Applying behavioural insights to support flood resilience

Summary report

Behavioural Insights Team: Elizabeth Convery, Alice Farrell, James Farrington, Madeline Gross, Toby Park, Andrew Schein

WPI Economics: Joe Ahern, Matthew Oakley

Environment Agency: Louise Bransby, Jacqui Cotton

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1. Executive summary

The Behavioural Insights Team (BIT) and the WPI Economics were commissioned by the Environment Agency (EA) to explore the take-up of property flood resilience (PFR) measures amongst homeowners in England.

The project and findings are structured in accordance with BIT's TEST (Target, Explore, Solution and Trial) methodology.

During the **Target** phase, stakeholders across the flood resilience sector, including representatives from EA, Defra, and Flood Re helped to identify three psychological / behavioural objectives to focus this project on:

1. Improve self-efficacy, responsibility, and awareness of flood resilience measures
2. Increase engagement with EA's online content about flooding
3. Improve engagement with, and usefulness of, flood plans

These were judged to be (1) feasible to influence (through the levers available to EA); and (2) potentially impactful on PFR uptake.

During the **Explore** phase, the project team conducted two main research activities:

1. **Quantitative research:** an online survey of 2,033 homeowners across England.
2. **Qualitative research**: ten one-to-one interviews with expert stakeholders, and five virtual focus groups and three one-to-one interviews with homeowners.

Though a great breadth of insights emerged, the three key findings were:

1. **A strong link between perceived responsibility and self-efficacy:** there is an association between homeowners feeling responsibility for protecting their home from flooding and feeling able to carry out the required actions to reduce flood damage.
2. **Low awareness of risk and PFR:** homeowners have low awareness of the potential damage that could be caused to their property by flooding, and of the varied sources of flood risk. There is also a lack of awareness about the range of Property Flood Resilience (PFR) measures available.
3. **Lack of time, thought and motivation to make a flood plan:** homeowners face specific barriers to making flood plans. The most significant of these is a lack of time and knowledge; other barriers include an aversion to thinking about flooding, little perceived value in creating one, and the idea of making a flood plan not occurring to them.

Following the Target and Explore phases, the project team identified three interventions for the Solution and Trial phases of the research.

1. Improve the 'How to plan ahead for flooding' webpage
2. Increase click-through traffic to key web content from social media ads

3. Improve engagement with, and usefulness of, flood plans

Trial 1: Improve the 'How to plan ahead for flooding' webpage

Trial

The ‘How to plan ahead for flooding' webpage presents information about measures homeowners can take to protect their home from flooding. BIT and WPI created three new versions of the webpage, which were as follows:

1. **Social modelling.** Supported self-efficacy by using social models (a home-owning couple) to act as a case study to show how PFR measures can be used to protect against flooding.
2. **Enhanced beta (text only).** Broke the information on the webpage into manageable ‘chunks’ to make the information easier to understand and put into practice.
3. **Enhanced beta (text + images).** Used visuals to make the information in the webpage more salient,[1] therefore improving engagement.

BIT ran an online randomised controlled trial (RCT) with 4,196 homeowners to test the efficacy of the three treatment versions compared to the EA beta 'How to plan ahead for flooding' webpage. The trial also compared the EA beta to (1) a similar page managed by the Government Digital Service; and (2) not seeing a webpage at all (the ‘pure control’).

Findings

The findings from the trial were as follows:

- **The treatments did not have any impact on combined self- and response-efficacy** (the primary outcome measure) compared to the EA beta.
- **Some treatments (particularly the social modelling arm) increased awareness of PFR measures.**
- **All webpages led to better outcome measures than when participants saw no webpage at all.** This indicates that viewing informational web pages delivers benefits to self-efficacy, response-efficacy, and awareness.
- **The EA beta version performed better on some outcomes than the gov.uk version**.

Trial 2: Increase click-through traffic to key web content from social media ads

Trial

BIT collaborated with the EA social media team to create new versions of EA Facebook and Instagram advertisements. The advertisements encouraged users to (1) play a short video

[1] In this report, ‘salient’ and ‘salience’ refer to making key features of a communication more noticeable, conspicuous, and/or prominent.

which explains what to do if there is a flood; and (2) click through to the 'what to do in a flood' gov.uk webpage. BIT applied behavioural science to two EA social media campaigns:

1. **The 'flood action campaign'** which ran from October 2020 to March 2021
2. **Flood action week,** which ran from the 9th to the 15th of November 2020

Flood action campaign

BIT developed two new versions of the flood action campaign advertisements:

- **Location reciprocity:** leveraged reciprocity[2] to improve engagement and personalised information (i.e. location) to increase salience.
- **Location risk:** leveraged loss-aversion by emphasising the level of risk flooding poses to users' homes and personalised information (i.e. location) to increase salience.

Flood action week

BIT developed three new versions of the flood action week advertisements:

- **Reciprocity:** leveraged **reciprocity** by reminding readers that EA are taking action to protect residents from flooding, but that homeowners need to do their bit too.
- **Ability:** supported **self-efficacy** by highlighting that there are simple steps homeowners can take to protect their homes from flooding.
- **Loss aversion:** leveraged **loss aversion** by prompting users to reflect on which possessions they might lose in the event of a flood.

Engagement was measured via:

- **The 'click-through rate'**: the proportion of users who clicked through to the gov.uk 'what to do in a flood' webpage; and
- **'Video play to completion rate':** the proportion of users who played the video embedded in the advertisement to completion.

Findings

The key findings from the trials were:

- **The 'reciprocity' framing was most effective at increasing click-through and video completion rates** across the two social media trials. This implies that highlighting the reciprocity between government and homeowners increases engagement with communications about flooding.
- **Location-specific messaging had mixed effects as a standalone approach.** It led to increased click-through but decreased video plays.

[2] In this report, 'reciprocity' refers to the idea that the government *and* homeowners *both* do what is in their power to reduce flood risk – and that homeowners are more willing to 'do their bit' when the government is doing 'its bit', too.

Trial 3: Improve engagement with, and usefulness of, flood plans

Trial

A flood plan is a document which homeowners can use to plan what they should do in the event of a flood. BIT developed four new versions of EA's flood plan (currently hosted on the gov.uk website) to address the behavioural barriers identified during the Explore phase. These were as follows:

- **Simplified flood plan.** Made the flood plan easier to understand and fill out by: (1) combatting choice overload by reducing the number of actions required; and (2) breaking behaviours down into manageable steps.
- **Context:** Supported response-efficacy and motivation by providing explanations for suggested actions.
- **Images:** Used pictures and icons to increase salience, therefore increasing engagement with the flood plan.
- **Future self:** Had participants complete a short exercise before completing the flood plan. The exercise prompted them to reflect on how a flood could impact their future self. It was designed to (1) address present bias by encouraging users to consider their future self; and (2) increase the salience of the negative aspects of flooding, so that users are more motivated to make a plan.

BIT conducted an online RCT with 3,866 English homeowners to test the effectiveness of the four new flood plans, compared to the current EA version hosted on the gov.uk website. The experiment also collected outcome measures for participants who did not see a flood plan at all, but instead answered a survey about their environmental attitudes (the 'pure control').

Findings

The key findings from the trial were:

- **All four treatments led to a significant improvement in the primary outcome measure: self-reported usefulness.**
- **All four treatments also led to increased self-reported preparedness for a flood and comprehension of actions to take in the event of a flood.**
- **There was a weaker indication that the 'context' and 'future self' versions led to increased download rates of the flood plan** compared to the EA flood plan.
- **Participants who completed the EA flood plan performed better than those who hadn't completed a flood plan at all across multiple measures**, including comprehension of actions to take in the event of a flood and sense of preparedness for actions to take in the event of a flood. This indicates that completing a flood plan is an effective way to improve preparedness for flooding.
- **Completing a flood plan made participants feel more strongly that homeowners should be responsible for protecting their home in the event of a flood**, rather than the government.

Recommendations

Based on these findings, the research recommends the following next steps:

- **Incorporate the EA beta 'How to plan ahead for flooding' webpage into the official government page.** The trial showed that this version improved participants' response-efficacy, resource-adequacy, and awareness of PFR measures compared to the GDS-managed gov.uk webpage. Each of the BIT-designed variants performed similarly to the EA beta page, and so elements of them could be adopted, or not. Most notably, the social modelling arm showed some benefits to participants' awareness of PFR measures. However, it is important that simplicity is not compromised if merging elements of these designs.
- **Apply reciprocity framing in communications** where possible. In both the trial comparing ad variants during the flood action campaign, and in the trial comparing ad variants during flood action week, the reciprocity framing performed best. While click-through and video plays are arguably distant from the ultimate outcomes of interest (making concrete plans and investments to improve a home's flood resilience), it is still promising to see the reciprocity message's strong performance. Not only does it subtly convey an important message about shared responsibility, it also seems to garner higher engagement than other framings.
- **Host the 'context' version of the flood plan on the gov.uk website going forward.** This version performed the most consistently well across the primary and secondary outcome measures (apart from Treatment D, the 'future self' treatment) and would be the most straightforward to implement on the gov.uk website in the short term.
- **Further explore how a 'future self' exercise might be implemented within the gov.uk 'personal flood plan' webpage, and/or consider how prompts to think about what it would be like to experience a flood might be integrated into other PFR-related communications.** While it may be challenging to implement an interactive exercise on the gov.uk website, EA could include a short paragraph encouraging participants to reflect on the impact of flooding on their future self. EA could also explore opportunities to test the impact of similar communications via social media, local flood plans, community outreach, and video communications. This could involve collaborating with other groups e.g. local authorities, flood forums, and the pathfinder projects.
- **Continue to promote flood plans to help homeowners prepare for flooding.** The findings demonstrate that completing a flood plan leads to improvements across key outcomes related to flooding, including: sense of preparedness, knowledge of which actions to take in the event of a flood, responsibility, response-efficacy, and self-efficacy. With this in mind, EA should continue to encourage homeowners to complete flood plans.

