

Dear Marvin Ravan, and Reviewers,

On behalf of all the authors, I would like to thank you for the constructive comments and criticism received on our manuscript entitled ‘Individual Flood Risk Adaptation in Germany: Exploring the Role of Different Types of Flooding’. We believe that in the current revision we have addressed the comments raised by the reviews and that in doing so our revised manuscript is now more suitable for publication in Natural Hazards and Earth System Sciences.

We are looking forward to your comments.

Reviewer 2		
No.	Comment	Answer
	<p>The paper provides an overview on how experiencing a flooding event may impact people's attitudes towards these events. In particular, it does so by building on data collected among the German population that was exposed to three types of floods: fluvial floods, urban pluvial floods and flash floods (circa 3000 households). The analysis is framed within the framework of the Protection Motivation Theory (PMT) and the Protection Action Decision Model (PADM). The topics approached in the paper are extremely relevant as we can expect these events to become more and more common and more and more disruptive in a warming planet. The structure is adequate, but I am raising some points that I hope the authors would be happy to consider as a contribution to improve the quality of their manuscript:</p>	<p>Thank you for reviewing our manuscript. Your comments will help us improve the paper. Please find below a point-by-point response how we are going to revise the manuscript.</p>
1	<p>It would be useful to quote the official documents (even though they may be in German) of the Federal Water Act mentioned on line 42/43.</p>	<p>We will add the following text to the revised manuscript:</p> <p>”In particular, floods that occur due to an overloaded drainage system can be excluded by member states when adhering to the plan. Germany made use of this option when adapting the Federal Water Act (Wasserhaushaltsgesetz – WHG) in 2009 to the requirements of the Floods Directive (WHG, 2009). <i>Section 72 of the</i></p>

		<i>Federal Water Act defines flooding as "[...] a temporary inundation of land not normally covered by water, in particular by surface waters or by seawater entering coastal areas. This does not include flooding from sewage systems."</i>
2	Regarding Figure 1, I understand it builds on previous papers that are, rightfully, cited, but where does the top sentence ("... are caused by the release of large quantities [...]) come from? Would not it be easier to have a full sentence? Are you providing a definition of floods?	Figure 1 shows the different definitions of the types of flooding discussed in this paper and their overlaps. For better readability, we have now formulated complete sentences. The definitions with the respective references can also be found in the text.
3	On line 89 you mention that "The PADM adds - among other variables - [...]". What does it add to? Compared to what? I guess, maybe, the PMT?	Yes, PADM adds to the PMT. We will change the text as follows: "The PADM <i>adds to the basic constructs of the PMT</i> that individuals assess the extent to which they themselves (perceived self-responsibility) or public institutions (perceived government responsibility) are responsible for the implementation of measures and the idea of framing/context giving factors (Lindell & Perry, 2012)."
4	On line 161 you mention "the average age". I would avoid using "average" as a term, as it may be understood in different ways according to the context. Are we talking about the mean? The median?	We will use the term "MEAN age" throughout the paper and will specify the text accordingly: "The median age of the respondents was 59, which is approx. 8 years above the average <i>mean</i> age of the over 18s in the German population (DeStatis, 2014)"
5	I am wondering if the decision to reach out to people through Facebook (mentioned on line 166) may represent a cause of concerned over biased sample selection. Are not older people significantly less likely to be on social media? Also, is this a standard practice? If other studies approached respondents in the same way, it may be useful to say so.	Thank you for bringing this to our attention. Surveys have already been promoted via Facebook and social media in health-related studies. We will refer to these applications in the revised text as follows: "In North Rhine-Westphalia (as well as in S-5) people from the affected areas were invited for a CAWI via advertisements on Facebook and other media. <i>Advertising via Meta to recruit survey participants is a method used in health-related research during the last decades (Gilligan et al., 2014; Kapp et al., 2013; Shaver et al., 2019). Thieken et al. (2023) advertised a survey via Meta and "did not find any anomalies concerning the age distribution of the respondents in the data collected in this way.</i> However, we also want to point out that the groups studied, namely those affected by flash

