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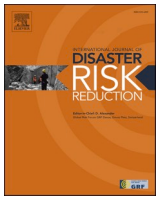

Risk behaviour and people's attitude towards public authorities – A survey of 2007 UK and 2013 German floods

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ABSTRACT

This paper reports on people's preparedness, perception and behaviour of flood risk as well as their trust and attitude towards public authorities in the flood context. Two areas were studied: Catcliffe, situated near Sheffield in the United Kingdom, which was severely flooded in 2007, and Passau in Bavaria, Germany, which was hit by an extreme flood in 2013. We conducted a survey in both study areas and collected data on risk perception, people's perceptions of their own preparedness, their use of information, trust in the authorities and evacuation behaviour. We found that although there were few significant differences between the two case studies, risk perception and risk preparedness was significantly higher in Catcliffe than in Passau and during the flood emergency people in Catcliffe see themselves acting more self-protectively (78%) than in Passau (42%). In both places, people who had direct experience of floods had a higher level of risk perception and preparedness compared to those with no previous experience. In both Catcliffe and Passau, trust in government was fairly low. Nevertheless, when people were asked the hypothetical question how they would react to a public evacuation order, almost 70% in Catcliffe and 80% of respondents in Passau would take immediate action to evacuate. Interestingly, the answer was similar when we asked the conflicting question whether the respondents would follow a public evacuation order although their family recommended not doing so.

1. Introduction

In terms of frequency and amount of damage, floods and flood disasters are currently among the greatest global risks. As a result of climate change, the number of flood catastrophes is increasing. Over the last 20 years, more than 120,000 people lost their lives in severe floods worldwide and also the economic damage nearly reached US-$ 600 bn. over the same period showing an upward trend [1,2]. As a consequence, national and international efforts to improve flood precautions and to react quickly in the event of a catastrophe have been stepped up considerably in the last 10–15 years in research, insurance and practical civil protection. In this context, improved flood protection of private households is seen as among the most important factors of flood resilience. People's preparation for flood as well as people's reaction to an impending flood disaster are thus essential factors to reducing flood risks. However, to positively influence the risk behaviour of the population in their own interest, e.g. through risk communication or concrete suggestions of protective measures, a thorough understanding of the complex link between risk perception on the one hand and risk prevention on the other hand is necessary. Among other mediating variables, the trust of the population in the state authorities is a determining factor.

This empirical study reports risk attitudes, trust in government as well as the actual and hypothetical reactions of people in two communities affected by floods (river flooding), following events in the United Kingdom in 2007 and in Germany in 2013. The respondents live in two communities that were severely flooded: Catcliffe, a suburb of 2100 people (2011), between Sheffield and Rotherham in South Yorkshire, and the city of Passau, a town of 50,000 people (2011) near the Austrian border in Bavaria. Both places have been flooded numerous times in the past. Prior to 2007, Catcliffe was flooded in 1973, 1991, 1998, whilst Passau had suffered nine major floods prior to 2013 since records began in the 16th Century. Most recently, Catcliffe, where homes are very close to the River Rother, was flooded in 2000 and 2007, whilst Passau, at the

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confluence of the rivers Inn, Ilz and Danube, was flooded in 2002 and 2013. The two events were comparable in terms of impacts, levels of preparedness and government response and show similar patterns of recovery [3]. In both places, face-to-face surveys were conducted with local residents most of which were experienced with flooding. All the respondents were living and/or working in flood prone areas and, no matter if they had been personally flooded or not, were aware of flood risk.

The focus of the study is twofold: The first part focusses on flood risk perception and its impact on flood preparedness. In this part we want to find out whether the usually established connection between flood risk perception and flood risk precaution is also confirmed in our case study regions. For of flood precautions we choose a formulation that avoids the problem of a confounding effect from already adopted mitigation measures [4]. The second part looks at the respondents' attitude towards government agencies and its effect on preparation and evacuation behaviour. Public recommendations may refer to long-term, preparatory measures (e.g. construction of flood protection walls) or to very short-term, reactive measures, such as a call for immediate evacuation. Government advice directed at the population will only fall on fertile grounds if there is a sufficiently high level of acceptance among the population. Such advice are more likely to be ignored if citizens either don't trust the state authorities or if they generally have a more critical attitude towards the state or public institutions, and hence show an expressed preference for independence and self-determination. Since we are using the case studies to examine trust and risk prevention in two different countries, a country-comparison of the effects of "trust in government" is also instructive.

The remainder of the paper is organized as follows: In section 2 we provide an overview on the state of the art and establish our research hypotheses. Section 3 provides a more detailed description of the two case study regions, of the respective flood events in terms of people affected and economic damage and of the applied data collection procedure. Section 4 presents the results of the study, which are discussed in section 5.

2. Theoretical background: state of the art and research questions

2.1. Risk perception and flood preparedness

Research on risk perception began in the 1940s, with White [5] seminal contribution about how people's past experience influences their behaviour under threat of flooding. Risk perception can be defined as a "perception of the likelihood and consequence of a future adverse event" [6] and is seen as an essential precursor of mitigation behaviour [7]. Perceptions of risk are a key component in vulnerability assessments, for example in the hazards-of-place model [8,9].

Preparedness is defined as the knowledge, capabilities and actions of governments, organisations, community groups, and individuals to effectively anticipate, respond to, and recover from, the impacts of hazard events [10]. Grothmann and Reusswig [11] suggested that preparedness and preventative actions by residents could reduce flood damage by 80%.

The most influential theoretical foundations, which establish a link between risk perception and risk mitigation were the psychometric paradigm and the Protection Motivation Theory (PMT). According to the psychometric paradigm advanced by Slovic [12] risk perception is a subjective judgment based on several qualitative characteristics including severity of the threat, controllability and personal impact. Similarly, PMT constitutes the theoretical basis for the relationship between risk perception and risk mitigation. Originally developed to understand how people cope with fear and threats, PMT views behaviour as motivated by perception of the severity of the threat, the probability of its occurrence, the effectiveness of an action, and the person's ability to implement this action [13]. Building upon this theoretical foundation, most of the in-depth, systematic research into the relationship between perception and preparedness has taken place over the last 20 years [14–17]. The general findings show that attitudes to risk and the degree of preparedness vary with topographical and geographical location and that each disastrous flood is different in timing and scale.

2.1.1. Flood risk perception

In the literature, there is consensus that flood risk perception is principally influenced by people's experiences and demographic factors, followed by the risk attitudes of civil society and the actions of public institutions [18]. Lechowska [19] suggests that flood risk perception is determined by interrelations between awareness, worry and preparedness and that empirical studies unambiguously indicate that knowledge and personal experience are important factors.

In our study, we therefore assume a strong link between prior flood experience, socio-demographic variables and risk perception (Fig. 1). In our first hypothesis (H1a), we assume that people with experience of flooding show a lower flood risk perception [4,11,20–22]. By the lower-letter "a" we indicate the effect of a variable on flood risk perception and by a lower-letter "b" we indicate the effect on flood risk preparation. For the item "Prior flood experience" we asked the question "Do you have personal experience with the following hazards?" and for risk perception we asked the question "What level of risk do you feel you are in from the following hazards?". For both questions, respondents had to rate their answer using a five-point likert scale.

There is also evidence from various studies that risk perception amongst people who have experienced a flood declines over time. It has been estimated that flood awareness diminishes significantly with a distance of at least 7 years after a flood event [4]; International Commission for the Protection of the Rhine [23]. In Catcliffe, the survey was conducted nearly 12 years after the flood event and in Passau 6 years after the flood. Although we can't control for all aspects in which the two cases differ (except the similarity of the events in terms of scope and damage), we expect a higher risk perception in Passau because it was a more recent event (H2), and expected higher risk perception to increase the preparedness level (H3) which is explained in more detailed later.

