-0.05	-0.04	-0.20 – 0.10	-0.15 – 0.07	0.499
Stay: Indoors	-0.02	-0.01	-0.11 – 0.07	-0.08 – 0.06	0.727
Damage: Yes	0.10	0.08	0.02 – 0.19	0.02 – 0.14	**0.012**
Satisfaction with weather warnings	-0.00	-0.00	-0.03 – 0.03	-0.03 – 0.03	0.813
Confidence in weather forecasts	0.23	0.23	0.20 – 0.26	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.02 – 0.05	0.327
Attitudinal_Cluster: Weather disinterested	-0.86	-0.64	-0.95 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.04	0.03	-0.06 – 0.13	-0.04 – 0.10	0.462
Lifestyle: Konventio-nalisten	-0.09	-0.07	-0.38 – 0.21	-0.29 – 0.15	0.552
Lifestyle: Bodenständige Traditionelle	0.07	0.06	-0.20 – 0.35	-0.15 – 0.26	0.598
Lifestyle: Liberal Gehobene	0.06	0.04	-0.22 – 0.33	-0.17 – 0.25	0.698
Lifestyle: Mittel-ständische	-0.07	-0.05	-0.36 – 0.21	-0.27 – 0.16	0.620
Lifestyle: Heim-zentrierte	-0.25	-0.18	-0.54 – 0.04	-0.40 – 0.03	0.096
Lifestyle: Innovativ Gehobene	-0.18	-0.13	-0.50 – 0.14	-0.37 – 0.10	0.268
Lifestyle: Hedonisten	-0.43	-0.33	-0.78 – -0.09	-0.58 – -0.07	**0.013**
Lifestyle: Unterhaltungs-suchende	-0.14	-0.10	-0.50 – 0.23	-0.37 – 0.17	0.467
StructureStructured:LifestyleKonventio- nalisten	0.00	0.00	-0.42 – 0.43	-0.32 – 0.32	0.996
StructureLinks:LifestyleKonventio- nalisten	0.00	0.00	-0.42 – 0.43	-0.31 – 0.32	0.985
StructureStructured:LifestyleBodenständige Traditionelle	-0.28	-0.21	-0.67 – 0.12	-0.50 – 0.09	0.166
StructureLinks:LifestyleBodenständige Traditionelle	0.02	0.02	-0.37 – 0.42	-0.28 – 0.31	0.911
StructureStructured:LifestyleLiberal Gehobene	-0.18	-0.13	-0.58 – 0.22	-0.43 – 0.17	0.385
StructureLinks:LifestyleLiberal Gehobene	-0.06	-0.05	-0.46 – 0.34	-0.35 – 0.26	0.766
StructureStructured:LifestyleMittel- ständische	-0.09	-0.07	-0.48 – 0.31	-0.36 – 0.23	0.667
StructureLinks:LifestyleMittel- ständische	-0.04	-0.03	-0.44 – 0.37	-0.33 – 0.28	0.863
StructureStructured:LifestyleHeim- zentrierte	0.02	0.02	-0.39 – 0.43	-0.29 – 0.32	0.920
StructureLinks:LifestyleHeim- zentrierte	0.38	0.28	-0.03 – 0.78	-0.02 – 0.59	0.068
StructureStructured:LifestyleInnovativ Gehobene	-0.34	-0.26	-0.78 – 0.10	-0.59 – 0.08	0.132
StructureLinks:LifestyleInnovativ Gehobene	0.22	0.17	-0.24 – 0.68	-0.18 – 0.51	0.340
StructureStructured:LifestyleHedonisten	-0.07	-0.05	-0.55 – 0.42	-0.41 – 0.32	0.792
StructureLinks:LifestyleHedonisten	0.21	0.16	-0.28 – 0.70	-0.21 – 0.52	0.398
StructureStructured:LifestyleUnterhaltungs- suchende	-0.34	-0.25	-0.86 – 0.19	-0.65 – 0.14	0.206
StructureLinks:LifestyleUnterhaltungs- suchende	-0.19	-0.14	-0.70 – 0.31	-0.52 – 0.23	0.454
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.82				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.276 / 0.738				

Table A 20. Mixed effects regression analysis testing for the interaction effect between structure and gender on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.72	0.05	3.42 – 4.02	-0.07 – 0.17	**<0.001**
Content: Event comparison	0.04	0.03	-0.06 – 0.13	-0.04 – 0.10	0.457
Content: User-specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.921
Structure: Structured	0.04	0.03	-0.10 – 0.17	-0.07 – 0.13	0.588
Structure: Links	-0.07	-0.05	-0.20 – 0.06	-0.15 – 0.04	0.274
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.37	0.27	0.23 – 0.50	0.17 – 0.37	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.783
Education: High	0.01	0.01	-0.09 – 0.11	-0.06 – 0.08	0.829
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.13	-0.07 – 0.09	0.793
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.137
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.096
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.044**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.10	-0.14 – 0.08	0.565
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.861
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.010**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.652
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.332
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.14	-0.04 – 0.11	0.326
StructureStructured:GenderFemale	0.01	0.01	-0.18 – 0.19	-0.13 – 0.14	0.943
StructureLinks:GenderFemale	-0.07	-0.05	-0.26 – 0.11	-0.19 – 0.08	0.447
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 21. Mixed effects regression analysis testing for the interaction effect between structure and age on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response					
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*std. p*
(Intercept)	3.80	0.05	3.46 – 4.13	-0.06 – 0.17	**<0.001**	0.360
Content: Event comparison	0.03	0.03	-0.06 – 0.13	-0.04 – 0.10	0.465	0.465
Content: User-specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.923	0.923
Structure: Structured	-0.14	0.03	-0.44 – 0.16	-0.04 – 0.10	0.353	0.395
Structure: Links	-0.15	-0.08	-0.45 – 0.15	-0.15 – -0.01	0.320	**0.020**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**	**<0.001**
Age	0.01	0.10	0.00 – 0.01	0.05 – 0.15	**<0.001**	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.09	-0.08 – 0.06	0.821	0.821
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.771	0.771
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.809	0.809
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.131	0.131
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.091	0.091
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.044**	**0.044**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.10	-0.14 – 0.08	0.566	0.566
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.860	0.860
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.010**	**0.010**
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.684	0.684
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.328	0.328
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.70 – -0.57	**<0.001**	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.15	-0.03 – 0.11	0.309	0.309
StructureStructured:Age	0.00	0.04	-0.00 – 0.01	-0.02 – 0.11	0.210	0.210
StructureLinks:Age	0.00	0.01	-0.01 – 0.01	-0.06 – 0.08	0.768	0.768
Random Effects						
σ^2	0.47					
$\tau_{00\ TN}$	0.84					
ICC	0.64					
N_{TN}	2910					
Observations	5820					
Marginal R^2 / Conditional R^2	0.266 / 0.738					