		<p>flooding and those affected by urban pluvial flooding, were not exclusively advertised in this way, as outlined in Table 1. The computer-assisted web interviews (CAWI) were advertised by writing invitation letters directly to those affected in 2021. For the surveys advertised in this way, there was always the option for those invited to receive the questionnaire in printed form so that we did not exclude people who were less Internet-savvy or without the opportunity to use the Internet from the surveys. Nevertheless, we agree that our sampling method may contain biases. We will discuss these possibilities in an additional chapter, "Limitations", at the end of the paper as suggested in the other review and hope we will sufficiently address your concerns, too.</p>
6	<p>On Table 2, gender options are listed as "m/f/d". What does "d" stand for?</p>	<p>The "d" stands for "diverse". We will explain the labelling in the caption of the table.</p>
7	<p>On the phrasing "Yet, most of those affected by flash, fluvial and urban pluvial floods [...]" (line 266) I am wondering if these words simply imply every respondent. Are not you interviewing people affected by these three types of floods?</p>	<p>Thanks for pointing this out. This is correct and we will change the text as follows: "Yet, most of those affected by flash, fluvial, and urban pluvial floods <i>flooding</i> (median: 5-6) have little confidence in public flood protection measures."</p>
8	<p>The description of the statistics is clear but I am particularly concerned about one question and how it was measured (see Table 5). Every question (or most of them) measures the degree of agreement from 1 to 6, where 1 indicated full agreement. However, Question 1 seems to be reversed, where very low levels indicate a disagreement (not really a disagreement, but an expectation that the event may not manifest). I found this a rather confusing approach. In a sense, it could have been phrased as a statement like "Your apartment would be hit by flooding" and then a scale of agreement from 1 to 6 as all the others. I guess you could revert the values and turn the measuring of this question into something closer to the others? (I hope this point is clear enough but I am more than happy to come back to it).</p>	<p>Thank you for this clear and understandable comment. The questions and scales used in this paper correspond to those from our surveys which were initially created after the flood in 2002 and were expanded by PMT factors over the years. However, the item on perceived future probability (question 1) was consistently phrased in the presented way in all surveys. Of course, we cannot change the data anymore, but we will keep your comment in mind for future surveys. However, to facilitate the interpretation of the data, we will recode some items in Table 5 and for the regressions so that for all items, low values represent a "low/decreasing effect on protection motivation according to PMT" of the respective statement. High values represent a "high/increasing effect on protection motivation according to PMT" of the respective statement. This will result in changes to the "Results" and "Discussions" sections.</p>

9	<p>On Table 6, it would probably be easier for the reader to see the dependent variable pointed out in the table itself rather than in its description. At least, this is the standard approach in econometrics, where regression results are omnipresent.</p>	<p>We agree that the dependent variable is more easily accessible to the reader if it is mentioned directly in the tables. Therefore, we will adapt this.</p>
10	<p>I have some points on the results of the regression as presented in Table 7. (a) It could be interesting to introduce event- fixed effects. Fixed Effects models are straightforward to add in a simple Ordinary Least Square and would help capturing anything that is specific to that single event and that the other independent variables would not be able to capture, improving the fitness of the model. (b) Maybe test the errors for heteroskedasticity? This is one of the standard assumptions (see, for instance, Wooldridge's Introductory Econometrics) to guarantee consistent and unbiased estimates. If you were to find issues of heteroskedasticity, it could be useful to provide measures of robust standard errors. (c) I notice that you are also concerned by this in the pages that follow, but I was wondering if you could compare your R-squared to those from studies that adopted a similar approach. If the R-squared there are also found to be so small, a somehow less worrying issue should be raised for your single case (and maybe a methodological discussion for the whole field should be raised). Otherwise, if this low R-square is specific to your manuscript you may want to rethink your model. (d) One potential way to improve the fitness of your model may be to account for insurance claim data (this data is difficult to obtain at the granular level due to privacy issues, though). It could be interesting to insert the</p>	<p>According to (a): Fixed effects regression models fix variables that do not change over time, thereby removing their influence on the model. This method can only be applied to datasets that record how variables change over time, so it can only be applied to panel data. However, we use cross-sectional data, so this method cannot be applied. In addition, some of the variables we have defined as framing factors do not change over time. Their effects could, therefore, not be analysed within a fixed effects regression model. However, we understand that the different events and the characteristics associated with the events (such as the locations) could have an influence that we do not capture in our model, which could be why our model has low R-squared values. To address this issue, we will introduce event-specific dummy variables when analysing the framing factors through regression analysis. This allows us to identify event-specific effects and to improve the r-square slightly.</p> <p>According to (b): We tested for heteroscedasticity and found that it was confirmed. Therefore, we applied bootstrapping.</p> <p>According to (c) The regression analysis of the framing factors shows low R-squared values. This is a known problem in psychological research. It is due to the fact that people are very different, but they do not participate in interviews that last longer than 30 minutes, making it impossible to include all personal and contextual factors (Grothmann & Reusswig, 2006).</p> <p>According to (d) We don't get access to insurance claims, but we have compared mean losses from our survey with mean insured losses reported by the German Association of Insurers.</p>

	amount of damages faced by these households in their attitudes and their reactions to the events. They may have experienced flood events first-hand, but if the damages were not so consistent they may have been left unaltered by the events.	
	To conclude, I hope you will find these comments useful and I wish you good luck with the rest of your work!	Thank you very much again.

References

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