Regarding sociodemographic variables and individual parameters we asked for age, gender and elicitated risk preference by the established risk-question "In general, are you a person who takes risk or do you try to avoid risks?". We assumed that older people (H4a), women (H5a) and people with higher risk aversion (H6a) should state a higher risk perception [19,24].

2.1.2. Flood risk preparation

Risk perception in the sense of being aware of risk is a necessary but by no means sufficient condition for people to actively prepare against risk. Other "activating factors" come into play as stated by PMT [4,18]. Similarly, Grothmann and Reusswig [11] built on this idea, arguing that decisions to take precautions, for example installing water barriers, are influenced by appraisals of the threat level, ability to cope, personal experience and administrative measures and that these perceptions interact in various ways. In other words, those activating factors don't apply homogeneously to all people in the same manner. To answer the question of why some people take precautionary action while others do not Grothmann and Reusswig [11] set up a regression model based on PMT that related private flood precautions to previous flood experience, risk of future floods, reliability of public flood protection, the efficacy and costs of self-protective behaviour and the perceived ability to take action. The validity of the model was tested by a telephone survey of residents in flood prone homes in Cologne. Results confirm the explanatory power of the model and the authors conclude that to motivate residents in flood-prone areas to take action it is essential to communicate the effectiveness and cost of private precautionary measures. Since people who haven't previously been affected by a flood show the least self-protection, they should be targeted by risk communication. Bradford et al. [25] also identify those who have not personally

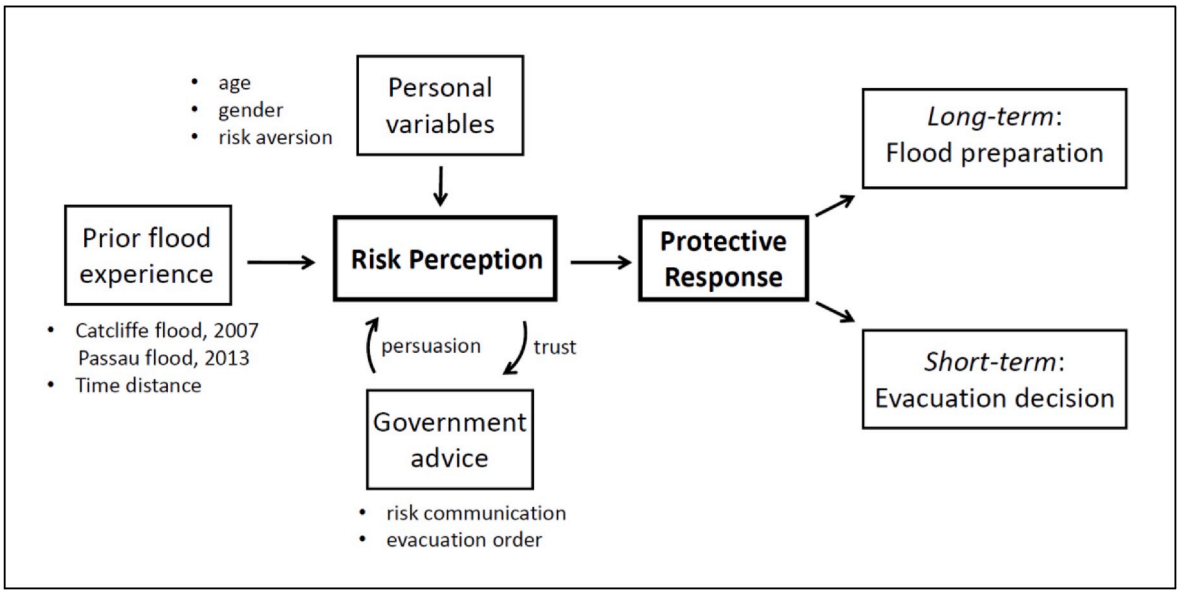

Fig. 1. Influence factors and effect chain for people's response on flood risk.

experienced floods as being in most need of information and suggest that since many people with no direct flood experience live in areas at risk, consideration must be given to how to raise their perception of risk in the absence of experiential learning.

Several studies have, however, found only a weak correlation between personal flood experience and performance of precautionary measures [11,26–28]. Other studies even found no significant relationship [29]. Reporting on the results of sociological research in four communities exposed to flood risk in the Eastern Italian Alps, Scolobig et al. [30] found no statistically significant relationship between risk awareness and preparedness. Kienzler et al. [31] conducted interviews with German households that had suffered property damage from floods in 2005, 2006, 2010 or 2011 and found that previous flood experience did not necessarily result in precautionary measures. Overall flood-proofing and retrofitting measures were carried out by less than 15% of respondents and no constant improvement of private precaution could be identified over the course of the four events. Empirical studies from around the world suggest a number of factors may be important in influencing adaptive behaviour. In Lechowska [19]; "worry" is seen as necessary to move from awareness to action. The argument runs that individuals can be aware of flood risk but unless they are afraid, they will not take any action to mitigate the risk. Consequently, a higher level of worry is likely to result in a higher level of preparedness [15]. In contrast, Bradford et al. [25] found that worry does not play a major role in the relationship between awareness and preparedness. A study in Nagoya, Japan, found that preparedness for floods is determined by a complex relationship of socioeconomic factors including home ownership, fear of flooding and the amount of damage from previous floods rather than the individual's previous experience [32]. Based on findings from a survey of risk perception in Germany with nearly 2000 respondents, Gerhold et al. [33] identified 4 kinds of response: self-confident all-rounders (31%), unsure non-prepared (27%), unconcerned optimists (24%) and risk-oriented independents (18%). Women and minority groups generally perceive themselves to be at greater risk than men and majority groups [34]. Religious belief, and fatalism especially, has been found to weaken preparedness [35–37]. It is not that women and minorities always act differently from men, but rather that they do in particular situations and what makes perceptions of hazard subject to race and gender effects are differences in financial resources, home ownership, car ownership etc [38]. In summary, implementation costs and effectiveness are the most important activating factors for reactive measures, but there are also many psychological effects at work. With regard to the latter, the findings are less clear.

In our study, we did not ask the participants to name the measures they had implemented or which they plan to implement, but how well they felt prepared in the face of a flood: "How well are you and your family prepared for the following hazards?" (on a five-point likert scale, ranging from "not prepared at all" to "very well prepared"). We did not ask people what precautionary measures they had taken and relied on them using their own judgement to assess how well prepared they were.

It follows from this that altogether four constellations of risk perception and risk preparation can be distinguished. In the first, both, perceived risk and perceived preparation, are low: People don't perceive the risk as salient, which justifies low levels of preparation. In the second, the state of the perceived risk and perceived preparedness is high: People perceive the risk as a potential threat and are optimally adapted accordingly due to a good preparation. Note, that psychological factors, such as cognitive dissonance [39,40] can also cause such a response: If people perceive a threat but have to admit that they are not well prepared this can evoke a negative feeling of guilt because one did not live up to one's own responsibility. If people perceive a high risk but they feel that there is not much what they can do about it on their own, the third constellation of high perception combined with low preparedness is also plausible. If the number of respondents in this category is high, public authorities not only bear (even) more responsibility for protection of the public, they also have the largest opportunity to improve the preparedness of the population through risk communication and recommending precautionary measures. Fourthly, low risk perception but good preparation corresponds to the seemingly paradoxical case of a negative correlation between risk perception and risk mitigation as described by Bubeck et al. [4]. This effect occurs when the measures (implied by the question) relate to the past and have already been taken and are effective, which in turn endogenously reduces the perceived risk "now". Note that this effect should not be observed in our study because we ask for the perception of risk and preparedness at one point in time.

Since a positive correlation between perception and preparation was found in several studies, we also assume a positive correlation between the two variables (H3). However, we also expect a significant proportion of the first constellation and interpret a high proportion of "high perception – low preparation" as a window of opportunity and a responsibility for public authorities to communicate and act. In addition, we have a second look at sociodemographic variables, risk preference

and risk experience and compare the link to preparation with the results from the perception-analysis (lower-case "b"-Hypotheses: H1b, H4b, H5b, andH6b).