1. Introduction

Although the risk of flooding is only faced by a minority of households, it is the most significant source of natural catastrophe risk faced by the UK.[3] For those seriously affected by flooding, the impact can be significant, particularly the psychological stress of the flood event itself, as well as the disruption to lives caused by being displaced while repair and restoration takes place.[4] Furthermore, flood risk is increasing as a result of climate change,[5] and so the impetus to take action to address this is increasing.

Property Flood Resilience (PFR) is an essential 'tool in the toolbox' needed to address flood risk, and there is significant domestic and international evidence of its effectiveness.[6] There are two types of PFR:

1. **Resistance measures**, which reduce the amount of water getting into a property. Examples include flood doors, sump pumps, flood barriers, non-return valves, and automatic air bricks.
2. **Resilience measures**, also referred to as internal adaptations, reduce the damage caused should flood water enter a property. Examples include wall, flooring and kitchen and bathroom fittings that are water-compatible, raised electric sockets, and plinths for raising white goods.

This report uses the term *PFR measures* to refer collectively to both of the above types.

Although many households could potentially benefit from PFR, take-up is currently low. A survey by Defra found that only 27% of households who had been flooded had installed any kind of PFR, such as flood doors or raised plugged sockets, with a take-up of 7% among the wider population.[7] Furthermore, techniques such as household flood plans can support homeowners to respond efficiently in the midst of a flood event, thus having a better chance of protecting themselves, their families, as well as their possessions and homes.

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[3] National Risk Register (2021), URL [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/969213/20210310_2008-NRR-Title-Page_UPDATED-merged-1-2.pdfb]

[4] WPI Economics (2019) Flood Performance Certificates Available here http://wpieconomics.com/site/wp-content/uploads/2020/12/Flood-Performance-Certificates-20201208-Pages.pdf

[5] Emma Howard Boyd (2019) 'A different philosophy: why our thinking on flooding needs to change faster than the climate' URL: [https://www.gov.uk/government/speeches/a-different-philosophy-why-our-thinking-on-flooding-needs-to-change-faster-than-the-climate]

[6] UWE (2019) 'Evidence Review for Property Flood Resilience', URL: [https://www.floodre.co.uk/wp-content/uploads/UWE-report_Evidence-review-for-PFR_Phase-2-report-1.pdf]

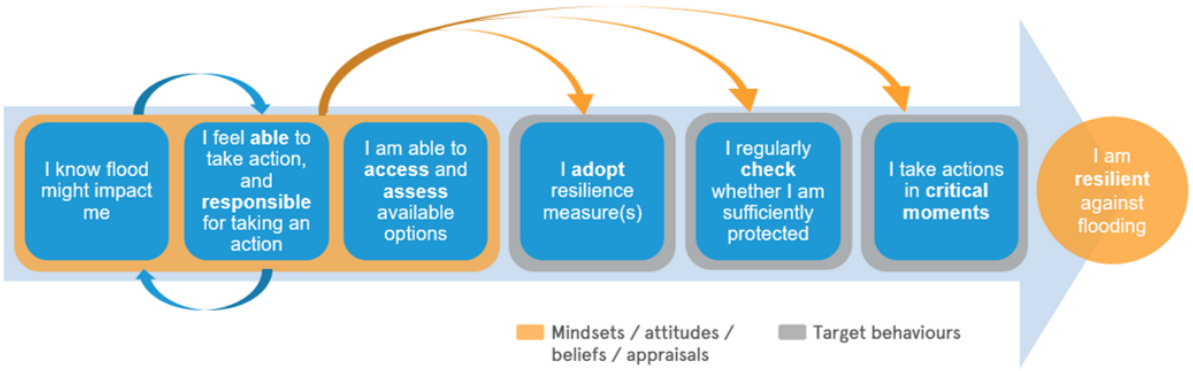
[7] DEFRA and Environment Agency (2008) 'Developing the evidence base for flood resistance and resilience: Summary Report' URL: [http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=14738]

Driving take-up of PFR and flood plans relies heavily on actions taken by individual homeowners. As a result, behavioural insights can play a key role in supporting policy makers and responsible agencies to drive take-up.

2.1 Summary of evidence review

Prior to this research project taking place, The Behavioural Insights Team (BIT) and WPI Economics, on behalf of the Environment Agency (EA), carried out an evidence review exploring the application of behavioural insights to property flood resilience.[8] This review drew on literature across the fields of flooding and hazards, behavioural science, and the intersection between these.

The primary output of this review was of a 'Decision journey' (full graphic below) comprising the key steps required, through a behavioural science lens, for an individual to become resilient against flooding.



Each of the steps in this decision journey relate to a set of attitudes, mindsets and beliefs required for an individual to take action to address their flood risk. The findings of the literature review are set out below.

'I know flooding might impact me'
Protection Motivation Theory (PMT) posits that people rationally appraise the likelihood of a hazard event taking place and calibrate their response to the risk accordingly, but in practice, people's perception of risk is more complex. The literature in relation to hazard awareness for flooding indicates that individuals have a poor understanding of the probability that they will be flooded. Furthermore, there are a range of other factors that affect people's understanding of risk beyond a rational calculation, including heuristics (or psychological shortcuts) and emotional cues.

'I feel able to take action and responsible for taking an action'

[8] BIT and WPI Economics (2020) 'Applying Behavioural Insights to Property flood Resilience' URL: https://assets.publishing.service.gov.uk/media/6038bfbce90e070558e429c2/Applying_behavioural_insights_to_property_flood_resilience_-_report.pdf

If individuals feel unable to address the risk that they face, then it is likely that they will disengage from the issue. Available evidence suggests that someone's view of whether they can actually address their risk (their 'self-efficacy') is more consequential as to whether they would act than an accurate appraisal of their chances of being flooded. In this context, it is known that most households do not have strong knowledge and understanding of the options available to them to address their flood risk, such as PFR.

In addition to 'can I act?', also important is 'should I act?'. A sense that fundamentally the state - rather than the household themselves - is responsible for defending homes from serious hazards such as flooding has been identified as a major barrier to take-up of PFR.

'I am able to access and assess available options'
An individual having the necessary information and capability to decide between different options is also a crucial element of ensuring that they (a) engage in the process at all and (b) make effective decisions about their resilience. The review of the evidence identified serious barriers here in relation to PFR for various reasons. In particular - the market is divergent, non-standardised, and complex to understand for non-professionals. Furthermore, the knowledge and understanding deficits identified under the previous heading prevent individuals from making choices between different options effectively.

'I adopt resilience measures'
At the stage of taking action to put in place PFR, a range of practical barriers emerge around cost, the real and perceived complexity of accessing financial help, and concerns about the aesthetics of PFR installations. 'Present bias' also has the effect of encouraging the avoidance of the upfront cost of installing PFR in exchange for a long term and uncertain benefit.

In addition, during the optimum times to install PFR (after a flood has taken place) an individual's priority will generally be to restore and re-enter their home as quickly as possible to bring what can be a traumatic experience to its conclusion.

Furthermore, among those who have not been flooded, even if vague intentions exist, the various frictional costs (hassle etc.) associated with installing PFR combine with human beings' tendency to procrastinate. This means that it will generally be avoided as a non-urgent task with no obvious deadline.

'I regularly check whether I am sufficiently protected'
Once installed, PFR needs to be regularly checked and maintained to be effective against flooding. There is little theory around formalising how people can be encouraged to fully maintain PFR. However, there are some interesting insights from the behavioural science literature around the use of defaults, trigger points, reminders, and deadlines to encourage follow-up or routine behaviours.

'I take action in critical moments'
This final step invokes some of what are currently key elements of the flood resilience landscape: flood warnings (to ensure people are aware of when a flood is likely and that they

need to act) and flood plans (to allow people to clearly set out in advance what their actions in response to a flood should be). The literature on implementation plans and intentions powerfully demonstrates the effectiveness of making pre-set strategies, as opposed to improvising when under pressure. The evidence also highlights the importance of social networks, since people often rely on their neighbours' or peers' behaviour to assess the severity of a risk, or the appropriate action, when a situation is uncertain. This can lead to issues of 'diffused responsibility' or collective inaction.

WPI and BIT drew on the insights from this initial evidence review as a baseline in deciding which precise behaviour to 'target' for influencing as part of this work.

3. Target

Following BIT's 'TEST' methodology, the first element of this project was to establish target behaviours, which would become the focus of intervention design and trialling. This is a mapping process to identify the specific behavioural problems that need to be addressed, across different audiences, to improve take-up of property flood resilience. Following this, there was a need to rank the behaviours identified on the basis of their feasibility and impact, and then build three specific target statements, articulating the objectives for three trials.

BIT and WPI held a workshop with key stakeholders across the property flood resilience sector to discuss and agree the target behaviours for the project. The stakeholders in attendance included representatives from EA, Defra, Flood Re, and other representatives from the resilience roundtables and the Pathfinder projects.