Table A 22. Mixed effects regression analysis testing for the interaction effect between structure and educational level on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.74	0.06	3.43 – 4.04	-0.07 – 0.19	**<0.001**
Content: Event comparison	0.03	0.03	-0.06 – 0.13	-0.04 – 0.10	0.467
Content: User-specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.951
Structure: Structured	0.02	0.01	-0.16 – 0.19	-0.12 – 0.14	0.833
Structure: Links	-0.11	-0.08	-0.28 – 0.06	-0.21 – 0.05	0.218
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.31	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.06	-0.04	-0.23 – 0.11	-0.17 – 0.08	0.508
Education: High	0.03	0.02	-0.13 – 0.19	-0.10 – 0.14	0.720
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.823
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.134
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.100
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.044**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.583
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.881
Damage: Yes	0.10	0.08	0.02 – 0.19	0.02 – 0.14	**0.012**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.653
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.325
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.03	-0.05 – 0.14	-0.04 – 0.11	0.347
StructureStructured:EducationMiddle	0.07	0.05	-0.17 – 0.31	-0.13 – 0.23	0.557
StructureLinks:EducationMiddle	0.06	0.04	-0.18 – 0.30	-0.13 – 0.22	0.628
StructureStructured:EducationHigh	-0.00	-0.00	-0.23 – 0.23	-0.17 – 0.17	0.980
StructureLinks:EducationHigh	-0.05	-0.04	-0.28 – 0.18	-0.21 – 0.13	0.661
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 23. Mixed effects regression analysis testing for the interaction effect between structure and size of home town on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.76	0.08	3.46 – 4.06	-0.05 – 0.21	**<0.001**
Content: Event comparison	0.03	0.03	-0.06 – 0.13	-0.04 – 0.09	0.472
Content: User-specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.950
Structure: Structured	0.01	0.01	-0.14 – 0.16	-0.10 – 0.12	0.863
Structure: Links	-0.17	-0.13	-0.32 – -0.02	-0.24 – -0.02	**0.023**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.777
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.823
Children: Children 11 or younger at home	0.02	0.01	-0.10 – 0.13	-0.07 – 0.09	0.787
Residence: Suburban	0.06	0.04	-0.10 – 0.22	-0.08 – 0.16	0.477
Residence: Rural	-0.00	-0.00	-0.16 – 0.15	-0.12 – 0.11	0.959
Vulnerability (N)	0.03	0.03	-0.00 – 0.06	-0.00 – 0.06	0.050
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.581
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.852
Damage: Yes	0.11	0.08	0.02 – 0.19	0.02 – 0.14	**0.011**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.631
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.354
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.14	-0.04 – 0.11	0.334
StructureStructured:ResidenceSuburban	-0.03	-0.02	-0.26 – 0.20	-0.19 – 0.15	0.822
StructureLinks:ResidenceSuburban	0.07	0.05	-0.16 – 0.29	-0.12 – 0.22	0.568
StructureStructured:ResidenceRural	0.11	0.08	-0.11 – 0.33	-0.09 – 0.24	0.347
StructureLinks:ResidenceRural	0.13	0.10	-0.08 – 0.35	-0.06 – 0.27	0.229
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 24. Mixed effects regression analysis testing for the interaction effect between structure and experiencing damage on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.75	0.07	3.45 – 4.04	-0.05 – 0.19	**<0.001**
Content: Event comparison	0.03	0.03	-0.06 – 0.13	-0.04 – 0.09	0.471
Content: User-specific	0.00	0.00	-0.09 – 0.10	-0.07 – 0.07	0.939
Structure: Structured	0.02	0.02	-0.09 – 0.14	-0.07 – 0.10	0.684
Structure: Links	-0.13	-0.10	-0.25 – -0.02	-0.19 – -0.02	**0.020**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.31	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.764
Education: High	0.01	0.01	-0.09 – 0.11	-0.06 – 0.08	0.829
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.13	-0.07 – 0.09	0.803
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.137
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.101
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.046**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.10	-0.14 – 0.08	0.567
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.867
Damage: Yes	0.06	0.05	-0.08 – 0.20	-0.06 – 0.15	0.371
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.632
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.325
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.15	-0.04 – 0.11	0.320
StructureStructured:DamageYes	0.05	0.04	-0.15 – 0.24	-0.11 – 0.18	0.619
StructureLinks:DamageYes	0.08	0.06	-0.12 – 0.27	-0.09 – 0.20	0.445
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.265 / 0.738				

Table A 25. Mixed effects regression analysis testing for the interaction effect between structure and attitudinal cluster on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.00	0.11	3.74 – 4.26	-0.01 – 0.24	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.10 – 0.06	-0.08 – 0.05	0.672
Content: User-specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.394
Structure: Structured	0.07	0.06	-0.06 – 0.20	-0.05 – 0.17	0.285
Structure: Links	-0.16	-0.14	-0.29 – -0.03	-0.25 – -0.03	**0.016**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.00	0.00	-0.08 – 0.09	-0.07 – 0.07	0.919
Education: High	-0.04	-0.03	-0.12 – 0.04	-0.10 – 0.04	0.367
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.691
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.298
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.139
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.534
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.10 – 0.11	0.956
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.455
Damage: Yes	0.17	0.15	0.10 – 0.24	0.09 – 0.20	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.727
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.054
Attitudinal_Cluster: Weather disinterested	-0.77	-0.65	-0.90 – -0.64	-0.77 – -0.54	**<0.001**
Attitudinal_Cluster: Weather affected	0.03	0.03	-0.11 – 0.17	-0.09 – 0.15	0.653
StructureStructured:Attitudinal_ClusterWeather disinterested	0.01	0.01	-0.18 – 0.19	-0.15 – 0.16	0.948
StructureLinks:Attitudinal_ClusterWeather disinterested	0.03	0.02	-0.16 – 0.21	-0.13 – 0.18	0.781
StructureStructured:Attitudinal_ClusterWeather affected	-0.01	-0.01	-0.21 – 0.19	-0.18 – 0.16	0.928
StructureLinks:Attitudinal_ClusterWeather affected	0.16	0.13	-0.05 – 0.36	-0.04 – 0.30	0.130
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.295 / 0.725				

Table A 26. Mixed effects regression analysis testing for the interaction effect between structure and behavioural cluster on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.65	0.42	4.40 – 4.91	0.30 – 0.55	**<0.001**
Content: Event comparison	-0.02	-0.02	-0.09 – 0.06	-0.08 – 0.05	0.618
Content: User-specific	-0.02	-0.02	-0.10 – 0.05	-0.08 – 0.04	0.525
Structure: Structured	0.02	0.02	-0.11 – 0.15	-0.09 – 0.13	0.731
Structure: Links	-0.16	-0.14	-0.30 – -0.03	-0.25 – -0.02	**0.017**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.19	0.16	0.13 – 0.25	0.11 – 0.22	**<0.001**
Age	0.00	0.06	0.00 – 0.01	0.03 – 0.09	**<0.001**
Education: Middle	0.02	0.02	-0.06 – 0.10	-0.05 – 0.09	0.586
Education: High	-0.01	-0.01	-0.09 – 0.07	-0.08 – 0.06	0.755
Children: Children 11 or younger at home	0.04	0.03	-0.05 – 0.13	-0.04 – 0.11	0.392
Residence: Suburban	0.00	0.00	-0.07 – 0.08	-0.06 – 0.07	0.898
Residence: Rural	0.02	0.01	-0.06 – 0.09	-0.05 – 0.08	0.646
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.01	-0.04 – 0.02	0.463
Stay: Outdoors	0.02	0.01	-0.11 – 0.14	-0.09 – 0.11	0.804
Stay: Indoors	-0.03	-0.03	-0.11 – 0.04	-0.09 – 0.03	0.381
Damage: Yes	0.12	0.11	0.06 – 0.19	0.05 – 0.16	**<0.001**
Satisfaction with weather warnings	0.02	0.02	-0.01 – 0.04	-0.01 – 0.05	0.168
Confidence in weather forecasts	0.20	0.23	0.17 – 0.22	0.20 – 0.26	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.03	-0.01 – 0.04	0.234
Attitudinal_Cluster: Weather disinterested	-0.57	-0.48	-0.65 – -0.49	-0.55 – -0.42	**<0.001**
Attitudinal_Cluster: Weather affected	0.13	0.11	0.05 – 0.20	0.04 – 0.17	**0.002**
Behavioural_Cluster: Ignorant	-0.16	-0.14	-0.33 – 0.01	-0.28 – 0.01	0.059
Behavioural_Cluster: Risky Behaviour	-0.68	-0.57	-0.82 – -0.54	-0.69 – -0.46	**<0.001**
Behavioural_Cluster: No-Protect	-0.79	-0.67	-0.94 – -0.65	-0.80 – -0.55	**<0.001**
StructureStructured:Behavioural_ClusterIgnorant	-0.00	-0.00	-0.24 – 0.23	-0.20 – 0.20	0.996
StructureLinks:Behavioural_ClusterIgnorant	0.05	0.05	-0.18 – 0.28	-0.15 – 0.24	0.650
StructureStructured:Behavioural_ClusterRisky Behaviour	0.08	0.07	-0.11 – 0.27	-0.09 – 0.23	0.414
StructureLinks:Behavioural_ClusterRisky Behaviour	0.10	0.09	-0.09 – 0.30	-0.08 – 0.25	0.299
StructureStructured:Behavioural_ClusterNo-Protect	0.10	0.08	-0.11 – 0.30	-0.09 – 0.25	0.356
StructureLinks:Behavioural_ClusterNo-Protect	0.06	0.05	-0.14 – 0.26	-0.12 – 0.22	0.562
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.51				
ICC	0.57				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.355 / 0.725				