2.2. Attitude towards government and reaction to government advice

As government and public authorities, such as first-response agencies, have a pivotal role in crisis management, the public's attitude towards these institutions has an enormous influence on the effectiveness of state crisis management. The more positive the public's attitude towards government decision-makers, the effectiveness of their communication with the citizens will increase with respect to crisis preparation and reaction in at least two ways:

- Higher effectiveness of government advice for flood risk communication and recommendation of preparedness-measures (risk and crisis preparation)
- Higher effectiveness of government evacuation order (risk and crisis reaction)

Two major factors influencing this "attitude" are *perceived responsibility* und *trust*. Trust in government is especially important in crisis situations such as floods and in the aftermath of major disasters. Lack of trust may hamper emergency response and recovery causing harm and damaging government's capacity to act [41]. A lack of trust also makes risk communication more difficult. In an extensive survey of 11 'at flood risk' locations in the four European countries Finland, Ireland, Italy and Scotland, O'Sullivan et al. [42] found low levels of understanding of flood risk and low levels of self-assessed preparedness amongst the general public. Hence trust is critical to the effectiveness of any policy for risk communication and public engagement [43]. Trust in government is influenced by demographic factors, such as age, education, and occupation but the most influential factor for trust in government is general satisfaction with democracy [44]. Across Europe, trust in political institutions has dropped since 2009 and, in general, citizens that have benefited less from European integration show lower levels of trust in the government [45].

The factor "perceived responsibility" refers to the values citizens hold in terms of their attitude towards individualism versus state interventionism [46]. The central question here is whether an individual believes that the state is responsible for certain tasks or not. To a certain extent, this determines the relevance of "trust in government". If an individual is convinced that a particular task does not belong or should not belong to the domain of responsibility of the state, trust is of less importance. However, both variables can be positively correlated if a low trust level is the reason for taking more self-responsibility.

In our study we ask about trust in government, in family and in fellow citizens ("How much do you trust the following people or groups in the country you are living?") and where respondents see responsibility for crisis management ("What are your views about flood preparation – People should take more responsibility for themselves or government should take more responsibility?"). While both questions are taken from the classic World Values Survey (WVS)-catalogue, the responsibility question has been slightly adapted to the context of crisis-management. We assume that people who see the responsibility rather in the realm of the citizens (own responsibility) than in the realm of government (government responsibility) should see themselves as better prepared for flood (H8). With H7 we suggest that respondents with flood experience think individuals are responsible for flood protection rather than government.

Since the two case studies refer to different countries, it is interesting to compare the answers to the question of responsibility (H9) as well as the levels of trust in government (H10). In the UK, an economically liberal country where state influence has traditionally been viewed critically [47], responsibility should be that of the citizen. For example, in the 5th wave of the World Values Survey, sampled between 2005 and 2009, people were asked whether government or the people should take more responsibility for their lives. The resulting self-reliance-index was higher in UK (5.93) than in Germany (4.5). The lower level of government regulation in the UK than in Germany is also likely to have an impact in this area. We expect therefore that more respondents would opt for self-reliance rather than government responsibility in the UK than in Germany. An indication of this is that compensation for flood damage was paid by private insurance companies in the Catcliffe region, whereas state financial support was paid in Passau. However, there are also reasons that speak against the hypothesis of a lower level of trust in government by Catcliffe citizens (although not necessarily for a higher level of trust than in Passau). A critical attitude towards regulation might not transfer to crisis management because market regulation is different from state emergency aid. Second, even if the British government does not provide financial compensation for flood damage (or at least much less than in Germany), it is noticeably involved in risk communication. For example, in the UK, there have been regular round table dialogues between experts and members of the public on how flood risk agencies could communicate more effectively with the general public [48].

Apart from the overall attitude of people towards the government we were interested in how this attitude affects people's willingness to evacuate in the case of a hypothetic flood. And we wanted to know how trust in government and friends and relatives would influence (hypothetical) evacuation behaviour during a disaster (H11–H13). Community engagement and sense of belonging has been found to positively affect behaviour and people adjust their behaviour when they see others in their community, especially informal community leaders, adopting mitigation strategies [49]. Ties to family and friends should therefore play an influential role with respect to the evacuation decision. Strengthening local preparedness is viewed as an essential element in effective response to flood risk and social networks have been identified as contributing significantly to resilience by fostering individual and community capacity to deal with emergency situations [50]. Recent research on flood risk perception highlighted the importance of understanding and trust in the efficacy of individual protective actions and collective intervention measures [18].

Finally look at the effect of demographic (age, gender) and risk aversion variables on hypothetical evacuation behaviour (H14–H16).

Altogether, 17 hypotheses were derived from the literature review reported in the preceding section. In the first part, hypotheses 1 to 6 focus on flood risk perception and perceived flood preparedness, and in part 2 hypotheses 7 to 17 focus on people's attitude towards government and their reaction to government advice, in particular to an hypothetical evacuation order (Table 1).

3. Floods in UK 2007 and Germany 2013

Fig. 2 shows the extent of flooding in both countries during the referent events, and Tables 2 and 3 show how the two floods were similar in relative extent and impact. In terms of the economic loss and the number of people displaced the German floods were approximately twice as severe [66,69]. Private insurers compensated the majority of victims in the UK, whereas in Germany where insurance penetration was lower, government aid was much higher.

3.1. UK floods 2007

In summer 2007, much of the UK was hit by destructive storms and average rainfall around the country reached more than doubled [71,72]. Apart from the economic cost, which was USD 3.3–4.9 billion [67], 13 people died and hundreds had to be rescued in different cities and around 48,500 homes were flooded.

Catcliffe, our UK study area, is a village suburb northeast of Sheffield. During the night of 25 June, the River Rother overtopped its banks, flooding around 100 homes in the lower parts of Catcliffe (about 10% of

Table 1
Hypotheses generated from literature review.

Hypothesis	Reference
PART 1 Perception and flood preparedness	
H1a Perception of flood risk is higher amongst people with experience of flooding	Barnett & Breakwell [20]; Kellens et al. [21]; Grothmann & Reusswig [11]; Terpstra [22]; Bubeck et al. [4]; Fuchs et al. [51]
H1b People with flood experience see themselves better prepared for floods	White [5]; Kuhlicke [52]; Thieken et al. [53]; Kreibich et al. [28]; Birkholz et al. [18]; Kienzler et al. [31]; Kreibich et al. [54]; Lechowska [19]
H2 Perception of flood risk is higher in Passau-Germany than Catcliffe-UK because the flood was more recent.	Bhattacharya-Mis & Lamond [55]
H3 People with higher risk perception see themselves better prepared for flood	Brown & Damery [17]; Pitt [16]; Raaijmakers [15]; Botzen et al. [14]; Bubeck [4]; Bradford [25]
H4a Perception of flood risk is higher among older people than among younger people	Lechowska [19]; Maidl & Buchecker [24]
H4b Older people see themselves better prepared for flood than younger	Lechowska [19]; Dzialek et al. [56]; Maidl & Buchecker [24]; Gerhold et al. [33]
H5a Perception of flood risk is higher among women than among men	Bustillos Ardaya et al. [7]; Lechowska [19]; Maidl and Buchecker [24]
H5b Women see themselves better prepared for flood than men	Bustillos Ardaya et al. [7]; Lechowska [19]; Maidl and Buchecker [24]
H6a Perception of flood risk is higher among people with high risk aversion than among people with low risk aversion	Haer et al. [57] ; Botzen & van den Bergh [58]
H6b Risk averse people see themselves better prepared for flood	Maidl & Buchecker [24]
PART 2 Attitude toward government and reaction to government advice	
H7 Flood experienced people see themselves more responsible for preparedness	Slovic et al. [59] ; Bubeck [4]; Mileti & Fitzpatrick [49]
H8 People who see citizen more responsible for preparedness should also see themselves better prepared	Based on authors best knowledge this hypothesis is not mentioned in published articles
H9 Respondents in UK see citizens instead of government more responsible for flood preparedness compared to Germany respondents	Based on authors best knowledge this hypothesis is not mentioned in published articles
H10 Trust in government is higher among German respondents compared to UK respondents	Based on authors best knowledge this hypothesis is not mentioned in published articles
H11 People who see citizen more responsible for preparedness are less likely to follow government evacuation order	Based on authors best knowledge this hypothesis is not mentioned in published articles
H12 People with low trust in government are less likely to follow government order to evacuate	Gerhold et al. [33]; OECD [41]
H13 People with low trust in government chose to listen to family rather the government	West and Orr, [38]; Levac et al. [50]
H14 Older people are more likely to evacuate immediately than younger ones	Bateman & Edwards [60]; Resnick [61]; Dash & Gladwin [62]
H15 Women are more likely to evacuate immediately than men	Bateman & Edwards [60]; Whitehead et al. [63]; Karanci & Aksit [34]
H16 Risk averse people are more likely to evacuate immediately	Based on authors best knowledge, this hypothesis is not mentioned in published articles
H17 Age does not influence trust in government	Zhao & Hu [64]; Christensen & Lægreid [44]