3.1 Summary of workshop outputs

The research drew upon the knowledge and experience of participants to select a series of target behaviours which could be the focus of the forthcoming behavioural insights trials. Potential target behaviours were selected on two bases:

The potential positive **impact** of achieving each of the target behaviours, including considerations around:

- Would changing the behaviour/psychological state have a big impact on flood resilience, for a given individual?
- How widespread is / would the behaviour be? I.e. does it solve a widespread problem or a rare problem?
- If this target behaviour were achieved, would it have a significant impact on achieving the objectives around property flood resilience?

In addition, the **feasibility** of influencing and measuring these behaviours in the context of this project, i.e.:

- What existing channels can you tap to influence behaviour?
- Are there easy substitutes for undesirable behaviours?
- Are there formidable barriers to changing the behaviour?

Several target behaviours were selected for further exploration as a result of the workshop discussion, many of which centred around the following:

- **Increased perception of householder responsibility for flood risk** - increased responsibility was identified as a vital part of the 'theory of change' in the previous literature review. Participants at the roundtable had a perception that - currently - many householders regard the government as mainly responsible for addressing their flood risk.
- **Increased sense that it is possible to reduce that risk (self-efficacy) -** a lack of understanding that there are tools available to address household flood risk (i.e. PFR)

or a feeling that these are inaccessible to homeowners were regarded as key barriers to householders engaging with their home's flood risk.

- **Household drafting a flood plan** - household flood planning was regarded as key in (a) increasing household engagement with their flood risk and what can be done to address it and (b) helping individuals (with or without PFR installed) to respond effectively in a flood event.

Following the workshop, and discussions with the EA and potential delivery partners in public and private sector organisations, three target behaviours were chosen as the focus of the three trials.

3.2 Objectives chosen

The three psychological/behavioural objectives to focus on during the Explore phase were:

1. Improve self-efficacy, responsibility, and awareness of flood resilience measures
2. Increase engagement with EA's online content about flooding
3. Improve engagement with, and usefulness of, flood plans

4. Explore

The purpose of the Explore phase was to understand better the context within which homeowners make decisions about PFR measures. Understanding the context helped to identify relevant behavioural barriers to adoption of the three target behaviours, which informed the project team's thinking when developing behavioural interventions during later phases.

4.1 Research questions

To expand on (and fill some evidence gaps from) the earlier literature review, the Explore phase aimed to better understand individuals' attitudes towards flooding and flood risk, as well as their understanding of the range of steps that can be taken to reduce flood risk to their home. This entailed focusing on three main research questions:

1. At what point do people accept they are at risk from flooding? Beyond being flooded, are there other events, triggers, or moments of change which help people acknowledge the threat?
2. What factors contribute to or diminish individuals' sense of empowerment, self-efficacy, and personal responsibility during a flood event?
3. What are the main frictions and barriers to developing a flood plan?

4.2 Methodology

To answer the research questions, the project team conducted two main activities:

1. **An online survey** which sampled 2,033 homes across England. The sample was nationally representative on gender, age, location, and income. Across the survey sample, 27.5% of respondents had experienced some form of flooding to their home. This is substantially higher than the average for England, suggesting the sample is biased towards those with some flooding experience. This was not due to deliberate over-sampling of high-risk counties, as participants in low-risk counties were slightly more likely to report experiences with recent flooding.
2. **Qualitative research,** which included five virtual focus groups with homeowners; three one-to-one interviews with homeowners; and ten one-to-one interviews with expert stakeholders from across the flood resilience sector.

4.3 Findings

A short summary of findings from the survey and focus groups is presented below. Full results can be found in a separate report, 'Applying behavioural insights to encourage PFR uptake: Target and Explore findings.' Key insights from the survey and qualitative research are provided below.

Table 7: Key insights from the survey and qualitative research

Key Insight 1: The risk of flooding is generally rated low amongst homeowners
• More than 70% of participants consider their flood risk to be somewhat or very low (despite 27.5% having recently experienced flooding). • Flooding experience is highly correlated with higher perceived risk of flooding.
Key Insight 2: Understanding of the range of sources of flood risk could be improved
• Overflowing rivers and surface water are more recognised as flood causes, compared to groundwater flooding, flood water rising inside homes, and rising sea levels. • Those who had been flooded are significantly more likely to identify surface water and groundwater flooding as a cause.
Key Insight 3: The experience of flooding influences the way in which people attribute responsibility for mitigating flood risk
• Those who had been flooded were more likely to attribute more responsibility for mitigating flood risk to charities, farmers, insurance companies, and themselves (compared to those who hadn't been flooded). • Self-efficacy around flood protection and the view that homeowners are responsible for protecting their home from floods are positively correlated. It is hard to feel responsible if one does not believe there is anything one can do.
• Some interviewees felt that responsibility for mitigating flood risk does not lie with the homeowner, and that instead the broader community and ultimately the state should take responsibility. For others, there was a clear view of homeowner responsibility. There was also a wide view of risk being somewhat shared - with each party doing what is in its own power to mitigate against flood risk (reciprocity). • Developers/builders (and those who permit development) were frequently highlighted as being mainly responsible for flood risk. • Those who had been previously flooded were more likely to view themselves as having responsibility for their own flood risk.
Key Insight 4: People take less responsibility for flood risk than other household risks
• Those who have been flooded assigned more responsibility to themselves for flood risk and more responsibility to the government for other risks.
• Homeowners were perceived as more responsible for mitigating burglary and fire risk. This was due to higher self-efficacy and the ubiquitous risk of fire and burglary.
Key Insight 5: The experience of flooding is a powerful influence on installing PFR

	• Cost and access to information are likely critical barriers for low-income households. • The experience of being flooded is a large driver in having conversations about PFR. • These conversations are happening primarily at the local level, despite more trust in information from government agencies and flood groups. • Being flooded is associated with a significantly higher level of trust in insurance companies and friends / family, compared to not being flooded.
	• Barriers to installing PFR include: self-efficacy and responsibility; lack of awareness of the options available; and perceived low risk for any investment in PFR. • Sources of information included: EA website, local government, insurers, charities / community groups, friends / family, water company, home survey or experienced individuals. Trust in these sources varied by location. • It was felt there were too many sources of guidance, in particular for PFR. However, there was an overall desire for more proactive information about high flood risk. • The home buying process was a crucial touchpoint for PFR awareness.
Key Insight 6: The experience of flooding is a strong predictor of knowing what a flood plan is and making one	
	• Government agencies and flood groups rank highly in terms of providing useful information to write a flood plan. • Barriers for writing a flood plan include perceived low risk, not knowing how to fill it out, and not failing to consider completing it. • Enablers for writing a flood plan include streamlining information, templates, and tips on how to make a flood plan from trusted government sources.
	• There was low awareness overall of flood plans (47%) and few participants (14%) had made one. • Awareness of flood plans was higher among those who had been flooded and 95% had one in place. The value in plans was said to be the process of creating one rather than the end product. • Barriers to writing a flood plan include perceived low risk, not thinking the plan useful and not wanting to think about flooding. • Enablers for writing a flood plan include templates (though may need a bespoke approach) and information from a trusted source.

4.4 Applying the Explore findings

The Explore findings were extremely valuable for informing the design of three trials to test potential interventions for increasing flood resilience.

Firstly, the Explore phase revealed that respondents who have been flooded are more likely to have engaged with the risks of floods, taken responsibility to protect their home (including installing products to mitigate flood risk), had conversations about flooding, and know what a flood plan is and have made one. Transferring the lessons learned from those who have

experienced flooding to those who haven't could be a useful guide when considering possible future interventions.

Secondly, the Explore findings suggested a number of possible barriers to flood responsibility. Three key insights fed into subsequent trial design:

1. **A strong link between perceived responsibility and self-efficacy:** homeowners are more likely to take responsibility for protecting their home from flooding if they feel they can carry out the required actions to reduce flood damage.
2. **Low awareness of risk and PFR:** homeowners have low awareness of the potential damage that could be caused to their property by flooding, and of the varied sources of flood risk. There is also a lack of awareness about the range of PFR measures available.
3. **Lack of time, thought and motivation to make a flood plan:** homeowners face specific barriers to making flood plans. The most significant of these was a lack of time and knowledge; other barriers included an aversion to thinking about flooding, little perceived value in creating one, and the idea of making a flood plan not occurring to them.

5. Trial 1: Improve the 'How to plan ahead for flooding' webpage

In Trial 1, BIT and WPI Economics aimed to improve the government's 'How to plan ahead for flooding' webpage, which presents information about how to prepare for flooding, mostly by implementing PFR measures. BIT then tested the impact of these changes via an online trial.

The project team focused on this webpage because it is a key touchpoint in the government's interactions with citizens to increase take-up of PFR measures. The project team hypothesised that citizens who visit this page are particularly receptive to advice and encouragement to adopt government recommendations.