Table A 27. Mixed effects regression analysis testing for the interaction effect between structure and lifestyle on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.27	0.27	3.94 – 4.59	0.07 – 0.47	**<0.001**
Content: Event comparison	-0.01	-0.01	-0.09 – 0.07	-0.08 – 0.06	0.802
Content: User-specific	-0.04	-0.03	-0.11 – 0.04	-0.10 – 0.04	0.378
Structure: Structured	0.15	0.13	-0.12 – 0.43	-0.10 – 0.36	0.274
Structure: Links	-0.28	-0.23	-0.55 – 0.00	-0.47 – 0.00	0.053
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.24	0.20	0.17 – 0.31	0.15 – 0.26	**<0.001**
Age	0.01	0.08	0.00 – 0.01	0.05 – 0.11	**<0.001**
Education: Middle	0.01	0.00	-0.08 – 0.09	-0.07 – 0.08	0.895
Education: High	-0.02	-0.02	-0.11 – 0.06	-0.09 – 0.05	0.581
Children: Children 11 or younger at home	0.01	0.01	-0.09 – 0.10	-0.08 – 0.09	0.900
Residence: Suburban	0.03	0.03	-0.05 – 0.11	-0.04 – 0.10	0.414
Residence: Rural	0.04	0.04	-0.03 – 0.12	-0.03 – 0.10	0.265
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.467
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.11 – 0.11	0.980
Stay: Indoors	-0.03	-0.03	-0.11 – 0.04	-0.10 – 0.04	0.376
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.470
Confidence in weather forecasts	0.23	0.26	0.20 – 0.25	0.23 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.02	-0.00 – 0.04	-0.00 – 0.05	0.103
Attitudinal_Cluster: Weather disinterested	-0.77	-0.65	-0.85 – -0.69	-0.72 – -0.59	**<0.001**
Attitudinal_Cluster: Weather affected	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.107
Lifestyle: Konventio-nalisten	-0.19	-0.16	-0.44 – 0.06	-0.38 – 0.05	0.138
Lifestyle: Bodenständige Traditionelle	-0.14	-0.12	-0.38 – 0.10	-0.32 – 0.08	0.244
Lifestyle: Liberal Gehobene	0.02	0.02	-0.22 – 0.26	-0.18 – 0.22	0.847
Lifestyle: Mittel-ständische	-0.20	-0.17	-0.44 – 0.04	-0.37 – 0.04	0.109
Lifestyle: Heim-zentrierte	-0.34	-0.29	-0.59 – -0.09	-0.50 – -0.08	**0.007**
Lifestyle: Innovativ Gehobene	-0.34	-0.29	-0.61 – -0.07	-0.52 – -0.06	**0.014**
Lifestyle: Hedonisten	-0.38	-0.32	-0.67 – -0.08	-0.57 – -0.07	**0.012**
Lifestyle: Unterhaltungs-suchende	-0.17	-0.15	-0.48 – 0.14	-0.41 – 0.12	0.277
StructureStructured:LifestyleKonventio- nalisten	-0.03	-0.03	-0.39 – 0.33	-0.33 – 0.28	0.869
StructureLinks:LifestyleKonventio- nalisten	0.23	0.19	-0.13 – 0.59	-0.11 – 0.50	0.218
StructureStructured:LifestyleBodenständige Traditionelle	-0.13	-0.11	-0.46 – 0.21	-0.39 – 0.18	0.461
StructureLinks:LifestyleBodenständige Traditionelle	0.17	0.15	-0.16 – 0.51	-0.14 – 0.43	0.316
StructureStructured:LifestyleLiberal Gehobene	-0.24	-0.20	-0.58 – 0.11	-0.49 – 0.09	0.175
StructureLinks:LifestyleLiberal Gehobene	0.04	0.04	-0.30 – 0.39	-0.26 – 0.33	0.802
StructureStructured:LifestyleMittel- ständische	0.00	0.00	-0.34 – 0.34	-0.29 – 0.29	0.995
StructureLinks:LifestyleMittel- ständische	0.19	0.16	-0.16 – 0.54	-0.13 – 0.46	0.277
StructureStructured:LifestyleHeim- zentrierte	0.14	0.12	-0.22 – 0.49	-0.18 – 0.42	0.447
StructureLinks:LifestyleHeim- zentrierte	0.43	0.37	0.09 – 0.78	0.07 – 0.66	**0.014**
StructureStructured:LifestyleInnovativ Gehobene	-0.16	-0.14	-0.54 – 0.21	-0.46 – 0.18	0.395
StructureLinks:LifestyleInnovativ Gehobene	0.28	0.24	-0.11 – 0.68	-0.09 – 0.57	0.159
StructureStructured:LifestyleHedonisten	-0.08	-0.07	-0.50 – 0.33	-0.42 – 0.28	0.695
StructureLinks:LifestyleHedonisten	0.03	0.03	-0.38 – 0.45	-0.32 – 0.38	0.872
StructureStructured:LifestyleUnterhaltungs- suchende	-0.34	-0.29	-0.79 – 0.11	-0.67 – 0.09	0.140
StructureLinks:LifestyleUnterhaltungs- suchende	-0.13	-0.11	-0.56 – 0.31	-0.47 – 0.26	0.569
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.58				
ICC	0.60				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.306 / 0.725				

Table A 28. Mixed effects regression analysis testing for the interaction effect between structure and gender on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.96	0.08	3.71 – 4.22	-0.03 – 0.20	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.09 – 0.06	-0.08 – 0.05	0.708
Content: User-specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.401
Structure: Structured	0.08	0.07	-0.03 – 0.19	-0.03 – 0.16	0.168
Structure: Links	-0.07	-0.06	-0.18 – 0.04	-0.16 – 0.03	0.214
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.29	0.24	0.18 – 0.40	0.15 – 0.34	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.07 – 0.08	0.871
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.383
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.694
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.297
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.133
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.556
Stay: Outdoors	0.00	0.00	-0.13 – 0.13	-0.11 – 0.11	0.980
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.450
Damage: Yes	0.17	0.14	0.10 – 0.24	0.09 – 0.20	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.700
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.058
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.054
StructureStructured:GenderFemale	-0.02	-0.02	-0.18 – 0.14	-0.15 – 0.12	0.817
StructureLinks:GenderFemale	-0.08	-0.07	-0.24 – 0.08	-0.20 – 0.07	0.330
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 29. Mixed effects regression analysis testing for the interaction effect between structure and age on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception					
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*std. p*
(Intercept)	4.06	0.10	3.77 – 4.34	-0.01 – 0.21	**<0.001**	0.088
Content: Event comparison	-0.02	-0.01	-0.10 – 0.06	-0.08 – 0.05	0.693	0.693
Content: User-specific	-0.03	-0.03	-0.11 – 0.04	-0.10 – 0.04	0.391	0.391
Structure: Structured	-0.04	0.06	-0.29 – 0.22	-0.01 – 0.13	0.789	0.082
Structure: Links	-0.24	-0.09	-0.49 – 0.02	-0.16 – -0.03	0.071	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**	**0.001**
Gender: Female	0.25	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**	**<0.001**
Age	0.01	0.08	0.00 – 0.01	0.03 – 0.13	**0.002**	**0.002**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.06 – 0.08	0.845	0.845
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.396	0.396
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.695	0.695
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.11	0.281	0.281
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.01 – 0.12	0.124	0.124
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.544	0.544
Stay: Outdoors	0.00	0.00	-0.13 – 0.13	-0.11 – 0.11	0.981	0.981
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.452	0.452
Damage: Yes	0.17	0.14	0.10 – 0.24	0.09 – 0.20	**<0.001**	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.705	0.705
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.056	0.056
Attitudinal_Cluster: Weather disinterested	-0.76	-0.65	-0.84 – -0.68	-0.71 – -0.58	**<0.001**	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.055	0.055
StructureStructured:Age	0.00	0.03	-0.00 – 0.01	-0.04 – 0.10	0.398	0.398
StructureLinks:Age	0.00	0.03	-0.00 – 0.01	-0.03 – 0.10	0.312	0.312
Random Effects						
σ^2	0.38					
$\tau_{00\ TN}$	0.60					
ICC	0.61					
N_{TN}	2910					
Observations	5820					
Marginal R^2 / Conditional R^2	0.294 / 0.725					