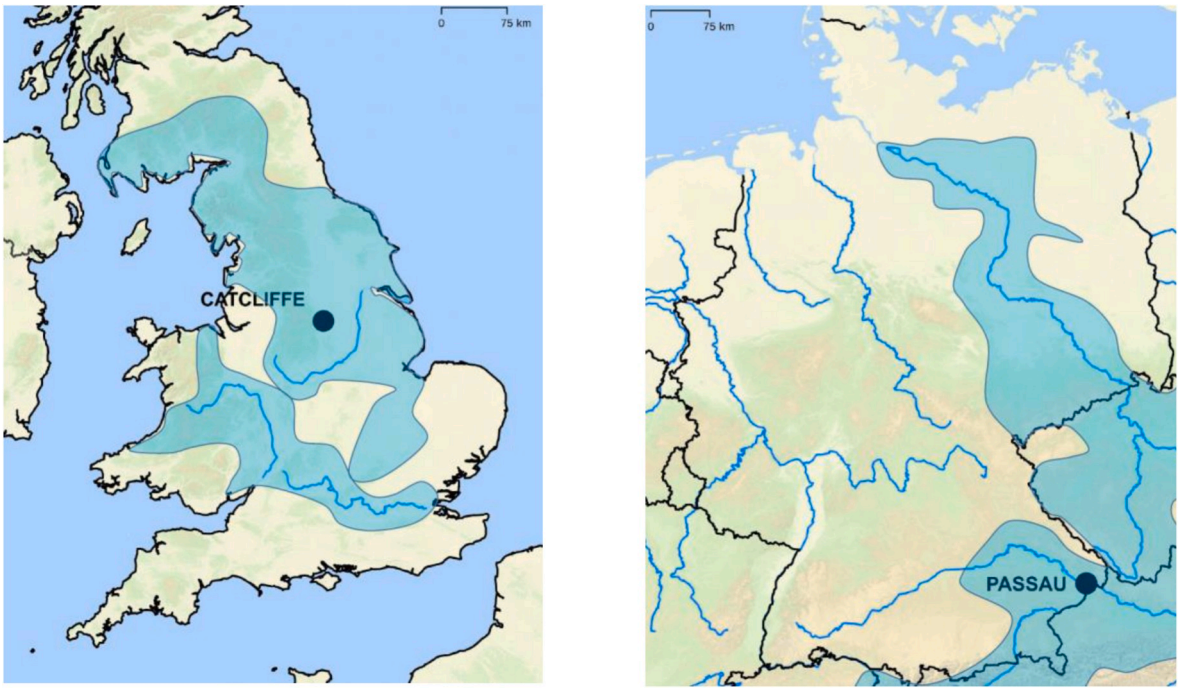

Fig. 2. Flooded areas UK 2007 and Germany 2013.

Table 2
Comparison of the impact of flooding in UK and Germany [3].

	UK 2007	Germany 2013
Extent	6 out of 9 Regions	8 out of 16 States
Fatalities	13	14
People Displaced	38,000	80,000
GDP, PPP (event year)	USD 2.2 tn	USD 3.6 tn
Economic Loss	USD 3.3–4.9 bn	USD 6.7 9.1 bn
Insurance Loss	USD 2.6 bn	USD 1.8 bn
Average cost per house	USD 32,000	USD 56,000
Insurance Households	75%	32%
Government Aid	USD 180 mn	USD 8.9 bn
Flood risk homes 2018	5.5 mn	3 mn

(Sources UK: [65–67]. Germany [68–70])

homes in Catcliffe). Flood depths were so high that bungalows were almost completely submerged by the flood-water [73], and after cracks appeared in the dam at Ulley reservoir more than 700 residents had to be evacuated [74]. In Sheffield the River Don burst its banks, flooding properties, including many commercial and industrial units [73]. The drainage systems could not cope, in part because of inadequate maintenance, and because flood defences were overtopped by the extreme river heights [75]. In Hull and East Riding 1 in 5 homes were flooded [72] and electricity and water supplies were affected for more than a fortnight [68]. In Yorkshire, power outages affected the supply to 130,000 people, including residents in Catcliffe. A survey of 2265 people in South Yorkshire showed a significantly high number of mental health issues among individuals who reported flood water in the home [76]. The evidence clearly shows that the UK was insufficiently prepared in terms awareness and preparedness [16]. This degree of flood risk persists and it is estimated that 5.5 million homes are in flood prone areas in the UK [77].

3.2. German floods 2013

In Germany, in May 2013, rainfall reached to three times the monthly average and most major catchments experienced flooding. Furthermore, in 16 federal states disaster alerts were declared between May and June [70]. The floods resulted in 14 fatalities, 600,000 people affected, 80,630 evacuated in 8 states, and an economic loss of USD 6.7–9.1 billion. Passau, where this study was conducted, is located at the confluence of the three rivers, Danube, Inn and Ilz, experienced large scale inundations [78,79]. Germany had recent previous experience of major flooding. Floods in 2002 caused 20 fatalities [80]. Although structural defences improved after this flood and most places faced less damage in 2013, in some areas, including Passau, the risk reduction

Table 3
Comparison of floods in Catcliffe and Passau [84–87].

	Catcliffe, Sheffield/Rotherham	Dreiflüsse-Eck (Altstadt), Passau
Character	low density commuter village	high density, historic city centre
Location	2.5 miles from Rotherham and 4 miles from Sheffield city centre	historic centre of Passau at confluence of Danube, Inn and Ilz
Date flood	25-Jun-07	03-Jun-13
Population 2011	2108	2990
Population year of flood	1971	2981
Population 18–64	64%	66%
Area	30 ha	37 ha
Flooded area	16 ha	26 ha
Flooded area %	52%	70%
Properties total/flooded	372/195	800/560
Evacuation	Forcible evacuation due to fear of dam failure	Water supply failure meant 60 inmates of Passau prison had to be transferred

Fig. 3. Study areas in Catcliffe (left) and Dreiflüsse-Eck, Three Rivers Corner, Passau (right)- Google earth.

Table 4
Survey factors.