5.1 Background

Reviews of previous flood events[9] and other research show that PFR measures can be effective at reducing risk and damage, and that packages of PFR measures could provide cost-effective protection for a wide range of residential properties across the UK.[10,11] PFR measures have been shown to provide a cost-effective route for many households and businesses looking to reduce both the risk of water entry and the damage caused when water does enter the property. A comparison of the damage caused by two similar floods in Cologne found that, due to property level flood protection measures, the costs of the two floods dropped from €65bn in 1993 to €30bn in 1995.[12] A report on the flood recovery schemes in England found that for every £1 spent on property flood resilience measures, approximately £5 could be saved in future flood damage costs.[13]

Despite the benefits of PFR measures, and grant schemes that subsidise their installation, take-up in the UK remains low.[14,15] While there is no systematic collection of data on the take-up of PFR measures, a range of survey evidence exists that demonstrates this. For example, a survey conducted among at risk people in England in 2013 found that 21% of respondents had bought flood protection equipment.[16] Another suggested that around 27% of

[9] Pitt, M., 2008. *The Pitt Review: learning lessons from the 2007 floods. An independent review*. London: Cabinet Office, 2008.
[10] Lamond, J., Rose, C., Bhattacharya-Mis, N. and Joseph, R., 2018. *Evidence review for property flood resilience phase 2 report*.
[11] Oakley, M., 2018. *Incentivising Household action on flooding: options for using incentives to increase the take up of flood resilience and resistance measures*. London: Social Market Foundation; Flood Re.
[12] Fink, Ulbrich, and Engel, 'Aspects of the January 1995 Flood in Germany'.
[13] Merret, 'Evaluation of the Defra Property-Level Flood Protection Scheme'.
[14] Wamsler & Lawson (2011) & Harries, T., (2008) 'Feeling secure or being secure? Why it can seem better not to protect yourself against a natural hazard', Health, Risk & Society, 10:5, 479 — 490.
[15] Harries, T., (2009), Review of the Pilot Flood Protection Grant Scheme in a Recently Flooded Area. R&D Technical Report FD2651/TR. Defra, London.
[16] Langley and Silman, 'Public Flood Survey: 2013 to 2014', 12.

households and businesses that have previously experienced flooding have taken up protection measures, while for those without previous experience the figure was only 6%.[17] Another estimate from 2008 found that overall, only 16% of households in areas at significant risk of flooding have taken any practical steps to reduce their exposure to risk.[18]

5.2 Solution

BIT and WPI Economics combined the findings from the Explore phase with BIT's EAST framework for behaviour change[19] and the organisations' knowledge of behavioural science to develop a set of potential solutions to increase people's sense of ability to protect their home and belongings against flood damage.

5.2.1 Methodology

In drafting the solutions, BIT and WPI Economics conducted a series of workshops to generate an initial set of ideas drawing on findings from the Explore phase; BIT's idea-generation frameworks EAST[20] and MINDSPACE,[21] and BIT, WPI Economics and EA's subject-matter expertise and knowledge of behavioural insights.

5.2.2 Proposed solutions

The project team developed three new versions of the 'How to plan ahead for flooding' webpage. The changes used a range of behavioural science techniques to adjust the framing used for each version.

BIT and WPI Economics compared two additional trial arms to the EA beta page: a 'pure' control where participants saw no webpage at all (Control A), and a version of a similar government webpage (not managed by the EA) on planning ahead for flooding (Control B).

Table 8 below sets out the control and treatment arms, and the behavioural techniques used to design the treatment arms.

Table 8: Trial 1 control and treatment arms

Condition	Description
Control A	**'Pure' control**: No web page presented (i.e. administration of outcome measures only).
Control B	**Current central government page managed by Government Digital Services (GDS)**: Current government flood information that includes content

[17] Thurston et al., 'Developing the Evidence Base for Flood Resistance and Resilience: Summary Report'.
[18] Thurston et al., 'Developing the Evidence Base for Flood Resistance and Resilience: Summary Report'.
[19] Behavioural Insights Team. (2014). EAST: Four simple ways to apply behavioural insights.
[20] Behavioural Insights Team (2014). EAST: Four simple ways to apply behavioural insights.
[21] Dolan, P., Hallsworth, M., Halpern, D., King, D., & Vlaev, I. (2010). MINDSPACE: influencing behaviour for public policy.

	from If you're about to be flooded,[22] Protect yourself from future flooding,[23] and Get insurance[24] on a single, non-interactive web page.
Control C	**Beta government page (by EA)**: Beta version of the How to plan ahead for flooding web page.[25]
Treatment A (Treatment A1 - younger couple - and Treatment A2 - older couple)	**Social modelling**: An altered version of Control C, where information and recommendations about PFR are framed as a case study from a couple who benefited from the PFR measures. *Behavioural insight: BIT and WPI Economics hypothesized that the use of social modelling[26] could increase self-efficacy among participants. People are more receptive to messengers that come from sources who are demographically similar to them[27] – with this in mind, the project team constructed two versions of Treatment A, with social models (in this case, a couple) of different ages.[28] Finally, the project team hoped the social model frame would increase the persuasiveness of the recommendations by showing participants a concrete example of how they can make a difference.*
Treatment B	**Enhanced beta (text only)**: Beta version of the How to plan ahead for flooding webpage, modified to chunk the information and present it in (what BIT and WPI Economics perceived to be) a more logical order. *Behavioural insight: Behavioural science practitioners have used simplification to reduce prescribing errors[29], increase college applications[30], and increase online license plate renewals.[31] In a similar fashion, BIT and WPI Economics hoped that simplification and 'chunking' of information to make it easier to understand would yield improved self-efficacy, response-efficacy, and awareness.*

[22]Gov.uk, 'Prepare for flooding', URL [https://www.gov.uk/prepare-for-flooding]
[23] Gov.uk, 'Prepare for future flooding', URL [https://www.gov.uk/prepare-for-flooding/future-flooding]
[24] Gov.uk, 'Get insurance', URL [https://www.gov.uk/prepare-for-flooding/get-insurance]
[25] Gov.uk, 'How to plan ahead for flooding', URL [https://flood-warning-information.service.gov.uk/plan-ahead-for-flooding]
[26] Bandura, A. (2008). An agentic perspective on positive psychology. In S. J. Lopez (Ed.), Praeger perspectives. Positive psychology: Exploring the best in people, Vol. 1. Discovering human strengths (p. 167–196). Praeger Publishers, Greenwood Publishing Group.
[27] Cabinet Office & Institute for Government (2010). 'MINDSPACE: Influencing behaviour through public policy.'
[28] Note: BIT and WPI Economics thank the Weighill & Broadhead family for providing photos of themselves in front of their home for us to use in Treatments A1 and A2 (the older couple and younger couple in the social modelling arm).
[29] King, D., Jabbar, A., Charani, E., Bicknell, C., Wu, Z., Miller, G., ... & Darzi, A. (2014). Redesigning the 'choice architecture' of hospital prescription charts: a mixed methods study incorporating in situ simulation testing. *BMJ open*, *4*(12), e005473.
[30] Bettinger, E. P., Long, B. T., Oreopoulos, P., & Sanbonmatsu, L. (2012). The role of application assistance and information in college decisions: Results from the H&R Block FAFSA experiment. *The Quarterly Journal of Economics*, *127*(3), 1205-1242.
[31] Behavioural Insights Team (2016). *2015-2016 Update Report.*

Treatment C	**Enhanced beta (text + images)**: Beta version of the How to plan ahead for flooding webpage, modified to chunk the information, present it in (what BIT and WPI Economics perceived to be) a more logical order, and with images added to illustrate the page's recommendations. *Behavioural insight: BIT and WPI Economics hypothesised that using images to illustrate recommended PFR measures and related recommendations would make them more salient,[32] thereby improving engagement,[33] while also increasing participants' sense that the recommendations were concrete, achievable steps.*

5.3 Trial design and results

5.3.1 Trial design

Sample selection and eligibility

BIT ran a randomised controlled online trial, where they showed different versions of the webpage to samples of ~600 participants each (except for Treatment A, in which Treatments A1 and A2 each had ~600 participants). The total sample was 4,196 participants. After participants saw their trial arm's webpage (or saw nothing, in a 'pure control' arm), BIT surveyed participants on attitudinal and awareness measures.[34] Participants were financially incentivised to take part in the trial.

Outcome measures

BIT and WPI Economics created a set of primary, secondary, and exploratory outcome measures based on a battery of survey questions participants answered after they viewed the webpages.

Table 9: Trial 1 outcome measures

Measure	Definition
Primary	
Combined self-efficacy and response-efficacy for engaging with PFR	Mean self-rated agreement with these two statements: "I feel able to protect my home and belongings against flood

[32] In this report, 'salient' and 'salience' refer to making key features of a communication more noticeable, conspicuous, and/or prominent.
[33] Cabinet Office & Institute for Government (2010). *MINDSPACE: Influencing behaviour through public policy.*
[34] BIT recruited a representative sample of the UK with respect to gender, age bracket, income bracket, and location. BIT excluded participants who did not own their own properties. Allocation to treatment was randomised, where randomisation was stratified on participants' answer to a question about whether they had ever experienced flooding in their property (the purpose of stratification was to ensure balance on this important variable between trial arms).