Table A 30. Mixed effects regression analysis testing for the interaction effect between structure and educational level on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.01	0.13	3.75 – 4.27	0.00 – 0.25	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.09 – 0.06	-0.08 – 0.05	0.706
Content: User-specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.404
Structure: Structured	0.02	0.02	-0.13 – 0.17	-0.11 – 0.15	0.761
Structure: Links	-0.17	-0.14	-0.32 – -0.02	-0.27 – -0.02	**0.026**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	-0.04	-0.04	-0.19 – 0.10	-0.16 – 0.09	0.562
Education: High	-0.08	-0.07	-0.22 – 0.06	-0.19 – 0.05	0.241
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.07 – 0.10	0.709
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.295
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.134
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.537
Stay: Outdoors	0.00	0.00	-0.13 – 0.13	-0.11 – 0.11	0.982
Stay: Indoors	-0.03	-0.02	-0.11 – 0.05	-0.09 – 0.04	0.468
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.707
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.065
Attitudinal_Cluster: Weather disinterested	-0.76	-0.65	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.062
StructureStructured:EducationMiddle	0.06	0.05	-0.15 – 0.26	-0.12 – 0.22	0.582
StructureLinks:EducationMiddle	0.09	0.08	-0.11 – 0.30	-0.09 – 0.25	0.363
StructureStructured:EducationHigh	0.08	0.06	-0.12 – 0.27	-0.10 – 0.23	0.452
StructureLinks:EducationHigh	0.07	0.06	-0.13 – 0.26	-0.11 – 0.22	0.502
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 31. Mixed effects regression analysis testing for the interaction effect between structure and size of home town on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.00	0.12	3.74 – 4.26	-0.00 – 0.24	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.09 – 0.06	-0.08 – 0.05	0.710
Content: User-specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.403
Structure: Structured	0.04	0.03	-0.09 – 0.17	-0.08 – 0.14	0.574
Structure: Links	-0.15	-0.13	-0.28 – -0.02	-0.24 – -0.02	**0.020**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.07 – 0.08	0.884
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.381
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.692
Residence: Suburban	-0.00	-0.00	-0.14 – 0.14	-0.12 – 0.12	0.981
Residence: Rural	0.02	0.02	-0.11 – 0.16	-0.09 – 0.13	0.716
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.516
Stay: Outdoors	0.01	0.00	-0.12 – 0.13	-0.10 – 0.11	0.929
Stay: Indoors	-0.03	-0.02	-0.11 – 0.05	-0.09 – 0.04	0.473
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.714
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.060
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.058
StructureStructured:ResidenceSuburban	0.04	0.03	-0.16 – 0.23	-0.13 – 0.20	0.702
StructureLinks:ResidenceSuburban	0.10	0.08	-0.10 – 0.29	-0.08 – 0.25	0.330
StructureStructured:ResidenceRural	0.07	0.06	-0.12 – 0.26	-0.10 – 0.22	0.482
StructureLinks:ResidenceRural	0.04	0.03	-0.15 – 0.22	-0.13 – 0.19	0.708
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 32. Mixed effects regression analysis testing for the interaction effect between structure and experiencing damage on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.97	0.09	3.72 – 4.22	-0.03 – 0.21	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.09 – 0.06	-0.08 – 0.05	0.710
Content: User-specific	-0.03	-0.03	-0.11 – 0.05	-0.10 – 0.04	0.399
Structure: Structured	0.08	0.07	-0.02 – 0.18	-0.01 – 0.15	0.098
Structure: Links	-0.10	-0.08	-0.20 – -0.00	-0.17 – -0.00	**0.045**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.07 – 0.09	-0.06 – 0.08	0.837
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.396
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.697
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.11	0.287
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.132
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.548
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.11 – 0.11	0.963
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.447
Damage: Yes	0.19	0.16	0.07 – 0.31	0.06 – 0.27	**0.002**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.681
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.060
Attitudinal_Cluster: Weather disinterested	-0.76	-0.65	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.058
StructureStructured:DamageYes	-0.04	-0.03	-0.20 – 0.13	-0.17 – 0.11	0.662
StructureLinks:DamageYes	-0.04	-0.03	-0.20 – 0.13	-0.17 – 0.11	0.682
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 33. Mixed effects regression analysis testing for the interaction effect between content and attitudinal cluster on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.71	0.04	3.41 – 4.01	-0.09 – 0.16	**<0.001**
Content: Event comparison	0.07	0.05	-0.08 – 0.22	-0.06 – 0.16	0.392
Content: User-specific	0.06	0.04	-0.09 – 0.21	-0.07 – 0.15	0.470
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.377
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.022**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.31	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.769
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.818
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.815
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.137
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.097
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.049**
Stay: Outdoors	-0.05	-0.04	-0.20 – 0.10	-0.15 – 0.07	0.515
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.846
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.010**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.650
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.338
Attitudinal_Cluster: Weather disinterested	-0.81	-0.61	-0.97 – -0.66	-0.72 – -0.49	**<0.001**
Attitudinal_Cluster: Weather affected	0.10	0.08	-0.07 – 0.27	-0.05 – 0.21	0.232
ContentEvent comparison:Attitudinal_ClusterWeather disinterested	-0.01	-0.01	-0.23 – 0.20	-0.17 – 0.15	0.910
ContentUser-specific:Attitudinal_ClusterWeather disinterested	-0.10	-0.08	-0.32 – 0.11	-0.24 – 0.09	0.353
ContentEvent comparison:Attitudinal_ClusterWeather affected	-0.11	-0.08	-0.34 – 0.13	-0.26 – 0.10	0.384
ContentUser-specific:Attitudinal_ClusterWeather affected	-0.06	-0.05	-0.30 – 0.17	-0.22 – 0.13	0.611
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 34. Mixed effects regression analysis testing for the interaction effect between content and behavioural cluster on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.52	0.38	4.23 – 4.82	0.25 – 0.51	**<0.001**
Content: Event comparison	-0.02	-0.01	-0.17 – 0.13	-0.13 – 0.10	0.802
Content: User-specific	0.02	0.02	-0.13 – 0.18	-0.10 – 0.13	0.753
Structure: Structured	0.05	0.04	-0.04 – 0.13	-0.03 – 0.10	0.287
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.02	**0.014**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.26	0.20	0.19 – 0.34	0.14 – 0.25	**<0.001**
Age	0.01	0.07	0.00 – 0.01	0.04 – 0.10	**<0.001**
Education: Middle	0.00	0.00	-0.09 – 0.09	-0.07 – 0.07	0.962
Education: High	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.388
Children: Children 11 or younger at home	0.04	0.03	-0.07 – 0.14	-0.05 – 0.11	0.468
Residence: Suburban	0.02	0.02	-0.06 – 0.11	-0.05 – 0.08	0.596
Residence: Rural	0.03	0.02	-0.06 – 0.11	-0.04 – 0.08	0.552
Vulnerability (N)	0.03	0.03	0.00 – 0.05	0.00 – 0.06	**0.043**
Stay: Outdoors	-0.03	-0.02	-0.17 – 0.11	-0.12 – 0.08	0.715
Stay: Indoors	-0.01	-0.01	-0.10 – 0.07	-0.07 – 0.05	0.787
Damage: Yes	0.06	0.05	-0.02 – 0.14	-0.01 – 0.10	0.115
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.625
Confidence in weather forecasts	0.19	0.19	0.16 – 0.22	0.16 – 0.23	**<0.001**
Knowledge weather forecasts	0.00	0.01	-0.02 – 0.03	-0.02 – 0.03	0.728
Attitudinal_Cluster: Weather disinterested	-0.61	-0.46	-0.70 – -0.52	-0.52 – -0.39	**<0.001**
Attitudinal_Cluster: Weather affected	0.10	0.08	0.01 – 0.19	0.01 – 0.15	**0.025**
Behavioural_Cluster: Ignorant	-0.13	-0.10	-0.33 – 0.07	-0.25 – 0.05	0.206
Behavioural_Cluster: Risky Behaviour	-0.92	-0.69	-1.08 – -0.76	-0.81 – -0.57	**<0.001**
Behavioural_Cluster: No-Protect	-0.77	-0.57	-0.94 – -0.60	-0.70 – -0.45	**<0.001**
ContentEvent comparison:Behavioural_ClusterIgnorant	0.02	0.02	-0.25 – 0.30	-0.19 – 0.22	0.861
ContentUser-specific:Behavioural_ClusterIgnorant	-0.03	-0.03	-0.31 – 0.24	-0.23 – 0.18	0.807
ContentEvent comparison:Behavioural_ClusterRisky Behaviour	0.26	0.20	0.04 – 0.48	0.03 – 0.36	**0.021**
ContentUser-specific:Behavioural_ClusterRisky Behaviour	0.16	0.12	-0.07 – 0.39	-0.05 – 0.29	0.167
ContentEvent comparison:Behavioural_ClusterNo-Protect	-0.15	-0.11	-0.38 – 0.09	-0.29 – 0.07	0.226
ContentUser-specific:Behavioural_ClusterNo-Protect	-0.21	-0.16	-0.44 – 0.02	-0.33 – 0.02	0.080
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.71				
ICC	0.60				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.339 / 0.738				