Dependent variables	Independent variables
Risk perception (5 point scale)	Country (Germany, UK)
Flood preparedness (5 point scale)	Gender (male, female)
Immediate evacuation (Binary)	Flood experience (Binary)
General trust (5 point scale)	Responsibility (Binary)
Trust in government, family, neighbors (5 point scale)	Social activities (Categories)
Attitude to risk (5 point scale)	Knowledge of hazard maps and warning apps (Binary)
Reactions during event	Age (Categories)
Flood preparedness	Employment (Categories)
Attitude during flood emergency (5 point scale)	Source of information (Categories)

Table 5
Respondents in Dreiflüsse-Eck (three rivers corner) and catcliffe.

Case study area	Sample size	Previous experience of flood	Gender		Age	
Dreiflüsse-Eck, Passau, Germany	74	45%	Female: Male: Unknown:	45 27 2	18-30: 31-45: 46-65: Over 65: Unknown:	20 14 30 8 2
Catcliffe, Sheffield, UK	32	56%	Female: Male:	14 18	18-30: 31-45: 46-65: Over 65:	2 9 8 13

measures and flood defences proved either ineffective or the flooding was more severe than in 2002 [3]. Three million people in Germany live in areas that are considered flood prone, life threatening and with high potential for economic damage [69,70,81]. The location, frequency and intensity of storms has shown considerable variability across Europe over the past century, however, most studies agree that the risk of severe storms will increase for northern and central Europe over this century in response to forecast global climate change [82,83].

3.3. Comparison

Table 2 compares the UK 2007 and German 2013 floods and shows that the scale of the floods was comparable, with the German floods perhaps twice as severe in terms of people displaced and economic loss. In terms of response, the main difference was that Government aid in Germany was considerably higher than in the UK.

Table 6
Summary of results (in this table DE refers to Passau in Germany and UK refers to Catcliffe in UK. HC: hypothesis confirmed, HR: hypothesis rejected).

Hypothesis	Country	Test	P Value	Significance
PART 1 Perception and flood preparedness				
H1a	DE + UK	Mann-Whiteny U	≤.05	HC
H1b	DE + UK	Mann-Whiteny U	≤.001	HC
H2	DE vs UK	Mann-Whiteny U	≤.005	HC
H3	DE + UK	Kendall's tau	≤.005	HC
H4a	DE + UK	Kendall's tau	≤1	HR
H4b	DE + UK	Kendall's tau	≤.05	HC
H5a	DE + UK	Mann-Whiteny U	≤1	HR
H5b	DE + UK	Mann-Whiteny U	≤1	HR
H6a	DE + UK	Kendall's tau	≤.5	HR
H6b	DE + UK	Kendall's tau	≤.5	HR
	UK	Kendall's tau	≤.1	HR
	DE	Kendall's tau	≤.05	HC
PART 2 Behaviour during the flood and trust in authority				
H7	DE vs UK	Mann-Whiteny U	≤.5	HR
H8	DE + UK	Kendall's tau	≤1	HR
H9	DE vs UK	Mann-Whiteny U	≤.5	HR
H10	DE vs UK	Mann-Whiteny U	≤.001	HC
H11	DE + UK	Mann-Whiteny U	≤.5	HR
H12	DE + UK	Mann-Whiteny U	≤.05	HC
H13	DE + UK	Kendall's tau	≤1	HR
H14	DE + UK	Mann-Whiteny U	≤1	HR
H15	DE + UK	Chi-sq	≤.005	HC
H16	DE + UK	Mann-Whiteny U	≤.5	HR
H17	DE + UK	Kendall's tau	≤.005	HC

4. Case study area and methodology

The survey was conducted in Catcliffe, UK and Passau, Germany. As mentioned earlier, both places were severely flooded and almost half of the interviewees had suffered flooding of their homes or businesses and two-thirds of all respondents lived within 1 km of the flooded river. To have a higher chance of interviewing flood affected people or people who are aware of the risk, the residential area of the flood zone was selected (Fig. 3).

Although Catcliffe is a low-density commuter village and Dreiflüsse-Eck in Passau is in the historic centre of Passau, both areas are of similar size 30–37 ha. They also have a similar population size, 2100 and 2990 and similar age profiles. In Catcliffe, 52% of properties were flooded and in Dreiflüsse-Eck approximately 70% were flooded (Table 3) [3].

The survey design focused on the factors other researchers have identified as influencing flood resilience and included questions about the respondents perception and understanding of risk, trust in different addressees and in different sources of information, level of preparation, their detailed reactions during the flood event and personal details that may have affected their ability to cope (Table 4). Two native German speakers independently translated the questionnaire into German.

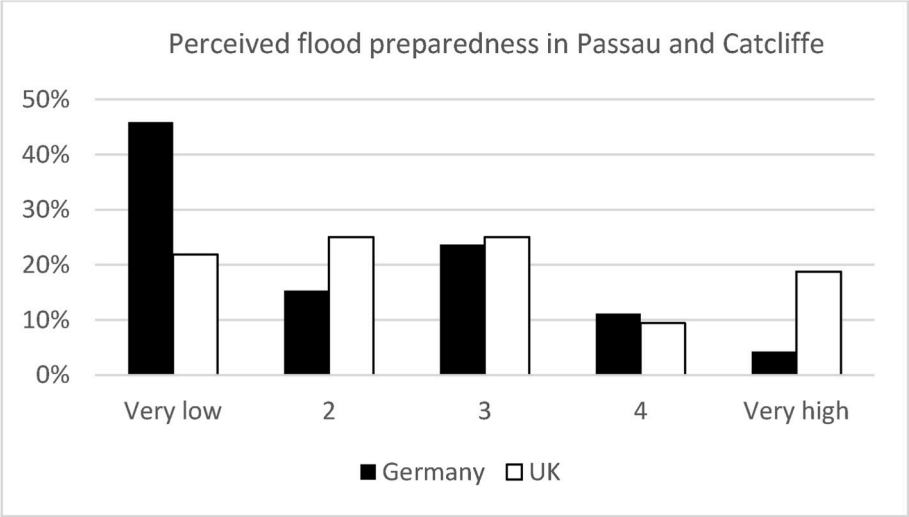

Fig. 4. Flood preparedness in Passau and Catcliffe (Passau-Germany N = 72, Catcliffe-UK N = 32).

Regarding the flood risk aspects, the questionnaire was independently validated by three experts of flood risk management from the Institute for Risk & Disaster Reduction at UCL, Risk Centre at Judge Business School in Cambridge and a consultant from United Nations Disaster Assessment and Coordination (UNDAC). With respect to the methodological approach and survey design, the authors consulted the GESIS – Leibnitz-Institute for the Social Sciences in Mannheim. The surveys were piloted in September 2018 with students and experts and considerable effort was devoted to honing the questionnaire to ensure that it would be meaningful and understandable to interviewees.

Maps of flooded areas were used to target households and businesses for interview and appointments were made to interview people working in local organisations affected by the flooding, including the library, church, cafes, supermarkets, bars, garages, and a cinema. Over 90% of the surveys were conducted face-to-face and the remaining interviews were conducted on the telephone. 32 people were surveyed in the UK and 74 in Germany (Table 5). The interviews in Catcliffe were conducted over four days in early November 2018 and in Passau over five days in February 2019. In both countries native language speakers who were familiar with the flood risk management supported the interviewer, a non-native speaker, to make sure there were no misunderstandings.

SPSS (Statistical Package for the Social Sciences) was used to analyse the data. Mann–Whitney U, Chi-square, Fisher's exact test, Kendall's-Tau and ordinal regression were used where relevant.

5. Results

Table 7
Constellations of perception and preparedness.

Germany + UK	No flood experience (N = 53)			Flood experience (N = 50)		
	Perception			Perception		
	Low 1, 2	Med 3	High 4, 5	Low 1, 2	Med 3	High 4, 5
Preparedness						
Low 1,2	40%	15%	17%	19%	2%	20%
Med. 3	9%	9%	2%	5%	8%	14%
High 4,5	2%	4%	2%	10%	8%	14%

The findings focus firstly on the factors affecting flood perception and preparedness and secondly on the issue of trust, attitude towards government and hypothetic evacuation decisions.

