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Comment

# ***Interactive comment on “Raising risk preparedness through flood risk communication” by E. Maidl and M. Buchecker***

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Dear reviewer, dear editor

Thank you for your valuable comments on our manuscript.

Response to major comments:

1) Since all property owners in areas at risk received the information material, no control group could be established. In the research design we considered this shortcoming and addressed it by comparing different groups of respondents: those who read/used the material, and those who did not, i.e. these respondents were not exposed to the stimulus. Comparison between users and non-users in respect of most variables

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showed neither significant differences in attitudes, socio-demographic characteristics, nor in their readiness to implement protection measures. This high compliance among the two groups is to some extent certainly due to the fact that they are sub-groups within those who took interest in the topic and participated in the survey (self-selection) . Both, users and non-users, are representatives of the same population, i.e. owners of property in areas at-risk of flood in the city of Zurich who received letters from the authority and participated in our survey. The group of non-users highly resembles the group of users, except that they do not know the content of the information material. Despite these interesting results we found by comparing the group of users and non-users, this is no substitute for a real control group. However, data allowed to distinguish between different levels of thoroughness with which the information was adopted by the respondents. We called this “intensity” of information. It is distinct from mere time one was occupied with the material: comparing the correlation of the time variable (minutes spent with information) with the intensity variable showed that it is relevant whether someone just read the material with low attention, or studied it intensively. This important nuance would have not been regarded if we just had looked at the user/non-user difference or the time variable.

Analysis of variance further revealed that group differences in respect of awareness and preparedness occurred rather according to different levels of values on influencing variables, i.e. predictors of the dependent variables (awareness and preparedness) than knowledge on floods and protection measures. For instance, respondents who highly trusted the authorities did not “need” to read the material in order to be convinced that flood was a serious topic and that they (the respondents) should do something about it. Within the group of users, significant differences in respect of the dependent variables were found according to thoroughness dedicated to the information, i.e. intensity of studying the material.

The review comment also addresses the issue of distinguishing the influence of individual characteristics vs. the effect of the campaign. Although there is a significant

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positive relation between risk aversion and the willingness to adopt measures, risk aversion is not a significant predictor of preparedness in the regression model. Risk aversion cannot explain preparedness sufficiently. The influence of other variables is stronger.

The relation between risk preparedness and other variables we analysed partly concerns individual characteristics on which the campaign did have an effect, others are stable personal traits. Our results show that the influence of individual characteristics is small compared to the influence of the campaign. This statement is based on results of in-depth data analysis, including further regression analysis we run on different outcome variables (risk preparedness, risk awareness and the sub-scales of risk awareness, further we looked at self-responsibility, risk acceptance, trust in authorities, and intensity of information as well). However, we decided to focus on most important findings in the article.

To sum up: we do not claim to generally explain to what extent such a campaign can affect property owners' preparedness and awareness. Our major point is, that it does have an effect, even though this effect is rather given by latent factors such as the property owners' attitude towards the authorities. We are aware that distinguishing between the influence of personal characteristics and the campaign is problematic, however, we think that especially differentiating between different levels of intensity to adopt information, as well as further comparisons between respondent groups that we conducted, allow to draw conclusions on the way the campaign could influence the respondents' awareness and preparedness. A special advantage of analysing the effects of the campaign regarding different levels of intensity was that this approach allowed us to carefully investigate individual influences. We will make this more explicit in the methods paragraph and address the issue of the control group in the paragraph on limitations.

2) We agree to better distinguish between factors that influence preparedness, and factors that explain effects of risk communication in the section on the state of the art.

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The note on the redundancy on the relation between perception and behaviour is also helpful for better structuring this section.

3) We consider the role of emotions important, indeed. It will be emphasized better by describing it as an essential component of the scale “risk awareness”. Including the item “worry” highly contributes to the internal consistency of the scale. This will be made more explicit in the method section (scale construction) as well as in the results (correlations and group differences in regard of emotional items will be given), and interpreted more prominently in the discussion. Emotional items in the questionnaire are “worry about floods”, attachment to the property, and importance of security (indicated by a low level of risk acceptance, low risk aversion, and ascribing higher priority to security than other values).