measures	damage." 0 - Complete disagreement; 100 - Complete agreement
Secondary	
Self-efficacy for engaging with PFR measures	Self-rated agreement with this statement: "I have the skills and capability to take steps to protect my home and belongings from flood damage." 0 - Complete disagreement; 100 - Complete agreement
Resource-adequacy	Self-rated agreement with this statement: "I have the resources I need to take steps to protect my home and belongings from flood damage." 0 - Complete disagreement; 100 - Complete agreement
Response-efficacy for engaging with PFR measures	Self-rated agreement with this statement: "There are concrete steps households can take to protect their homes and belongings from flood damage." 0 - Complete disagreement; 100 - Complete agreement
Exploratory	
Perception of personal responsibility for engaging with PFR measures	Response to this question: "Who is more responsible for protecting your home from flood damage – the homeowner or the government?" 0 Homeowner / 1 Mostly homeowner / 2 Equally responsible / 3 Mostly government / 4 Government
Awareness of PFR measures - unprompted	Free text response: "What are some measures that may protect properties from flooding? We mean modifications to your home, or products you could use, to reduce the risk of water getting in your property, and/or reduce the damage caused by floodwater once it's in your property. We have given space for up to 10 answers." (BIT and WPI Economics then created a list of words and phrases comprising common property flood resilience measures, including alternate spellings and common misspellings of each. We then counted the number of words / phrases from the list that the participant listed (counting only 1 for each word/phrase on the list, even if the participant used the word/phrase more than

	once.)
Awareness of PFR measures mentioned on Control C and Treatments A-C (note that this is the key outcome in this question)	"Does [_____] help protect your property and/or belongings from flood damage?" - 5 PFR measures mentioned on Control C and Treatments A-C: ● "Clearing debris out of drains and gullies" ● "Laying tiles instead of carpets" ● "Raising electrical sockets" ● "Installing non-return valves in pipes" ● "Installing raised door seals" - 2 PFR products **not** mentioned on **any** of the five trial arms' pages ● "Repainting brickwork with a water-resistant mortar" ● "Raising appliances onto plinths" - 2 non-PFR products ● "Making sure your garden hose is long enough to reach all areas of your house" ● "Keeping your thermostat as hot as possible for as long as you have electricity" Yes / No / I don't know
Awareness of PFR measures **not** mentioned on **any** of the trial arms' pages (note that this outcome is of more peripheral interest in this question)	
Awareness of non-PFR measures **mistakenly** considered PFR measures (note that this outcome is of more peripheral interest in this question)	

5.3.2 Results

In this trial, the EA beta page served as the main benchmark counterfactual against which all comparisons were made. This is because the EA advised us that this is closest to what they believe will become the 'business as usual' page to help people plan ahead for flooding.

In analysing trials, BIT specifies analyses as primary, secondary, and exploratory. These analyses are usually dictated simply by the outcome measure they concern. However, where trials have many arms, as this one did, BIT also sometimes pre-specifies comparisons with certain arms as 'exploratory' even if the analysis concerns primary or secondary *outcome measures*. In this case, BIT prespecified that the key comparisons would be the EA beta and the three treatments involving tweaks to it. BIT prespecified as exploratory analyses comparisons between the controls – Control A (the 'pure control'), Control B (the gov.uk webpage managed by Government Digital Services), and Control C (the EA beta). This means that differences between the Controls – even statistically significant ones – should be treated with caution until replicated by further testing.

Primary analysis

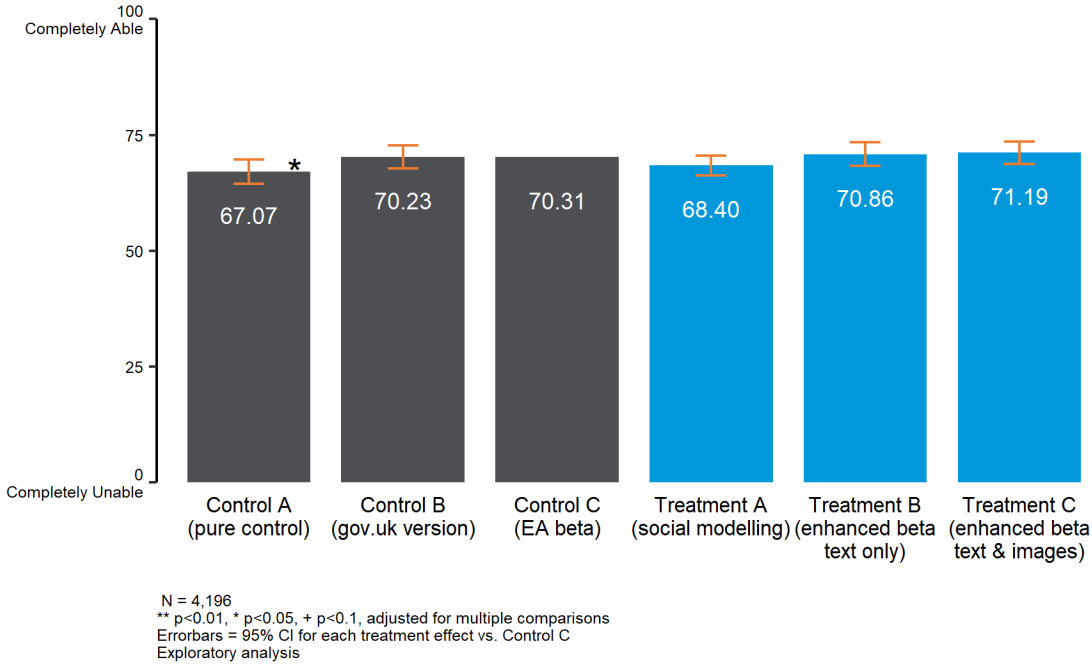
For the primary analysis, BIT tested the participants' perceived ability to protect their home and belongings against flood damage. Average perceived ability to protect home and belongings against flood damage was 69, where 0 corresponds to 'completely unable' and 100 'completely able'. The three treatments based on the EA beta did not differ from the EA beta in terms of participants' response to this question.

However, there are several notable associations between this outcome and other covariates:

- Prior experience with flooding (stratifying variable) is strongly predictive of perceived ability to protect against flooding: those without any personal experience self-report a score 6 points higher than those who have experienced a flood in the past 12 months.
- Those living in a flat above the ground floor report being 5 points better able to protect against flooding compared to those in houses, on average.
- Men, and those aged 55 and over, report significantly higher scores compared to women and 18- to 24-year-olds, respectively.

In addition, exploratory analyses indicate that the EA beta outperformed the 'pure control', though there was no difference between it and the gov.uk webpage.

Figure 1: Combined self- and response-efficacy measure by treatment arm



Secondary analysis

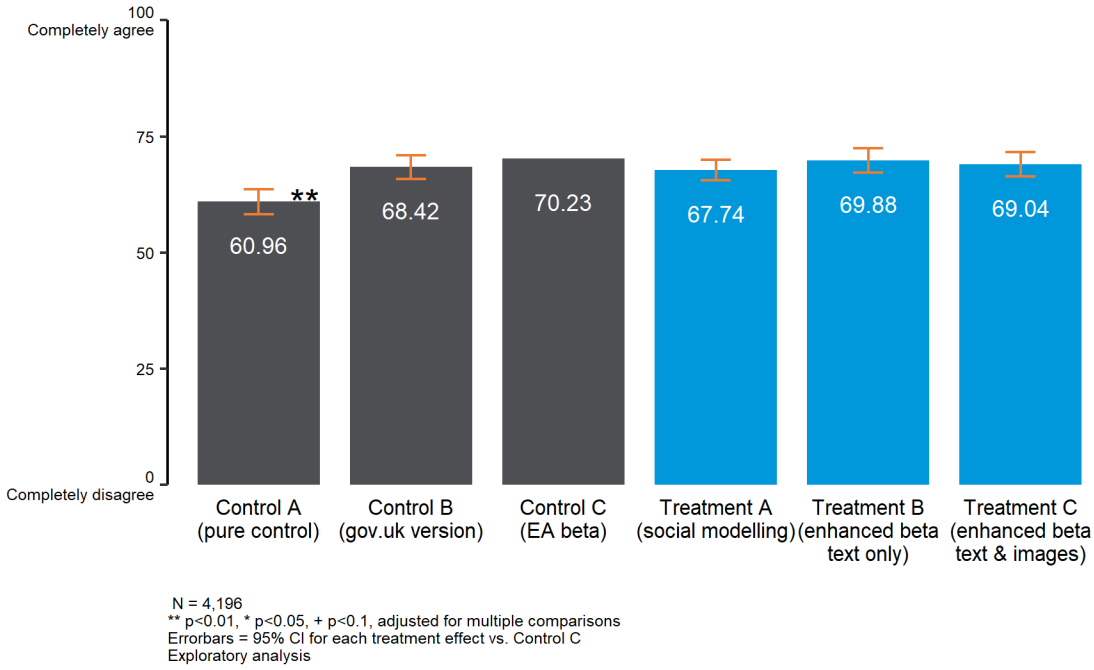
As secondary analysis, BIT were interested in comparing agreement (0-100) with three further statements, to make a finer distinction between self-efficacy, response-efficacy, and resource-adequacy (each of which were hypothesised as distinct concepts, but all contributing to the aforementioned primary outcome):

1. "I have the skills and capability to take steps to protect my home and belongings from flood damage." (self-efficacy). Overall, average reported self-efficacy was 67.
2. "There are concrete steps households can take to protect their homes and belongings from flood damage." (response-efficacy). Overall, average reported response-efficacy was 74.

3. “I have the resources I need to take steps to protect my home and belongings from flood damage.” (resource-adequacy). Overall, average reported resource-adequacy was 65.