The following table (Table 6) summarizes the test results of the hypotheses:

5.1. Flood risk perception and flood preparedness

As mentioned earlier, many authors stress that risk perception and preparedness are influenced by flood experience (Table 1). Respondents were therefore asked about their previous experience of floods, their level of flood risk perception and to rate how well prepared they imagined they were to cope with future floods. All interviewees were living or working in flood prone areas and about half had experienced previous floods (Passau 45%; Catcliffe 56%). It was expected that those previously affected by floods would have higher risk perception (Table 1: H1a). The mean risk perception in Passau was 2.8 among flood affected people and 2.3 amongst non-affected. In Catcliffe, the mean among flood affected people was 3.7 and among non-affected 3.0. The combined data for UK and Germany shows a statistically significant difference in risk perception between flood affected and non-affected people (Mann-Whitney U test, $p = 0.017$) supporting the findings of others that personal disaster experience makes people aware of their vulnerability [11,20–22].

We asked whether personal experience also leads people to take action and thus enhances preparedness (Table 1: H1b). As described in section 2, there is strong evidence for a positive correlation between risk perception and flood preparedness [4,14–17,25]. In addition, it is highly plausible that the far-reaching experience of the Elbe Flood in Germany in 2002 has led many residents and businesses to prepare themselves better [52,53]. We found that the perceived level of own preparedness was significantly higher for people with flood experience than for people without prior flood experience (Mann-Whitney U all respondents, $p \leq 0.0001$; Passau $p \leq 0.005$; Catcliffe $p < 0.05$).

We then compared levels of risk perception and preparedness in Passau and Catcliffe. It is important to note that preparedness was self-reported, in other words own people's perception of preparedness. We have no means to find out if their responses were entirely credible or if some people may have felt defensive and exaggerated. However, the interviewer's subjective impression was that the majority of respondents gave accurate and truthful answers. Given the low levels of preparedness reported in both places this judgement seems reasonable. Based on the literature, we expected that risk perception would be higher in Germany as the flood in 2013 was more recent than the UK flood in 2007 and people's appreciation of hazard and vulnerability drops with time [55] (Table 1: H2). We found a statistically significant difference in risk perception between the two areas, but, most interestingly the reverse of that expected with people in Catcliffe showing a higher level of risk

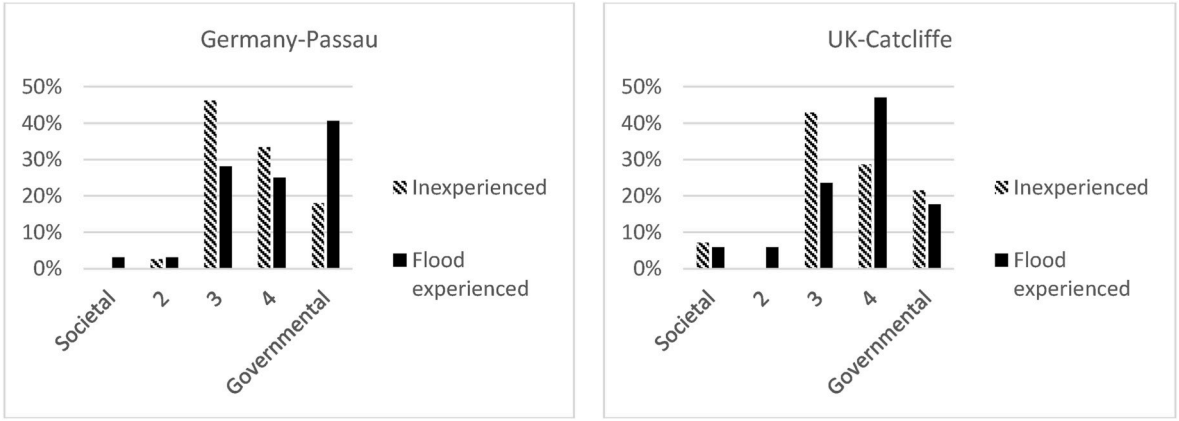

Fig. 5. Preparation responsibility expectation among flood experienced and inexperienced.

perception (3.4) than did people in Passau (2.5) (Mann–Whitney U, $p \leq 0.005$). Similarly, the perceived preparedness-level of the people in Passau was significantly lower than the preparedness-level of people in Catcliffe (Mean UK 2.8; Germany 2.1; Mann–Whitney U, $p \leq 0.025$). Fig. 4 shows that 46% of respondents in Passau had very low perceived flood preparedness compared to 22% in Catcliffe. Despite this difference, the perceived own flood preparedness is not very high in either Catcliffe or Passau, and the evidence from elsewhere suggests that people in risk prone areas rarely undertake mitigation measures voluntarily [4].

We tested if preparedness was related directly to risk perception and found a significant correlation when all the respondents from UK and Germany were considered together (H3: Kendalls Tau-b = 0.254,[1] P = 0.002). There was also a significant correlation for respondents in Passau (Tau = 0.305, p = 0.002) yet in Catcliffe no correlation was found between these two variables and the hypothesis was therefore not supported. Accordingly, also other researchers have found no statistically significant relation or only a weak relation between perception of flood risk and preparedness [4,14,52,53].

With respect to the four constellations of perception and preparation discussed in section 2, we pooled the data for Catcliffe and Passau in Table 7.

As can be seen in Table 7, among the respondents without flood experience the most frequent constellation is the combination of low perception and low preparedness (40%). This indicates that many people don't perceive a high risk of flood and therefore don't see any need for a high level of preparedness, either. A further 32% perceive themselves to be at medium or high risk but are still unprepared.

This suggests that there may be an expectation-gap with respect to the government. Put differently, this can be seen as a window of opportunity for public authorities to support flood risk protection without the need for specific risk communication and awareness campaigns (as the respondents of this category already have medium-high risk perception).

Amongst respondents with flood experience, a much greater proportion perceives themselves to have a high level of preparedness (32%) compared to 8% of those with no flood experience. Whether this finding is partly due to cognitive dissonance (implying that they merely hope to be better prepared) is an open question. Overall, we see that even among those without flood experience there is both a high potential for better protection and a high need for better governmental support.

Other hypotheses about flood preparedness were tested, including the effect of age, gender and risk aversion. We expected older people to be better prepared (H4b) [19,24,33,56]. We found no significant correlation between age and risk perception (H4a, Tau = 0,046, p = 0.575) but older people, aged over 45, are more likely to have a higher preparedness level (H5, Tau = 0,215**, p = 0.01 N = 104). It was expected that women would display higher risk perception (H5a) and would consider themselves to be better prepared than men (H5b). However, our study found no difference in neither perception nor preparedness between men and women. Therefore both hypotheses are rejected with a P-value equal to 0,583 for H5a, and P equal to 0,644 for H5b.

Preparedness is expected to increase with increasing anxiety [24,88] and we tested if risk aversion as a related concept was correlated with flood perception (H6a), and preparedness (H6b). Respondents ranked themselves on a 5-point scale from risk averse to risk taker.) There was no correlation between risk aversion and flood perception. There was, however, a significant correlation between risk aversion and flood preparedness in Passau (Tau = −0.250,[2] p = 0.013) and a less strong relationship in Catcliffe (p = 0.09).

5.2. Attitude towards government and reaction to government advice

Bubeck et al. [4] argue that flood prevention will require private households to take more flood mitigation measures. Respondents were asked if they considered flood preparedness was a task of the government or the responsibility of individual households. Respondents answered on a scale between 1 and 5 with 1 indicating full responsibility for individual households and 5 full responsibility on the side of the government. We expected flood experienced people would tend to be more independent and would take more responsibility for preparedness (H7).