Table A 35. Mixed effects regression analysis testing for the interaction effect between content and lifestyle on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.90	0.13	3.52 – 4.28	-0.07 – 0.34	**<0.001**
Content: Event comparison	0.04	0.03	-0.29 – 0.37	-0.22 – 0.27	0.826
Content: User-specific	0.06	0.05	-0.26 – 0.39	-0.19 – 0.29	0.697
Structure: Structured	0.04	0.03	-0.05 – 0.14	-0.04 – 0.10	0.346
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.021**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.33	0.25	0.26 – 0.41	0.19 – 0.31	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	-0.02	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.759
Education: High	0.03	0.02	-0.07 – 0.13	-0.05 – 0.10	0.554
Children: Children 11 or younger at home	-0.00	-0.00	-0.12 – 0.11	-0.09 – 0.08	0.931
Residence: Suburban	0.05	0.04	-0.04 – 0.15	-0.03 – 0.11	0.254
Residence: Rural	0.06	0.04	-0.03 – 0.15	-0.02 – 0.11	0.201
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.040**
Stay: Outdoors	-0.03	-0.03	-0.18 – 0.11	-0.14 – 0.08	0.642
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.08 – 0.06	0.777
Damage: Yes	0.10	0.07	0.02 – 0.18	0.01 – 0.13	**0.019**
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.690
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.360
Attitudinal_Cluster: Weather disinterested	-0.85	-0.63	-0.94 – -0.76	-0.70 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.04	0.03	-0.05 – 0.14	-0.04 – 0.10	0.390
Lifestyle: Konventio-nalisten	-0.04	-0.03	-0.34 – 0.26	-0.25 – 0.19	0.795
Lifestyle: Bodenständige Traditionelle	0.13	0.10	-0.15 – 0.41	-0.11 – 0.31	0.370
Lifestyle: Liberal Gehobene	0.02	0.02	-0.26 – 0.31	-0.20 – 0.23	0.881
Lifestyle: Mittel-ständische	-0.10	-0.07	-0.38 – 0.18	-0.28 – 0.14	0.485
Lifestyle: Heim-zentrierte	-0.18	-0.13	-0.47 – 0.11	-0.35 – 0.08	0.217
Lifestyle: Innovativ Gehobene	-0.22	-0.16	-0.53 – 0.09	-0.40 – 0.07	0.170
Lifestyle: Hedonisten	-0.56	-0.42	-0.91 – -0.20	-0.68 – -0.15	**0.002**
Lifestyle: Unterhaltungs-suchende	-0.27	-0.20	-0.65 – 0.11	-0.49 – 0.09	0.169
ContentEvent comparison:LifestyleKonventio- nalisten	0.01	0.01	-0.42 – 0.44	-0.31 – 0.33	0.965
ContentUser-specific:LifestyleKonventio- nalisten	-0.17	-0.13	-0.59 – 0.25	-0.44 – 0.19	0.434
ContentEvent comparison:LifestyleBodenständige Traditionelle	-0.15	-0.11	-0.55 – 0.25	-0.41 – 0.18	0.453
ContentUser-specific:LifestyleBodenständige Traditionelle	-0.26	-0.19	-0.65 – 0.14	-0.49 – 0.10	0.201
ContentEvent comparison:LifestyleLiberal Gehobene	-0.02	-0.02	-0.43 – 0.38	-0.32 – 0.29	0.913
ContentUser-specific:LifestyleLiberal Gehobene	-0.11	-0.08	-0.51 – 0.29	-0.38 – 0.22	0.595
ContentEvent comparison:LifestyleMittel- ständische	-0.10	-0.07	-0.50 – 0.31	-0.38 – 0.23	0.633
ContentUser-specific:LifestyleMittel- ständische	0.08	0.06	-0.32 – 0.48	-0.24 – 0.36	0.685
ContentEvent comparison:LifestyleHeim- zentrierte	0.22	0.16	-0.19 – 0.63	-0.14 – 0.47	0.300
ContentUser-specific:LifestyleHeim- zentrierte	0.01	0.00	-0.40 – 0.41	-0.30 – 0.31	0.975
ContentEvent comparison:LifestyleInnovativ Gehobene	0.03	0.02	-0.41 – 0.48	-0.31 – 0.36	0.886
ContentUser-specific:LifestyleInnovativ Gehobene	-0.08	-0.06	-0.54 – 0.37	-0.40 – 0.28	0.722
ContentEvent comparison:LifestyleHedonisten	0.25	0.18	-0.25 – 0.74	-0.19 – 0.56	0.333
ContentUser-specific:LifestyleHedonisten	0.24	0.18	-0.25 – 0.73	-0.18 – 0.54	0.334
ContentEvent comparison:LifestyleUnterhaltungs- suchende	-0.09	-0.07	-0.62 – 0.44	-0.46 – 0.33	0.735
ContentUser-specific:LifestyleUnterhaltungs- suchende	-0.05	-0.04	-0.57 – 0.47	-0.43 – 0.35	0.849
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.83				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.275 / 0.738				

Table A 36. Mixed effects regression analysis testing for the interaction effect between content and gender on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.69	0.02	3.39 – 3.99	-0.10 – 0.15	**<0.001**
Content: Event comparison	0.14	0.10	0.01 – 0.27	0.01 – 0.20	**0.037**
Content: User-specific	0.02	0.02	-0.11 – 0.15	-0.08 – 0.12	0.750
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.395
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.021**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.43	0.32	0.29 – 0.56	0.22 – 0.42	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.791
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.807
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.832
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.130
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.100
Vulnerability (N)	0.03	0.03	-0.00 – 0.06	-0.00 – 0.06	0.058
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.577
Stay: Indoors	-0.01	-0.00	-0.10 – 0.08	-0.07 – 0.06	0.900
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.008**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.665
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.02 – 0.04	0.331
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.70 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.15	-0.04 – 0.11	0.316
ContentEvent comparison:GenderFemale	-0.21	-0.16	-0.39 – -0.02	-0.29 – -0.02	**0.028**
ContentUser-specific:GenderFemale	-0.04	-0.03	-0.22 – 0.15	-0.17 – 0.11	0.709
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 37. Mixed effects regression analysis testing for the interaction effect between content and age on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response					
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*std. p*
(Intercept)	3.75	0.06	3.41 – 4.09	-0.06 – 0.17	**<0.001**	0.352
Content: Event comparison	-0.12	0.03	-0.41 – 0.18	-0.04 – 0.10	0.450	0.459
Content: User-specific	0.08	0.00	-0.22 – 0.39	-0.07 – 0.07	0.591	0.921
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.397	0.397
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.020**	**0.020**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**	**<0.001**
Age	0.01	0.11	0.01 – 0.01	0.06 – 0.16	**<0.001**	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.09	-0.08 – 0.06	0.821	0.821
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.769	0.769
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.809	0.809
Residence: Suburban	0.07	0.05	-0.02 – 0.16	-0.02 – 0.12	0.144	0.144
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.101	0.101
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.040**	**0.040**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.11	-0.14 – 0.08	0.618	0.618
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.865	0.865
Damage: Yes	0.10	0.08	0.02 – 0.19	0.02 – 0.14	**0.012**	**0.012**
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.664	0.664
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.327	0.327
Attitudinal_Cluster: Weather disinterested	-0.85	-0.63	-0.94 – -0.76	-0.70 – -0.57	**<0.001**	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.15	-0.04 – 0.11	0.316	0.316
ContentEvent comparison:Age	0.00	0.04	-0.00 – 0.01	-0.03 – 0.11	0.302	0.302
ContentUser-specific:Age	-0.00	-0.02	-0.01 – 0.00	-0.09 – 0.05	0.593	0.593
Random Effects						
σ^2	0.47					
$\tau_{00\ TN}$	0.84					
ICC	0.64					
N_{TN}	2910					
Observations	5820					
Marginal R^2 / Conditional R^2	0.266 / 0.738					

Table A 38. Mixed effects regression analysis testing for the interaction effect between content and educational level on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.78	0.09	3.48 – 4.08	-0.04 – 0.22	**<0.001**
Content: Event comparison	0.02	0.02	-0.15 – 0.20	-0.11 – 0.15	0.780
Content: User-specific	-0.15	-0.11	-0.32 – 0.03	-0.24 – 0.02	0.102
Structure: Structured	0.04	0.03	-0.05 – 0.14	-0.04 – 0.10	0.364
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.023**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.35	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.12	-0.09	-0.29 – 0.05	-0.21 – 0.04	0.174
Education: High	-0.03	-0.02	-0.20 – 0.13	-0.15 – 0.10	0.701
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.843
Residence: Suburban	0.07	0.05	-0.02 – 0.16	-0.02 – 0.12	0.148
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.095
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.044**
Stay: Outdoors	-0.04	-0.03	-0.18 – 0.11	-0.14 – 0.08	0.632
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.883
Damage: Yes	0.10	0.08	0.02 – 0.19	0.02 – 0.14	**0.012**
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.669
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.01	-0.01 – 0.04	-0.01 – 0.04	0.327
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.70 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.04 – 0.15	-0.03 – 0.11	0.296
ContentEvent comparison:EducationMiddle	0.08	0.06	-0.16 – 0.31	-0.12 – 0.23	0.524
ContentUser-specific:EducationMiddle	0.24	0.18	0.00 – 0.48	0.00 – 0.36	**0.047**
ContentEvent comparison:EducationHigh	-0.04	-0.03	-0.26 – 0.19	-0.20 – 0.14	0.742
ContentUser-specific:EducationHigh	0.18	0.13	-0.05 – 0.41	-0.04 – 0.31	0.127
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.267 / 0.738				