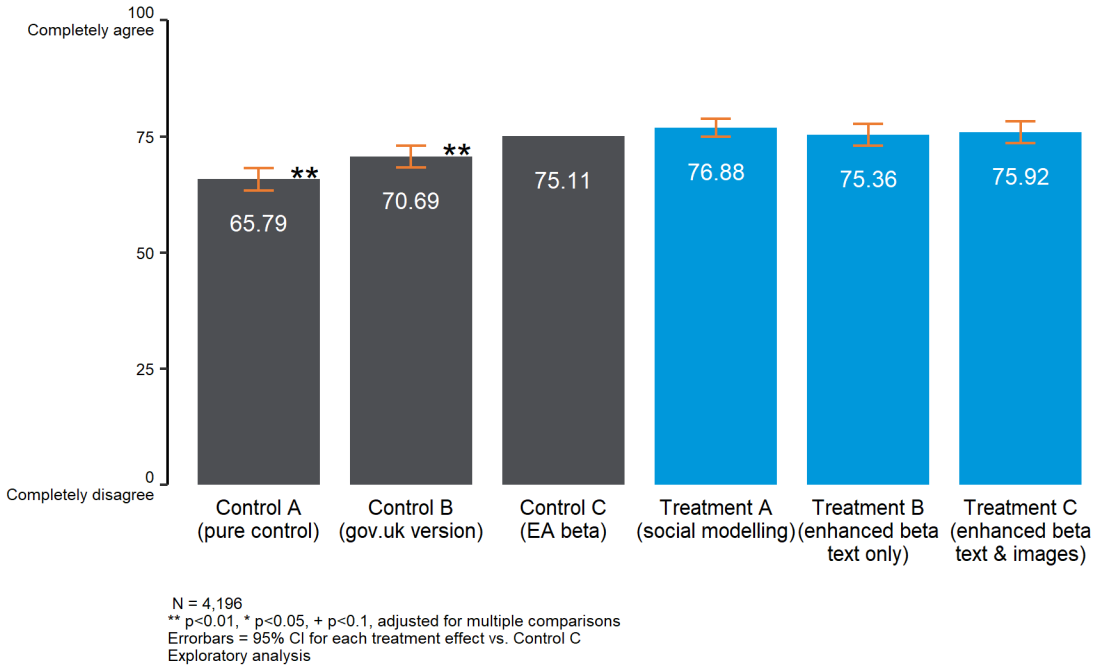
Similar to the primary analysis, there were no significant differences between Control C (EA version) and the three treatment versions. Agreement with each of the three statements was significantly lower in control A vs the remaining conditions, providing support for the use of web-page guidance on PFR measures in general. Furthermore, Control C (the EA version) scored significantly better than the existing gov.uk version (Control B) for response-efficacy and resource-adequacy. However, the adaptations in EA and BIT versions are not meaningfully different in terms of primary and secondary outcomes.

Figure 2: Self-efficacy by treatment arm



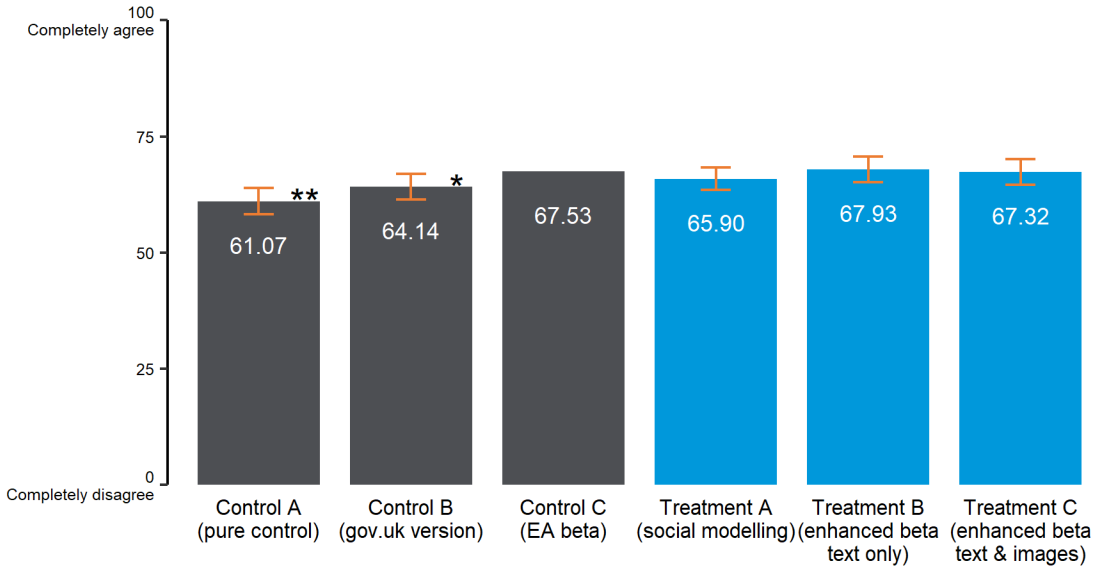
N = 4,196
** p<0.01, * p<0.05, + p<0.1, adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control C
Exploratory analysis

Figure 3: Response-efficacy by treatment arm



N = 4,196
** p<0.01, * p<0.05, + p<0.1, adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control C
Exploratory analysis

Figure 4: Resource-adequacy by treatment arm



N = 4,196
** p<0.01, * p<0.05, + p<0.1, adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control C
Exploratory analysis

Exploratory analysis

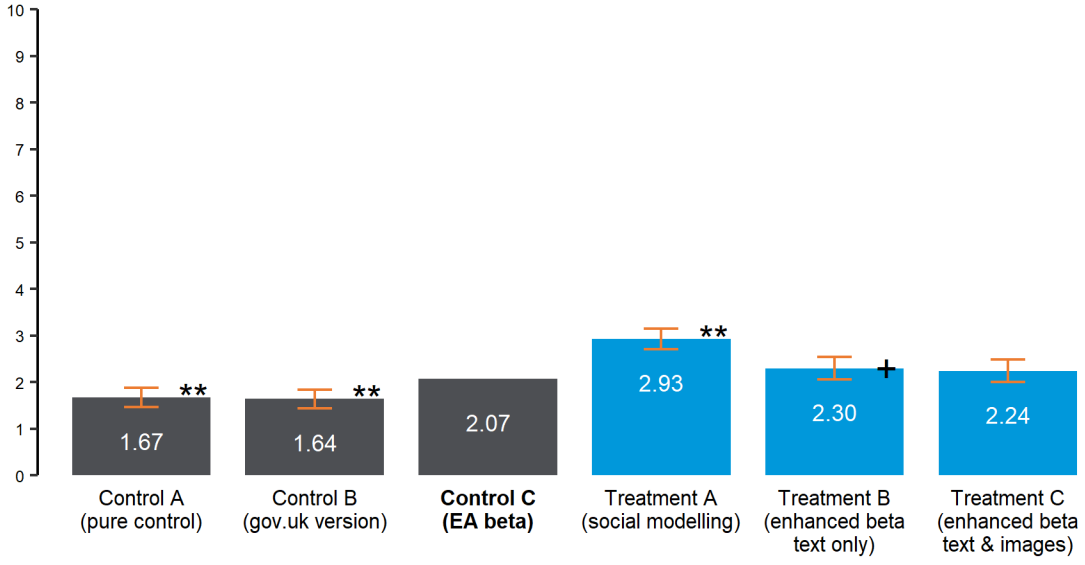
Additional exploratory analyses examined participants' *awareness* of PFR measures across trial arms:

- the number of PFR measures referenced in free-text entries
- the number of PFR measures correctly identified that were mentioned on the web pages
- the number of non-PFR measures incorrectly identified as PFR
- the number of PFR measures identified that were not mentioned on the simulated web pages.

Finally, exploratory analysis compared participants' perceptions of the relative responsibility of government versus households in protecting property from flood damage.

Number of PFR measures referenced (unprompted): The number of PFR measures referenced is significantly higher in Treatment A (social modelling) compared to Control C (EA version), with participants correctly referencing nearly one more PFR measure on average. The same directional difference was observed between Treatment B (enhanced beta) and Control C, though smaller in magnitude. The EA and BIT versions all significantly outperformed the gov.uk version (Control B), as well as the pure control.

Figure 5: Number of PFR measures referenced (unprompted) by treatment arm



N = 4,196
** p<0.01, * p<0.05, + p<0.1, not adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control C
Exploratory analysis

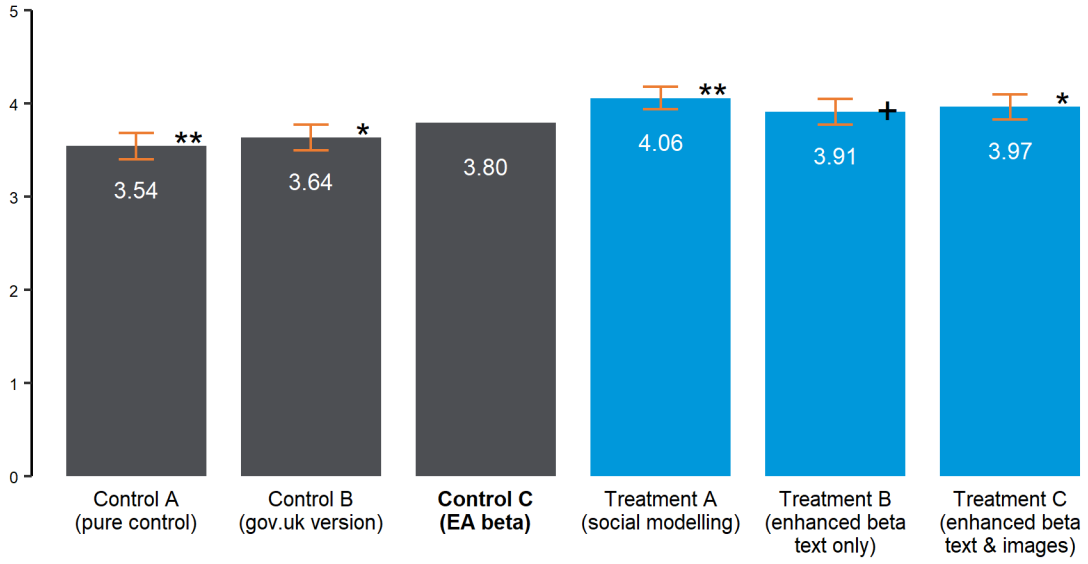
Awareness of the 5 PFR measures mentioned on Control C and Treatments A-C: Awareness of the 5 main PFR measures mentioned on Control C and Treatments A-C[35] is significantly higher in the BIT treatment versions of the web page compared to the EA version; this difference ranges from 0.1 to 0.25 more key PFR measures across treatments

[35] These were: "Clearing debris out of drains and gullies", "Laying tiles instead of carpets", "Raising electrical sockets", "Installing non-return valves in pipes", and "Installing raised door seals".