Fig. 5 shows that about two-thirds of respondents in both Passau and Catcliffe expect the government, rather than individuals, to take responsibility for flood preparedness. We wondered if the remaining 33% who think that individual families should be responsible rather than government would see themselves as better prepared (H8). Interestingly, there was no significant difference in preparedness between those who perceive a higher responsibility and those who think it is the job of government (P value = 0,726, N = 103). We also tested if there was a difference in flood preparedness between Passau and Catcliffe among those respondents who take responsibility for flood preparedness (H9), but we found no statistically significant correlation.

During emergencies, successful risk communication depends on public confidence in the authorities [89].

As data from the World Value Survey for 2006 show, both British and German citizens equally have low or very low trust in government (74%

[1] Correlation is significant at the 0.01-level (2-tailed).

[2] Correlation is significant at the 0.05-level (2-tailed).

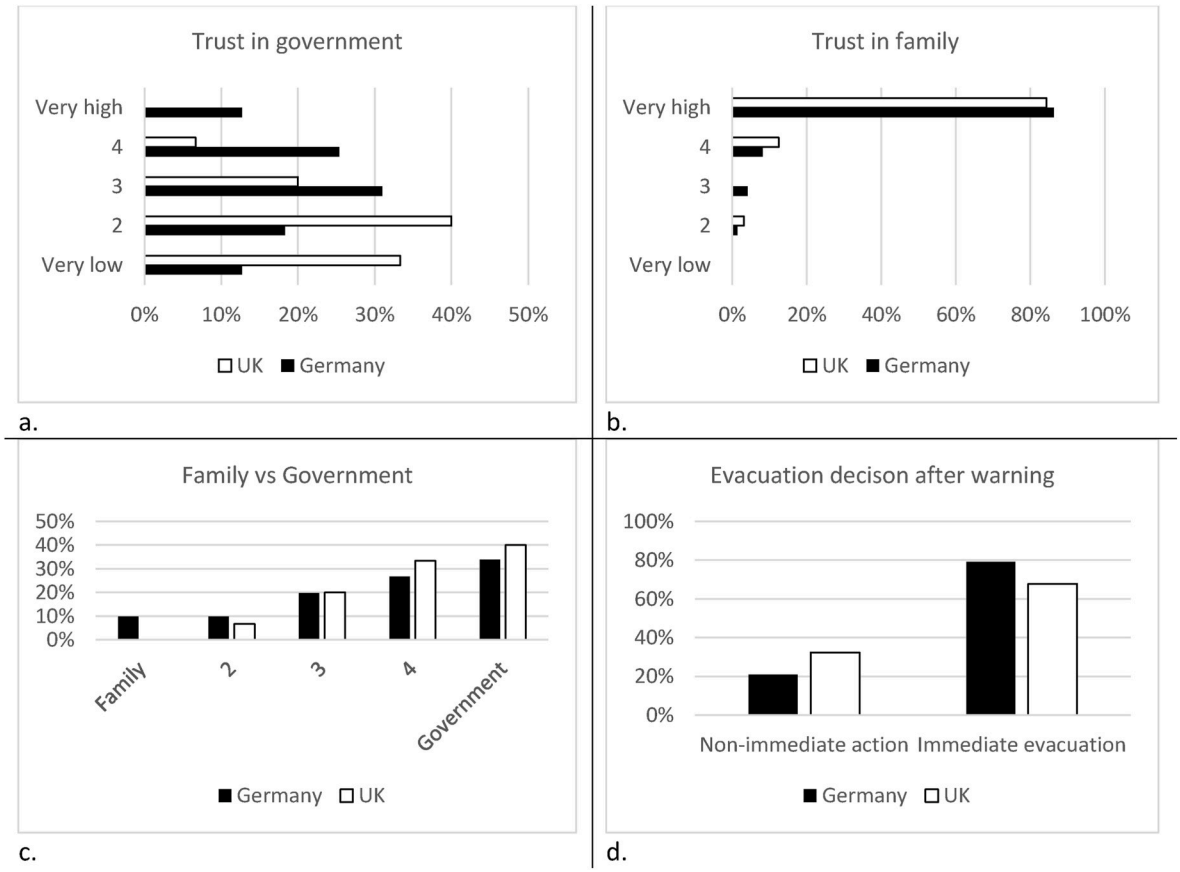

Fig. 6. (a) Trust in government (b)trust in family in normal time, (c) who do people follow in disaster time, (d) people who would immediately evacuate after being asked by government.

of citizens in Germany and 60% in UK). Due to differences in quality of governmental support in the study areas in each country, we anticipated that respondents in Passau would show higher trust in government than those in Catcliffe (H10). In the UK, respondents complained that the local authorities were slow to respond and there was little direct central government assistance, whereas in Germany volunteers organized by German Technical Relief Service reacted quickly and the Federal government provided generous financial aid [3]. As expected, we found a significant difference in trust in government between respondents in the two study areas (Passau mean = 3.1, Catcliffe mean = 2.0, Mann-Whitney $p = 0.000$).

In the specific case of an evacuation, low confidence in government can be dangerous. We confronted the interviewees with a hypothetical flood disaster and asked them whether and how quickly they would comply with a government order to evacuate. In total, 49% of all respondents (N = 104) had direct experience of their property being flooded (46% in Passau and 58% in Catcliffe). The interviewees were offered three choices: take the warning seriously and evacuate as quickly as possible (selected by 76%); take the warning seriously, but NOT hurry as the authorities usually exaggerate (20%); or not believe in warning (4%).

The relationship between the people's attitude toward the responsibility of flood preparedness is analysed in relation to their perception of risk and level of preparedness (H8 and 9). Moreover, we expected that people who see flood preparedness more as the task of citizens than government, would also rely less on government in times of crisis and therefore not evacuate immediately following a government evacuation order (H11). However, we found that this was not the case and that the greater propensity for independence and self-reliance does not affect the willingness to follow a government evacuation order in a hypothetical context (Mann-Whitney $p = 0.322$).

People with low trust in government have been found to be less likely to follow a government order to evacuate immediately (H12) [33]. Trust in government was measured on a 5-point scale from very low to very high. We found a significant relation between trust in government and immediate response to an evacuation order (Mann-Whitney $p = 0.02$) where 64% of people with low or very low trust in government would not evacuate immediately compared to the control group with higher trust in government. It is both interesting and important that low trust in government can spill-over to the willingness of people to immediately follow government advice in an emergency situation. Through hesitation and doubt valuable time can be lost.

When public instructions in emergency situations meet with a lower level of acceptance: To whom do people respond instead? In a study of attitudes to volcano risk, Haynes et al. [90] found the public viewed friends and relatives as the most trusted source of information. To test this, we asked respondents, "Imagine there is a flood in your region and you get a government order to evacuate but a family member or a close friend/neighbour recommends you to stay at home and try to stop water entering the house. Whose advice would you follow?" It was expected that when people have higher trust in family than government (Fig. 6b), they should rather follow the advice of the family than of the government (H13). We found, however, that in both countries most people said they would prioritize government advice over family (Fig. 6c). The reason may be that the public assumes an informational advantage on the side of public authorities regarding the severeness of the flood risk [89,91]. Therefore, despite the generally low trust in government, people in the UK and Germany are likely to follow the advice of the authorities. Fig. 6d summarizes the key findings on trust and the effects on evacuation for the two studied areas. Apart from the lower levels of trust in government in UK the results are similar for each country.

Looking at demographic variables, we find that older people see

themselves as better prepared for floods than do younger people (H4b). However there was no difference in the risk perception with age (H4a). Finally we checked whether older people are more likely to evacuate immediately on being told to by government (H14), but found no relationship (Mann-Whitney p = 0,897).

Various researchers [38,60] found that men are less likely to evacuate than women (H15). We also found a highly significant difference between women and men (Chi-square p = 0.003) where 64% of the people who said they would evacuate immediately were women and 36% were men. This is in line with other studies, which found women to be almost twice as likely to evacuate when given a mandatory order [63]. We also tested if risk averse people are more likely to evacuate immediately (H16), which was not confirmed.