Table A 39. Mixed effects regression analysis testing for the interaction effect between content and size of home town on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.75	0.07	3.45 – 4.05	-0.05 – 0.20	**<0.001**
Content: Event comparison	-0.02	-0.02	-0.18 – 0.13	-0.13 – 0.09	0.747
Content: User-specific	0.00	0.00	-0.14 – 0.15	-0.11 – 0.11	0.979
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.413
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.020**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.34	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.09	-0.08 – 0.06	0.803
Education: High	0.01	0.01	-0.09 – 0.11	-0.06 – 0.08	0.832
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.13	-0.07 – 0.09	0.796
Residence: Suburban	0.07	0.05	-0.09 – 0.23	-0.07 – 0.17	0.406
Residence: Rural	0.02	0.01	-0.14 – 0.18	-0.11 – 0.13	0.820
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.042**
Stay: Outdoors	-0.04	-0.03	-0.19 – 0.10	-0.14 – 0.08	0.555
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.843
Damage: Yes	0.11	0.08	0.03 – 0.19	0.02 – 0.14	**0.010**
Satisfaction with weather warnings	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.687
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.21 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.324
Attitudinal_Cluster: Weather disinterested	-0.85	-0.64	-0.94 – -0.76	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.05 – 0.14	-0.04 – 0.11	0.321
ContentEvent comparison:ResidenceSuburban	0.03	0.02	-0.20 – 0.26	-0.15 – 0.19	0.795
ContentUser-specific:ResidenceSuburban	-0.01	-0.01	-0.24 – 0.22	-0.18 – 0.16	0.917
ContentEvent comparison:ResidenceRural	0.15	0.11	-0.07 – 0.37	-0.05 – 0.28	0.185
ContentUser-specific:ResidenceRural	0.02	0.02	-0.20 – 0.24	-0.15 – 0.18	0.853
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 40. Mixed effects regression analysis testing for the interaction effect between content and experiencing damage on warning response. * p<0.05 **p<0.01 *** p<0.001

	Warning Response				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.74	0.07	3.45 – 4.04	-0.05 – 0.19	**<0.001**
Content: Event comparison	0.04	0.03	-0.07 – 0.15	-0.06 – 0.12	0.495
Content: User-specific	-0.05	-0.04	-0.17 – 0.06	-0.13 – 0.05	0.366
Structure: Structured	0.04	0.03	-0.05 – 0.13	-0.04 – 0.10	0.388
Structure: Links	-0.11	-0.08	-0.20 – -0.02	-0.15 – -0.01	**0.019**
Event: Thunderstorm & Rainfall	-0.05	-0.04	-0.08 – -0.01	-0.06 – -0.01	**0.007**
Gender: Female	0.35	0.26	0.27 – 0.42	0.20 – 0.32	**<0.001**
Age	0.01	0.12	0.01 – 0.01	0.09 – 0.15	**<0.001**
Education: Middle	-0.01	-0.01	-0.11 – 0.08	-0.08 – 0.06	0.777
Education: High	0.01	0.01	-0.08 – 0.11	-0.06 – 0.08	0.824
Children: Children 11 or younger at home	0.01	0.01	-0.10 – 0.12	-0.07 – 0.09	0.838
Residence: Suburban	0.07	0.05	-0.02 – 0.17	-0.02 – 0.12	0.130
Residence: Rural	0.08	0.06	-0.01 – 0.17	-0.01 – 0.13	0.095
Vulnerability (N)	0.03	0.03	0.00 – 0.06	0.00 – 0.06	**0.048**
Stay: Outdoors	-0.05	-0.04	-0.20 – 0.10	-0.15 – 0.08	0.531
Stay: Indoors	-0.01	-0.01	-0.10 – 0.08	-0.07 – 0.06	0.849
Damage: Yes	0.06	0.04	-0.08 – 0.20	-0.06 – 0.15	0.420
Satisfaction with weather warnings	-0.01	-0.01	-0.04 – 0.02	-0.04 – 0.02	0.655
Confidence in weather forecasts	0.23	0.24	0.20 – 0.26	0.20 – 0.27	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.04	-0.01 – 0.05	0.297
Attitudinal_Cluster: Weather disinterested	-0.85	-0.63	-0.94 – -0.75	-0.70 – -0.56	**<0.001**
Attitudinal_Cluster: Weather affected	0.05	0.04	-0.04 – 0.15	-0.03 – 0.11	0.296
ContentEvent comparison:DamageYes	-0.02	-0.01	-0.21 – 0.18	-0.16 – 0.13	0.875
ContentUser-specific:DamageYes	0.16	0.12	-0.03 – 0.35	-0.03 – 0.27	0.105
Random Effects					
σ^2	0.47				
$\tau_{00\ TN}$	0.84				
ICC	0.64				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.266 / 0.738				

Table A 41. Mixed effects regression analysis testing for the interaction effect between content and attitudinal cluster on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.01	0.12	3.75 – 4.27	-0.00 – 0.24	**<0.001**
Content: Event comparison	-0.08	-0.07	-0.21 – 0.05	-0.18 – 0.04	0.237
Content: User-specific	-0.04	-0.03	-0.17 – 0.09	-0.14 – 0.08	0.552
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.079
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.25	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.06 – 0.08	0.869
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.395
Children: Children 11 or younger at home	0.02	0.01	-0.08 – 0.11	-0.07 – 0.10	0.723
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.301
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.133
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.517
Stay: Outdoors	-0.00	-0.00	-0.13 – 0.12	-0.11 – 0.10	0.956
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.427
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.683
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.059
Attitudinal_Cluster: Weather disinterested	-0.81	-0.69	-0.94 – -0.68	-0.80 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.07	0.06	-0.08 – 0.21	-0.07 – 0.18	0.381
ContentEvent comparison:Attitudinal_ClusterWeather disinterested	0.14	0.12	-0.05 – 0.32	-0.04 – 0.27	0.145
ContentUser-specific:Attitudinal_ClusterWeather disinterested	0.01	0.01	-0.17 – 0.20	-0.15 – 0.17	0.908
ContentEvent comparison:Attitudinal_ClusterWeather affected	0.05	0.04	-0.16 – 0.25	-0.13 – 0.21	0.658
ContentUser-specific:Attitudinal_ClusterWeather affected	0.00	0.00	-0.20 – 0.20	-0.17 – 0.17	0.990
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 42. Mixed effects regression analysis testing for the interaction effect between content and behavioural cluster on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.63	0.41	4.38 – 4.89	0.28 – 0.53	**<0.001**
Content: Event comparison	-0.04	-0.03	-0.17 – 0.09	-0.14 – 0.08	0.563
Content: User-specific	-0.05	-0.05	-0.19 – 0.08	-0.16 – 0.07	0.418
Structure: Structured	0.07	0.06	-0.00 – 0.15	-0.00 – 0.13	0.060
Structure: Links	-0.11	-0.09	-0.19 – -0.04	-0.16 – -0.03	**0.004**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.19	0.16	0.13 – 0.26	0.11 – 0.22	**<0.001**
Age	0.00	0.06	0.00 – 0.01	0.03 – 0.09	**<0.001**
Education: Middle	0.02	0.02	-0.06 – 0.10	-0.05 – 0.08	0.616
Education: High	-0.01	-0.01	-0.09 – 0.06	-0.08 – 0.06	0.749
Children: Children 11 or younger at home	0.04	0.03	-0.06 – 0.13	-0.05 – 0.11	0.445
Residence: Suburban	0.00	0.00	-0.07 – 0.08	-0.06 – 0.07	0.957
Residence: Rural	0.02	0.01	-0.06 – 0.09	-0.05 – 0.08	0.669
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.01	-0.04 – 0.02	0.476
Stay: Outdoors	0.02	0.01	-0.10 – 0.14	-0.09 – 0.12	0.795
Stay: Indoors	-0.03	-0.03	-0.11 – 0.04	-0.09 – 0.03	0.378
Damage: Yes	0.13	0.11	0.06 – 0.20	0.05 – 0.17	**<0.001**
Satisfaction with weather warnings	0.02	0.02	-0.01 – 0.04	-0.01 – 0.05	0.187
Confidence in weather forecasts	0.20	0.23	0.17 – 0.22	0.20 – 0.26	**<0.001**
Knowledge weather forecasts	0.01	0.02	-0.01 – 0.03	-0.01 – 0.04	0.219
Attitudinal_Cluster: Weather disinterested	-0.56	-0.48	-0.64 – -0.49	-0.55 – -0.41	**<0.001**
Attitudinal_Cluster: Weather affected	0.13	0.11	0.05 – 0.20	0.04 – 0.17	**0.001**
Behavioural_Cluster: Ignorant	-0.10	-0.08	-0.27 – 0.08	-0.23 – 0.07	0.277
Behavioural_Cluster: Risky Behaviour	-0.72	-0.61	-0.86 – -0.58	-0.73 – -0.49	**<0.001**
Behavioural_Cluster: No-Protect	-0.71	-0.60	-0.85 – -0.56	-0.72 – -0.48	**<0.001**
ContentEvent comparison:Behavioural_ClusterIgnorant	-0.07	-0.06	-0.31 – 0.17	-0.26 – 0.14	0.564
ContentUser-specific:Behavioural_ClusterIgnorant	-0.05	-0.04	-0.29 – 0.19	-0.24 – 0.16	0.691
ContentEvent comparison:Behavioural_ClusterRisky Behaviour	0.16	0.13	-0.03 – 0.35	-0.03 – 0.29	0.106
ContentUser-specific:Behavioural_ClusterRisky Behaviour	0.15	0.12	-0.05 – 0.34	-0.04 – 0.29	0.144
ContentEvent comparison:Behavioural_ClusterNo-Protect	-0.08	-0.07	-0.29 – 0.12	-0.24 – 0.10	0.425
ContentUser-specific:Behavioural_ClusterNo-Protect	-0.02	-0.02	-0.22 – 0.18	-0.19 – 0.15	0.822
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.51				
ICC	0.57				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.355 / 0.725				