A-C. Furthermore, Control C and Treatments A-C significantly outperformed the gov.uk version, as well as the pure control on this outcome.

The number of non-PFR measures mistakenly identified was low across arms (around 0.4 overall) and did not significantly differ across any versions of the web page. Similarly, awareness of more niche PFR measures (not mentioned on any of the webpage versions participants saw) did not significantly differ across any of versions of the web page.

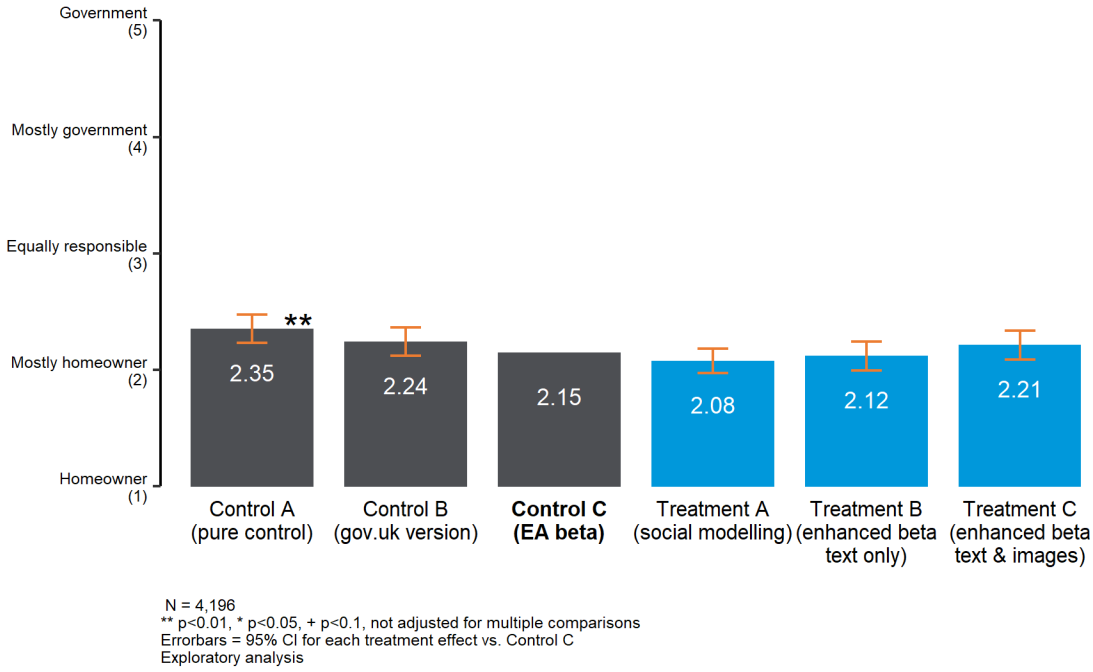
Figure 6: Awareness of PFR measures (prompted) by treatment arm



N = 4,196
** p<0.01, * p<0.05, + p<0.1, not adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control C
Exploratory analysis

Perceived responsibility for "protecting your home from flood damage": All of the simulated web page designs slightly decreased participants' expectations about the relative responsibility of the government in protecting property against flooding. This represented a shift in average perceptions halfway between 'Mostly homeowner' and 'Equally responsible' towards 'Mostly homeowner', suggesting that exposure to PFR materials help make people more willing to take on some responsibility in processes which protect against flood damage.

Figure 7: Perceived responsibility for protecting home from flood damage by treatment arm



Exploratory analyses: Does it help to have a social model who is similar (at least in age) to participants?

Finally, BIT also descriptively looked at whether there were differential effects across the primary and secondary outcomes within the Treatment A sub-arms A1 and A2, which varied the couple's identities used in the social model. As specified, the identity BIT varied was the couple's age – Treatment A1 uses pictures of a younger couple, whereas Treatment A2 uses pictures of an older couple, and all other aspects of the treatments are identical.

There was no evidence of differential identity effects across primary and secondary outcomes. Scores for older participants are consistently higher than for those aged below 45, but *differences* between A1 and A2 for these subgroups are very small in magnitude and statistically insignificant.

5.4 Discussion

The primary and secondary analysis show limited improvements from the treatments above and beyond the EA beta in terms of the primary outcome: combined self-efficacy and response-efficacy. The same is true for the secondary outcomes, self-efficacy, response-efficacy, and resource-adequacy. In considering these results, it is relevant to note that the design of the EA beta had been thoughtfully considered already, and therefore may have been difficult to improve on.

Relatedly, beyond the treatments' restructuring and chunking of the EA beta's tips, the treatments' changes to the EA beta involved making some *additions*, such as discussing the importance of obtaining a flood survey.[36] Even during design, the project team considered that these additions might have the disadvantage of reducing simplicity; in the end, the additions either had little effect or had a benefit that was balanced out by the detriment of reducing simplicity.

A second point to consider is that the motivation for many of the changes was to help people become more *informed* about taking up PFR measures. The project team hypothesised that becoming more informed would make participants feel more confident about installing PFR measures and increase the extent to which they feel PFR measures protect their property from flood damage. However, the connection between informedness and self-efficacy is complex. For example, it is theoretically possible that becoming more informed could *increase* self-efficacy for some, *reduce* self-efficacy for others (e.g. a previously overconfident person[37]), or have little effect at all. All one can be sure of from these findings is that the treatments did not improve *average* self-efficacy across participants.

With this in mind, it is interesting to note that the treatments did have some impact on exploratory outcome measures. In particular Treatment A (social modelling) seemed to increase people's recall/awareness of PFR measures, in both the 'unprompted' and 'prompted' measures of their awareness, compared to the EA beta. The other two treatments – the 'enhanced' beta versions, with and without images – also seemed to increase participants' awareness of PFR measures compared to the EA beta. That said, these findings are exploratory, meaning that the reader should be cautious about them until further research replicates them, as noted above.

One final cluster of potentially interesting findings, again from the exploratory analysis, is that the EA beta (alongside all of BIT's versions) were superior to the similar gov.uk (GDS-managed) webpage in terms of some of the secondary and exploratory outcomes, in particular response-efficacy, resource-adequacy, and awareness of PFR measures. This provides a strong validation for rolling-out the new beta version, and/or adopting aspects of BIT's versions, in place of the older GDS-managed page. The results provide strong validation that the web pages provide significant benefit compared to seeing no content at all. Though this isn't surprising, it was not a given, and confirms the value of Trial 2's objective: boosting the number of people who visit key flood information web pages.

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[36] That said, having informally interviewed various EA experts in the course of creating these interventions, BIT and WPI Economics believe that it is very important for the EA and other sources of flood preparation tips to emphasise the importance of obtaining a flood survey. This is the most important first step along the PFR 'journey' for the great majority of households, yet very few stakeholders in the flooding community emphasise it.

[37] Indeed, the results indicate that people who have experienced a flood have lower self-efficacy in the Explore work, suggesting that being more informed may well diminish self-efficacy, by correcting overconfidence. Similarly, as noted above, in this trial, those without any personal experience self-report a score 6 points higher than those who have experienced a flood in the past 12 months.

6. Trial 2: Increase click-through traffic to key web content from social media ads

6.1 Background

As the exploratory analysis from Trial 1 indicates, showing citizens information about preparing for floods is an important influence on their self-efficacy, response-efficacy, and awareness of PFR measures. The EA runs many activities to raise awareness about flood readiness and direct people to EA websites about preparing for floods, particularly during their flood action campaign, which runs from October through the end of March each year. Social media ad campaigns form an important part of these activities. BIT worked with the EA social media team to test a few ad variants as part of two of their social media campaigns.

This trial consisted of two separate but closely related trials:

- Three Facebook and Instagram ad variants run during the 'flood action campaign' from October 2020 through March 2021
- Four Facebook and Instagram ad variants run during flood action week (09 through 15 Nov 2020).

In both cases, the main call to action of the ads was for users to visit the gov.uk webpage 'What to do in a flood.'[38] Note that the ad variants looked the same on Facebook and Instagram, and BIT did not differentiate in analysis between the platform on which a user saw the ad.

6.2 Solution

A key finding from the Explore research was that government communications should 'go beyond merely informing' by also 'persuasively conveying that there are effective things that homeowners can do to reduce risk, and that homeowners should shoulder some of the responsibility to do so.'