Finally, we tested for further age effects. Zhao and Hu [64] and Christensen and Lægreid [44] found trust in government increases with age, although Maidl and Buchecker [24] stress citizens' trust in government varies with political and cultural circumstances rather than age. Using Kendall's Tau we tested if trust is correlated with age and found a significant relation (H17) for Germany and the UK combined (P = 0,005, correlation = −0,232).

6. Discussion

Writing about seismic risk, Rossetto et al. [92] argue that "a large proportion of people the world over do nothing or very little to adjust to seismic hazards." Rossetto, Joffe and Solberg [92] argue that seismic adjustment adoption rates relate to feelings of community, self-worth, trust and control. Understanding such motivations and constraints is a step in understanding how to encourage risk mitigation. The low risk awareness of the residents living in flood-prone areas is usually considered as a main cause of low preparedness and inadequate response to floods, yet few studies have evaluated how risk communication programs affect these risk perceptions. Terpstra et al. [93]; in a study of flood risk in 3 Dutch provinces, found only weak support for the idea that risk communication programs can affect risk perceptions. Knocke and Kolivras [94] investigating flash floods in Virginia thought awareness of flash-flood risk could be improved through training, television campaigns fliers and the provision of better weather data.

In this empirical study, we analysed people's perception of flood risk, of their own preparedness and their attitude towards government advice in two cities, Catcliffe and Passau, which were both seriously affected by flooding. Although the sample sizes were relatively small (32 in Catcliffe and 74 in Three Rivers Corner) they are fairly representative of the populations living in both places.

Perception of risk is integral to determining the response to flood warnings and flood risk management. Efforts to increase community preparedness have largely failed when the authorities overlooked the subjective nature of public perception [17]. During the UK 2007 summer floods, the poor public response to Environment Agency warnings was thought to depend on whether people were aware of their own personal risk [16]. This lack of understanding by the agencies involved in the public's perception of risk can render warnings ineffective [33]. Modern theories of cognitive psychology suggest that perception and action are bi-directional and interdependent [95–97] and that cognitive function, i. e. understanding, resides in the interactions of perception and action [98]. This discrepancy between risk perception and preparedness was one key area we have explored and reported on. We found that although there were few significant differences between the two case studies, risk perception and risk preparedness was significantly higher in Catcliffe than in Passau and during the flood emergency people in Catcliffe see themselves acting more self-protectively (78%) than in Passau (42%). In both case studies, people who had direct experience of floods had a higher level of risk perception and preparedness compared to those with no previous experience, which is in line with findings from prior studies on risk perception. Although most respondents displayed low perception of flood risk and low level of their own perceived preparedness, the combination of high risk perception and low preparedness was the most frequent constellation among respondents with prior flood experience. Why do people with high risk perception don't do more to protect themselves? The causal pathways are more complex than a direct link between experience and preparedness and intervening variables, such as perception of hazard cycles and the time since previous events can modify behaviour. In turn, responsiveness depends on the perception of one's own agency to engage in effective protective actions and on the strength of belief that personal responsibility can be delegated to public emergency management. These issues need to be taken into account when developing communication and participative activities [99]. Interpreted this way, our findings indicate a window of opportunity for governmental support as the scope for private protection is limited but the risk awareness is already high.

A second prerequisite for effective public intervention is the citizens' attitude towards government and their trust in particular. With respect to self-reliance and independency, a majority of all respondents holds the opinion that flood preparedness is a major task of government. However, even among those who think differently we did not find a significantly larger level of perceived own flood preparedness. In both Catcliffe and Passau, trust in government was fairly low. Nevertheless, when people were asked the hypothetical question how they would react to a public evacuation order, almost 70% in Catcliffe and 80% of respondents in Passau would take immediate action to evacuate. In spite of this finding, trust matters: People with low trust in government don't follow government advice immediately whereas people with medium and high trust levels tend to follow government advice. Interestingly, the willingness to follow government order was more pronounced when we asked the conflicting question whether the respondents would follow a public evacuation order although their family recommended not doing so. This finding shows that only low levels of confidence have an impact on the context of the crisis,. This is understandable, since the motives for distrust in state action are less relevant in the crisis context. Nevertheless, it is clear that too little trust in the state can lead to a hesitant, wait-and-see attitude and in extreme cases this can be dangerous. It is therefore important to understand where government measures are needed, where they encounter fertile ground and what conditions need to be created in parallel to achieve broad acceptance of measures.

As mentioned earlier, the frequency and severity of floods events is increasing in Germany and the UK and an adaptive response is required to preparedness and mitigation that involves all parties including the state, the insurance sector, businesses and households [3,29,100,101]. These adaptive responses call for a new social contract between public and private sector actors to respond to the challenges to flood risk management posed by climate change [102–104].

7. Conclusions

Summarising the results of the surveys in the UK and Germany, in both case studies, people who had direct experience of floods had a higher level of risk perception and preparedness compared to those who had no previous experience. We also found that older people had a higher level of risk perception and preparedness compared to younger people. Residents of both countries showed different perception-preparation patterns with respect to their prior flood experience. 35% of the people with no flood experience displayed medium or high risk perception but rated their own flood preparation low. As there is no need to convince this group (e.g. by costly awareness campaigns), policy makers can go ahead to support people's flood risk preparation, either by technical recommendations or financial support. In both Catcliffe and Passau, trust in government was fairly low. Nevertheless, if the government asked people to evacuate immediately, almost 70% in Catcliffe and 80% of respondents in Passau would take immediate action to evacuate. Furthermore, no matter how much people trust their family, if the government asked them to evacuate and their family said it was unnecessary, nearly 70% of respondents in both areas would follow

government advice.

Meanwhile, it was interesting to see that low trust in government can spill-over to the willingness of people to follow government advice immediately in an emergency situation. Political decision makers should be well aware that a low level of public trust can translate in a significant loss of valuable time during a crisis situation. The decision to evacuate is significantly higher amongst women than men. Although there were few significant differences between the two case studies, risk perception and risk preparedness was significantly higher in Catcliffe than in Passau and during the flood emergency, people in Catcliffe acted more self-protectively (78%) than in Passau (42%). In both areas people living in a flood hazard zone cannot easily get flood insurance coverage, and in Germany, to date the government compensates most people.

In general the people who had been directly affected by flood were dissatisfied with flood early warning. Many respondents in Passau complained about not receiving a flood warning in time and that the authorities had underestimated the severity of the situation. In the UK, people in Catcliffe also blamed government for not providing sufficient warning and were dissatisfied with the performance of the local authorities and Environment Agency. In each country respondents reported that the severity of the flood was under-estimated and the forecast of water levels was inaccurate and that the flood warning was not broadcasted early enough or sufficiently well enough to give them the opportunity to move their valuables or car to a safe place which meant they suffered higher economic damage to their business or home, and, in Passau, some people were even trapped on the upper floor of their apartment. According to respondents, the first source of information was word of mouth and personal observation of increasing water level, rather than siren or loud-speaker announcements. In Catcliffe, police officers evacuated people by knocking door by door at midnight and driving them out of flooding area.

Extreme events can be catalysts for policy change [105]. In the UK the 2007 flood was called a 'game changer' in the Pitt [16] and in Germany Kreibich et al. [28] described the 2002 flood in Germany as a 'focusing event' that concentrated minds on improving resilience. After both floods there were significant changes in flood awareness and preparedness amongst both residents and the authorities [106]. However, the findings of this study of floods in the UK 2007 and Germany 2013 suggest that few people in known flood hazard areas take personal responsibility to limit the damage from floods. Given the likely increased incidence of flooding in both the UK and Germany with climate change and given the possible withdrawal of state aid in Germany and the difficulty of getting insurance cover in both countries progress is needed in turning awareness into effective action.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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