Table A 43. Mixed effects regression analysis testing for the interaction effect between content and lifestyle on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.11	0.15	3.79 – 4.44	-0.05 – 0.35	**<0.001**
Content: Event comparison	0.11	0.09	-0.17 – 0.39	-0.15 – 0.33	0.444
Content: User-specific	0.18	0.15	-0.09 – 0.45	-0.08 – 0.39	0.198
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.072
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.02	**0.007**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.25	0.21	0.18 – 0.31	0.15 – 0.27	**<0.001**
Age	0.01	0.08	0.00 – 0.01	0.05 – 0.11	**<0.001**
Education: Middle	0.00	0.00	-0.08 – 0.09	-0.07 – 0.07	0.973
Education: High	-0.03	-0.02	-0.11 – 0.06	-0.10 – 0.05	0.497
Children: Children 11 or younger at home	-0.00	-0.00	-0.10 – 0.09	-0.08 – 0.08	0.976
Residence: Suburban	0.03	0.02	-0.05 – 0.11	-0.04 – 0.09	0.498
Residence: Rural	0.04	0.04	-0.03 – 0.12	-0.03 – 0.10	0.258
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.542
Stay: Outdoors	0.01	0.01	-0.12 – 0.13	-0.10 – 0.11	0.914
Stay: Indoors	-0.03	-0.03	-0.11 – 0.04	-0.09 – 0.04	0.384
Damage: Yes	0.16	0.13	0.09 – 0.23	0.07 – 0.19	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.615
Confidence in weather forecasts	0.23	0.27	0.20 – 0.25	0.23 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.05	0.090
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.57	**<0.001**
Attitudinal_Cluster: Weather affected	0.07	0.06	-0.01 – 0.16	-0.01 – 0.13	0.077
Lifestyle: Konventio-nalisten	0.04	0.03	-0.21 – 0.29	-0.18 – 0.25	0.760
Lifestyle: Bodenständige Traditionelle	0.08	0.07	-0.16 – 0.32	-0.13 – 0.27	0.500
Lifestyle: Liberal Gehobene	0.11	0.09	-0.13 – 0.35	-0.11 – 0.30	0.373
Lifestyle: Mittel-ständische	-0.04	-0.04	-0.28 – 0.20	-0.24 – 0.17	0.728
Lifestyle: Heim-zentrierte	-0.04	-0.03	-0.28 – 0.21	-0.24 – 0.17	0.758
Lifestyle: Innovativ Gehobene	-0.28	-0.24	-0.55 – -0.02	-0.47 – -0.01	**0.037**
Lifestyle: Hedonisten	-0.37	-0.31	-0.67 – -0.07	-0.57 – -0.06	**0.016**
Lifestyle: Unterhaltungs-suchende	-0.31	-0.27	-0.64 – 0.01	-0.54 – 0.01	0.059
ContentEvent comparison:LifestyleKonventio- nalisten	-0.18	-0.16	-0.55 – 0.18	-0.46 – 0.15	0.323
ContentUser-specific:LifestyleKonventio- nalisten	-0.33	-0.28	-0.69 – 0.04	-0.58 – 0.03	0.078
ContentEvent comparison:LifestyleBodenständige Traditionelle	-0.24	-0.21	-0.59 – 0.10	-0.50 – 0.08	0.162
ContentUser-specific:LifestyleBodenständige Traditionelle	-0.38	-0.33	-0.72 – -0.05	-0.61 – -0.04	**0.025**
ContentEvent comparison:LifestyleLiberal Gehobene	-0.17	-0.14	-0.52 – 0.18	-0.44 – 0.15	0.347
ContentUser-specific:LifestyleLiberal Gehobene	-0.28	-0.24	-0.63 – 0.06	-0.53 – 0.05	0.104
ContentEvent comparison:LifestyleMittel- ständische	-0.18	-0.15	-0.52 – 0.16	-0.44 – 0.14	0.307
ContentUser-specific:LifestyleMittel- ständische	-0.09	-0.08	-0.43 – 0.25	-0.36 – 0.21	0.605
ContentEvent comparison:LifestyleHeim- zentrierte	-0.08	-0.06	-0.43 – 0.27	-0.36 – 0.23	0.670
ContentUser-specific:LifestyleHeim- zentrierte	-0.27	-0.23	-0.62 – 0.08	-0.52 – 0.07	0.129
ContentEvent comparison:LifestyleInnovativ Gehobene	0.05	0.04	-0.33 – 0.43	-0.28 – 0.36	0.814
ContentUser-specific:LifestyleInnovativ Gehobene	-0.13	-0.11	-0.52 – 0.25	-0.44 – 0.22	0.499
ContentEvent comparison:LifestyleHedonisten	0.04	0.03	-0.39 – 0.46	-0.33 – 0.39	0.858
ContentUser-specific:LifestyleHedonisten	-0.13	-0.11	-0.55 – 0.28	-0.47 – 0.24	0.532
ContentEvent comparison:LifestyleUnterhaltungs- suchende	-0.08	-0.06	-0.53 – 0.37	-0.45 – 0.32	0.742
ContentUser-specific:LifestyleUnterhaltungs- suchende	-0.00	-0.00	-0.45 – 0.44	-0.38 – 0.37	0.988
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.58				
ICC	0.60				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.305 / 0.725				

Table A 44. Mixed effects regression analysis testing for the interaction effect between content and gender on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.94	0.06	3.69 – 4.20	-0.06 – 0.18	**<0.001**
Content: Event comparison	0.06	0.05	-0.05 – 0.17	-0.05 – 0.15	0.300
Content: User-specific	0.01	0.01	-0.11 – 0.12	-0.09 – 0.10	0.890
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.082
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.33	0.28	0.22 – 0.45	0.19 – 0.38	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.07 – 0.08	0.886
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.392
Children: Children 11 or younger at home	0.02	0.01	-0.08 – 0.11	-0.07 – 0.09	0.746
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.295
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.139
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.494
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.10 – 0.11	0.961
Stay: Indoors	-0.03	-0.02	-0.11 – 0.05	-0.09 – 0.04	0.475
Damage: Yes	0.17	0.15	0.10 – 0.24	0.09 – 0.20	**<0.001**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.692
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.059
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.052
ContentEvent comparison:GenderFemale	-0.15	-0.13	-0.31 – 0.01	-0.26 – 0.01	0.066
ContentUser-specific:GenderFemale	-0.08	-0.07	-0.24 – 0.07	-0.21 – 0.06	0.299
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.295 / 0.725				

Table A 45. Mixed effects regression analysis testing for the interaction effect between content and age on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception					
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*	*std. p*
(Intercept)	3.96	0.10	3.67 – 4.26	-0.02 – 0.21	**<0.001**	0.090
Content: Event comparison	-0.07	-0.01	-0.33 – 0.18	-0.08 – 0.05	0.573	0.702
Content: User-specific	0.05	-0.03	-0.20 – 0.31	-0.10 – 0.04	0.679	0.400
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.083	0.083
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**	**<0.001**
Age	0.01	0.10	0.00 – 0.01	0.05 – 0.15	**<0.001**	**<0.001**
Education: Middle	0.01	0.01	-0.07 – 0.09	-0.06 – 0.08	0.840	0.840
Education: High	-0.03	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.416	0.416
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.06 – 0.10	0.700	0.700
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.306	0.306
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.138	0.138
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.574	0.574
Stay: Outdoors	0.00	0.00	-0.12 – 0.13	-0.10 – 0.11	0.939	0.939
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.451	0.451
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.684	0.684
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.057	0.057
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.054	0.054
ContentEvent comparison:Age	0.00	0.02	-0.00 – 0.01	-0.05 – 0.08	0.640	0.640
ContentUser-specific:Age	-0.00	-0.02	-0.01 – 0.00	-0.09 – 0.04	0.479	0.479
Random Effects						
σ^2	0.38					
$\tau_{00\ TN}$	0.60					
ICC	0.61					
N_{TN}	2910					
Observations	5820					
Marginal R^2 / Conditional R^2	0.294 / 0.725					