4) We intended to measure risk awareness on more than one dimension in order to consider a broad scope of possible influences that turned out relevant in previous studies. This explorative approach provided a large number of variables, each telling something about risk awareness. Dimension reduction was a valuable method to better understand, which items measured the same aspect, and which items could be used for construction of a metric scale variable suitable for regression analysis. Data analysis revealed that “worry” was strongly correlated to the respondents’ perception of the flood risk in the area of their property and the perceived probability to experience a severe flood in one’s lifetime. In our view, analysing these items separately did not contribute to explaining influencing factors of risk preparedness.

More in-depth analysis, however, did reveal results that are interesting in respect of measuring risk awareness. We did not put emphasis on displaying the measurement of risk awareness in a more detailed manner, because the research question focuses on risk preparedness as our outcome variable, and not so much on components of risk awareness. Of course, a detailed description of scale construction is interesting and may be valuable for future research. We only put this topic apart due to limited space.

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We may remark some results on risk awareness here: Risk awareness in our study is a scale comprising the two subscales consisting of risk “perception” items and items representing the relevance of the topic (see table A1)

We run regression analysis using both subscales, compared the results, and found that using the overarching scale was more beneficial in terms of clear interpretation of influencing factors. There are some interesting differences among predictors of the two subscales: The main predictor of “relevance” was “intensity of reading the material” ( $\beta=.342^{***}$ ), but did only explain 17% ( $\beta=.170^{**}$ ), of the variance of the “perception” scale. Perception was best explained by relevance items, followed by personal flood experience ( $\beta=.192^{***}$ ). This is the only result, where experience turned out a significant factor. Further, it was interesting to see that high (self-reported) knowledge about floods before the campaign was a significant predictor of relevance ( $\beta=.145^{**}$ ), but did not contribute to the variance of the perception scale. All other independent variables influenced both outcome variable very much alike. The only exception was age: older respondents showed less risk awareness than younger people, however the older somebody was, the less he or she considered flood to be of personal relevance (note, that one item of the relevance scale represented the probability to experience a severe flood in one’s lifetime).

5) We are careful to draw causal conclusion from a cross-sectional study. Our study certainly show a number of correlations confirmed by p-values. However, we want to put emphasis on a careful interpretation of these results by making explicit that correlation can tell us that two variables are related to each other, but the direction of this relation cannot be interpreted clearly. For instance, risk awareness contributes to explain the variance of risk preparedness, and vice versa. This indicates an important relation between these variables, but it is not clear which one causes the other.

This will be mentioned in the discussion section.

Response to minor comments:

- 1) The assessment of knowledge before the campaign is self-reported. We did not ask respondents before and after the campaign.
- 2) Thank you for this advice concerning the wording.
- 3) We can provide such a map that illustrates the hazard zones.
- 4) Yes, according to the Flood Directive risk maps are to be made available. However, due to challenges in the implementation, they are not available everywhere yet.
- 5) We are aware of these publications and consider it in this section.
- 6) There is a shift in risk management towards integrated risk management. The new paradigm is about establishing a culture of risk that involves inhabitants of hazard zones as important actors in risk management. Therefore, management strategies need to regard social factors that influence the interaction between different actors like experts, authorities and the population.
- 7) “If investigated” is meant as follows: As far as preparedness was measured. Some studies focus on risk awareness only.
- 8) In our study, it turned out that there was a significant influence of gender on the intention to implement protective measures. Data analysis showed that this is to some extent due to the influence on gender on worry. Female respondents were more concerned about the flood risk and also show higher risk aversion. However, we found no significant gender differences among respondents who already adopted measures. Other studies measured preparedness in various ways, sometimes as the intention or readiness to prepare for hazards, sometimes as actually implemented measures. The results of these studies show no clear pattern of the influence of gender on risk preparedness.

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