Table A 46. Mixed effects regression analysis testing for the interaction effect between content and educational level on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.02	0.13	3.76 – 4.28	0.01 – 0.26	**<0.001**
Content: Event comparison	-0.05	-0.04	-0.20 – 0.10	-0.17 – 0.08	0.494
Content: User-specific	-0.14	-0.12	-0.29 – 0.02	-0.24 – 0.01	0.079
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.075
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.007**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.28	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	-0.07	-0.06	-0.22 – 0.07	-0.18 – 0.06	0.319
Education: High	-0.08	-0.07	-0.22 – 0.06	-0.19 – 0.05	0.254
Children: Children 11 or younger at home	0.02	0.01	-0.08 – 0.11	-0.07 – 0.10	0.721
Residence: Suburban	0.04	0.03	-0.04 – 0.12	-0.03 – 0.10	0.315
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.133
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.553
Stay: Outdoors	0.01	0.01	-0.12 – 0.13	-0.10 – 0.11	0.923
Stay: Indoors	-0.03	-0.02	-0.11 – 0.05	-0.09 – 0.04	0.460
Damage: Yes	0.17	0.14	0.10 – 0.24	0.08 – 0.20	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.682
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.057
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.050
ContentEvent comparison:EducationMiddle	0.09	0.08	-0.11 – 0.29	-0.10 – 0.25	0.383
ContentUser-specific:EducationMiddle	0.16	0.13	-0.05 – 0.36	-0.04 – 0.30	0.135
ContentEvent comparison:EducationHigh	0.02	0.01	-0.18 – 0.21	-0.15 – 0.18	0.865
ContentUser-specific:EducationHigh	0.13	0.11	-0.07 – 0.32	-0.06 – 0.28	0.213
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.294 / 0.725				

Table A 47. Mixed effects regression analysis testing for the interaction effect between content and size of home town on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	4.00	0.12	3.75 – 4.26	-0.00 – 0.24	**<0.001**
Content: Event comparison	-0.09	-0.08	-0.22 – 0.04	-0.19 – 0.03	0.165
Content: User-specific	-0.04	-0.04	-0.17 – 0.08	-0.14 – 0.07	0.510
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.089
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.27	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.06 – 0.08	0.860
Education: High	-0.04	-0.03	-0.12 – 0.04	-0.10 – 0.04	0.375
Children: Children 11 or younger at home	0.02	0.02	-0.08 – 0.11	-0.07 – 0.10	0.704
Residence: Suburban	0.01	0.01	-0.13 – 0.15	-0.11 – 0.13	0.868
Residence: Rural	0.00	0.00	-0.13 – 0.14	-0.11 – 0.12	0.949
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.565
Stay: Outdoors	0.00	0.00	-0.13 – 0.13	-0.11 – 0.11	0.986
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.432
Damage: Yes	0.17	0.14	0.10 – 0.24	0.09 – 0.20	**<0.001**
Satisfaction with weather warnings	0.01	0.01	-0.02 – 0.03	-0.02 – 0.04	0.641
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.058
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	-0.00 – 0.16	-0.00 – 0.14	0.052
ContentEvent comparison:ResidenceSuburban	0.07	0.06	-0.12 – 0.27	-0.10 – 0.23	0.468
ContentUser-specific:ResidenceSuburban	0.03	0.02	-0.17 – 0.22	-0.14 – 0.19	0.768
ContentEvent comparison:ResidenceRural	0.16	0.14	-0.03 – 0.35	-0.02 – 0.30	0.097
ContentUser-specific:ResidenceRural	0.00	0.00	-0.19 – 0.19	-0.16 – 0.16	0.990
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.295 / 0.725				

Table A 48. Mixed effects regression analysis testing for the interaction effect between content and experiencing damage on warning perception. * p<0.05 **p<0.01 *** p<0.001

	Warning Perception				
Predictors	*Estimates*	*std. Beta*	*CI*	*standardized CI*	*p*
(Intercept)	3.98	0.10	3.73 – 4.23	-0.02 – 0.22	**<0.001**
Content: Event comparison	0.01	0.01	-0.09 – 0.11	-0.07 – 0.09	0.811
Content: User-specific	-0.08	-0.07	-0.18 – 0.02	-0.15 – 0.02	0.118
Structure: Structured	0.07	0.06	-0.01 – 0.15	-0.01 – 0.13	0.075
Structure: Links	-0.11	-0.09	-0.19 – -0.03	-0.16 – -0.03	**0.006**
Event: Thunderstorm & Rainfall	-0.06	-0.05	-0.09 – -0.02	-0.07 – -0.02	**0.001**
Gender: Female	0.26	0.22	0.19 – 0.32	0.16 – 0.28	**<0.001**
Age	0.01	0.10	0.01 – 0.01	0.07 – 0.13	**<0.001**
Education: Middle	0.01	0.01	-0.08 – 0.09	-0.06 – 0.08	0.868
Education: High	-0.04	-0.03	-0.12 – 0.05	-0.10 – 0.04	0.394
Children: Children 11 or younger at home	0.02	0.01	-0.08 – 0.11	-0.07 – 0.09	0.730
Residence: Suburban	0.04	0.04	-0.04 – 0.12	-0.03 – 0.10	0.293
Residence: Rural	0.06	0.05	-0.02 – 0.14	-0.02 – 0.12	0.132
Vulnerability (N)	-0.01	-0.01	-0.03 – 0.02	-0.04 – 0.02	0.518
Stay: Outdoors	-0.00	-0.00	-0.13 – 0.12	-0.11 – 0.11	0.969
Stay: Indoors	-0.03	-0.03	-0.11 – 0.05	-0.09 – 0.04	0.439
Damage: Yes	0.16	0.13	0.04 – 0.27	0.03 – 0.23	**0.011**
Satisfaction with weather warnings	0.00	0.01	-0.02 – 0.03	-0.02 – 0.04	0.704
Confidence in weather forecasts	0.23	0.27	0.20 – 0.26	0.24 – 0.30	**<0.001**
Knowledge weather forecasts	0.02	0.03	-0.00 – 0.04	-0.00 – 0.06	0.050
Attitudinal_Cluster: Weather disinterested	-0.76	-0.64	-0.84 – -0.68	-0.71 – -0.58	**<0.001**
Attitudinal_Cluster: Weather affected	0.08	0.07	0.00 – 0.17	0.00 – 0.14	**0.044**
ContentEvent comparison:DamageYes	-0.08	-0.07	-0.25 – 0.09	-0.21 – 0.07	0.344
ContentUser-specific:DamageYes	0.12	0.10	-0.04 – 0.29	-0.04 – 0.25	0.149
Random Effects					
σ^2	0.38				
$\tau_{00\ TN}$	0.60				
ICC	0.61				
N_{TN}	2910				
Observations	5820				
Marginal R^2 / Conditional R^2	0.295 / 0.725				

Bibliography

Schulze, Katja; Voss, Martin (2020): Sturm „Sabine“: Wahrnehmung der Warnungen und Reaktionen. With assistance of Universitätsbibliothek der FU Berlin. Edited by Katastrophenforschungsstelle. Berlin (18).

Schulze, Katja; Voss, Martin (2022a): Weather Forecast and Weather Warning Preferences in Germany. Hg. v. Katastrophenforschungsstelle. Katastrophenforschungsstelle. Berlin (KFS Working Paper, 24).

Schulze, Katja; Voss, Martin (2022b): Wie Einstellungen zu Wettervorhersagen unsere Reaktion auf Wetterwarnungen beeinflussen. Ergebnisse einer repräsentativen Bevölkerungsbefragung. In: Notfallvorsorge 53 (4), S. 21–29.

Otte, Gunnar (2005): Entwicklung und Test einer integrativen Typologie der Lebensführung für die Bundesrepublik Deutschland. In: Zeitschrift für Soziologie 34 (6), S. 442–467.

Schulze, Katja; Popovic, Nathalie; Fleischhut, Nadine. How to communicate uncertainty in weather warnings? Public perception in Germany. 1st WWRP/SERA Weather and Society Conference, 28.02.- 11.03.2022

Pictures

Titelfoto: Bild von ofjd125gk87 auf Pixabay

Foto auf Seite 3: Bild von Gerd Altmann auf Pixabay

Foto auf Seite 7: Bild von Pexels auf Pixabay

Foto auf Seite 17: Bild von David Mark auf Pixabay

Foto auf Seite 19: Bild von ofjd125gk87 auf Pixabay

Foto auf Seite 24: Bild von Keli Black auf Pixabay

Foto auf Seite 30: Bild von Lee Murry auf Pixabay

Foto auf Seite 34: Bild von Clker-Free-Vector-Images auf Pixabay

Foto auf Seite 39: https://i.ytimg.com/vi/LLVTSt4MSGE/maxresdefault.jpg

Foto auf Seite 44: Bild von Hermann Traub auf Pixabay

Foto auf Seite 51: Bild von Hans auf Pixabay

Imprint

Title

Structure and Content of Weather Warnings. Potential for Improvement

Publisher

Disaster Research Unit (DRU) / Katastrophenforschungsstelle (KFS)
Freie Universität Berlin
FB Geowissenschaften
Carl-Heinrich-Becker-Weg 6-10
12165 Berlin

The authors

Dr. Katja Schulze is research assistant at the DRU, currently working in the project WEXICOM III.

Prof. Dr. Martin Voss is a university professor in the area of sociological disaster research at Freie Universität Berlin and director of the Disaster Research Unit (DRU).

Acknowledgement

We would like to thank all those who took part in the survey and shared their views with us. Without their great willingness to participate, this study would not have been possible.

Katastrophenforschungsstelle (KFS)
Freie Universität Berlin

http://www.fu-berlin.de/kfs