One way to do this is to highlight the implicit social contract / reciprocity[39] between the government and citizens. This trial – testing whether an appeal to reciprocity improves Facebook users' click-through to information about what to do in a flood – serves as a small test of this general idea.

[38] Environment Agency, 'What to do in a flood', URL [https://flood-warning-information.service.gov.uk/what-to-do-in-a-flood]

[39] In this report, 'reciprocity' refers to the idea that the government *and* homeowners *both* do what is in their power to reduce flood risk – and that homeowners are more willing to 'do their bit' when the government is doing 'its bit', too.

This trial investigated the extent to which reciprocity is a message framing that motivates people to inform themselves about what to do in a flood.

The project team was interested in testing the reciprocity framing for two reasons. First, it may create communications that garner higher engagement and response rates from citizens. Second, it may have the beneficial co-benefit of sending the message to citizens that flood resilience is a shared responsibility.

What is meant by reciprocity?

Reciprocity refers to the social norm of repaying favours, gifts, invitations, etc., sometimes with a reciprocal action whose value is higher than the original gift. An example from BIT's work is that writing 'I've booked you a place' on recruitment event invitations increased attendance above and beyond a 'business as usual' text.[40] Making the reciprocal relationship between an advisor and their jobseeker salient increased the jobseeker's sense of duty to follow through on the advisor's efforts.

Reciprocity is not necessarily only a person-to-person phenomenon; community groups and government organisations can leverage reciprocity, too. For example, people were more likely to sign up to be organ donors if messages asked 'If you needed an organ transplant, would you have one? If so please help others.'[41] In other words, making reciprocity salient increases willingness to sign up to be an organ donor.

Note that a closely related concept is 'operational transparency' – when users of a service can see the work that goes into that service, they value it more. The canonical example is that customers who could see chefs preparing their food reported higher satisfaction with that food than customers who received the same food but could not see its preparation.[42] The EA, local authorities, and other parts of the government invest a good deal of time and spending in flood resilience; this means there are some interesting opportunities to highlight this effort and tap into an implicit norm of reciprocity between the government and households.

BIT and WPI Economics created the treatments based on rapid idea generation sessions held internally and with the EA social media team.

[40] Sanders, M & Kirkman, E. (2014). I've booked you a place. Good luck: A field experiment applying behavioural science to improve attendance at high-impact recruitment events. *Centre for Market and Public Organisation Working Paper Series No. 14/334.*
[41] Cabinet Office Behavioural Insights Team (2013). *Applying behavioral insights to organ donation.*
[42] Buell, R.Y., Kim, T. & Tsay, C. (2015). Creating reciprocal value through operational transparency. *Harvard Business School, working paper.*

Table 10: Trial 2 control and treatment for the flood action campaign ad variants

Condition	Text in ad (*and behavioural insight underpinning the text, where applicable*)[43]	Preview link
Control: curiosity framing	Would you know what to do in a flood? On a rainy day like today it's a good time to find out.	https://fb.me/1VaWWwgGEkvX7Bo
Treatment 1: location reciprocity	We're focusing on protecting Bath from flooding this winter, but we need you to do your bit too. *Behavioural insight: Leverage **reciprocity**[44] to improve engagement and **personalise**[45] information (i.e. location) to increase salience.*	https://fb.me/1P7snpsPnKeaYgq
Treatment 2: location risk	Your property in Bath could be at risk of flooding. Learn about simple steps you can take to prepare. *Behavioural insight: Leverage **loss-aversion**[46] by emphasising the level of risk flooding poses to users' homes and **personalise**[47] information (i.e. location) to increase salience.*	https://fb.me/1Ki16s4DsZwmnEr

[43] Please note that the city is only 'Bath' for illustration; the area may be any of the 14 areas EA targeted
[44] Sanders, M & Kirkman, E. (2014). I've booked you a place. Good luck: A field experiment applying behavioural science to improve attendance at high-impact recruitment events. Centre for Market and Public Organisation Working Paper Series No. 14/334.
[45] Behavioural Insights Team (2014). EAST: Four simple ways to apply behavioural insights.
[46] Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent mode. The Quarterly Journal of Economics, 106(4), 1039-1061.
[47] Behavioural Insights Team (2014). EAST: Four simple ways to apply behavioural insights.

Figure 8: A screenshot of the location reciprocity flood action campaign ad variant

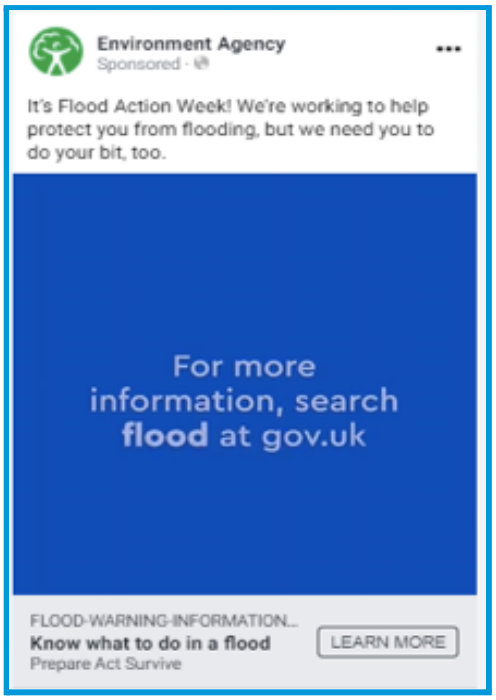
Table 11: Trial 2 control and treatment for the flood action campaign ad variants for the flood action week ad variants

Condition	Text in ad (*and behavioural insight underpinning the text, where applicable*)
Control: Question	It's Flood Action Week! Do you know what to do to keep you and your things safe in a flood?
Reciprocity	It's Flood Action Week! We're working to help protect you from flooding, but we need you to do your bit, too. *Behavioural insight: Leverage **reciprocity**[48] to improve engagement.*
Ability	It's Flood Action Week! You can take these simple but important steps to stay safe in a flood. *Behavioural insight: Support **self-efficacy**[49] by highlighting that there are simple steps homeowners can take to protect their homes from flooding.*
Loss aversion	It's Flood Action Week! Take action now before a flood ruins the things you value most.

[48] Sanders, M & Kirkman, E. (2014). I've booked you a place. Good luck: A field experiment applying behavioural science to improve attendance at high-impact recruitment events. Centre for Market and Public Organisation Working Paper Series No. 14/334.
[49] Bandura, A. (2008). An agentic perspective on positive psychology. In S. J. Lopez (Ed.), Praeger perspectives. Positive psychology: Exploring the best in people, Vol. 1. Discovering human strengths (p. 167–196). Praeger Publishers, Greenwood Publishing Group.

	*Behavioural insight: Leverage **loss aversion**[50] by prompting users to reflect on which possessions they might lose in the event of a flood.*

Figure 9: A screenshot of the reciprocity flood action week ad variant



6.3 Trial design and results

6.3.1 Trial design

This trial actually consisted of *two* field experiments using Environment Agency advertisements on Facebook and Instagram. Facebook users targeted by Facebook according to criteria set by the Environment Agency were allocated quasi-randomly into the trial arms.

In this trial, BIT could not use 'individual'-level randomisation. Each time an individual used Facebook, they were randomised to see a different ad variant (this is called an 'impression'). This means that an individual may end up seeing the same variant multiple times, may end up seeing multiple variants, or both. Facebook is sometimes able to track whether two 'impressions' are associated with the same user. An individual who sees the same ad multiple times is said to have been 'reached' just once – 'reach' is thus closer to how BIT would usually conceive of 'individual'-level randomisation (but note that this individual may still see the other ad variants, too).

[50] Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent mode. The Quarterly Journal of Economics, 106(4), 1039-1061.

Limitations

A key limitation to this trial is that users' allocation to ad variants was only quasi-random. Facebook tries to optimise which variant it shows a user based on the user's characteristics. This means that the trial is not a perfectly randomised A/B test. This has a few implications for interpretation – in particular, the treatment effects may be overestimated. This is because Facebook's algorithm presumably optimises the apparent chance of click-through for whatever it chooses, and so it might 'write off' one treatment if it happens to do badly early on, which is more likely if that treatment has been unlucky. BIT cannot correct for this, given uncertainties about how Facebook's algorithm works. Related to this, our standard error estimates may be too low. However, the experiment was very well powered, so BIT expects this effect to be small.

Outcome measures

The table below lists the outcome measures and covariates used in this trial.

Table 12: Trial 2 outcome measures

PRIMARY		
Measure	**Definition**	**Coding**
Click-through	Participants may click the main link to https://flood-warning-information.service.gov.uk/what-to-do-in-a-flood). If they do, they count as having 'clicked through'.	Binary – 1 if the user clicked the main link, else 0.
SECONDARY		
Video played to completion	Participants may allow the video to play through to completion. This may be an active choice. However, the video starts automatically for at least some users. This means that video completion may not be an active choice for many users.	Binary – 1 if the user let the video play to completion, else 0.

The flood action campaign ads reached 2,879,093 people, and the flood action week campaign reached (a potentially overlapping) 4,556,862 people. The following table shows the key summary stats from these two mini-trials.

Table 13: Flood action campaign and flood action week ad variants: summary statistics

	Flood action campaign (October 2020 through March 2021)	**Flood action week (09 through 15 Nov 2020)**
Impressions (which may include the same IP address seeing an ad	6,772,022	4,596,121

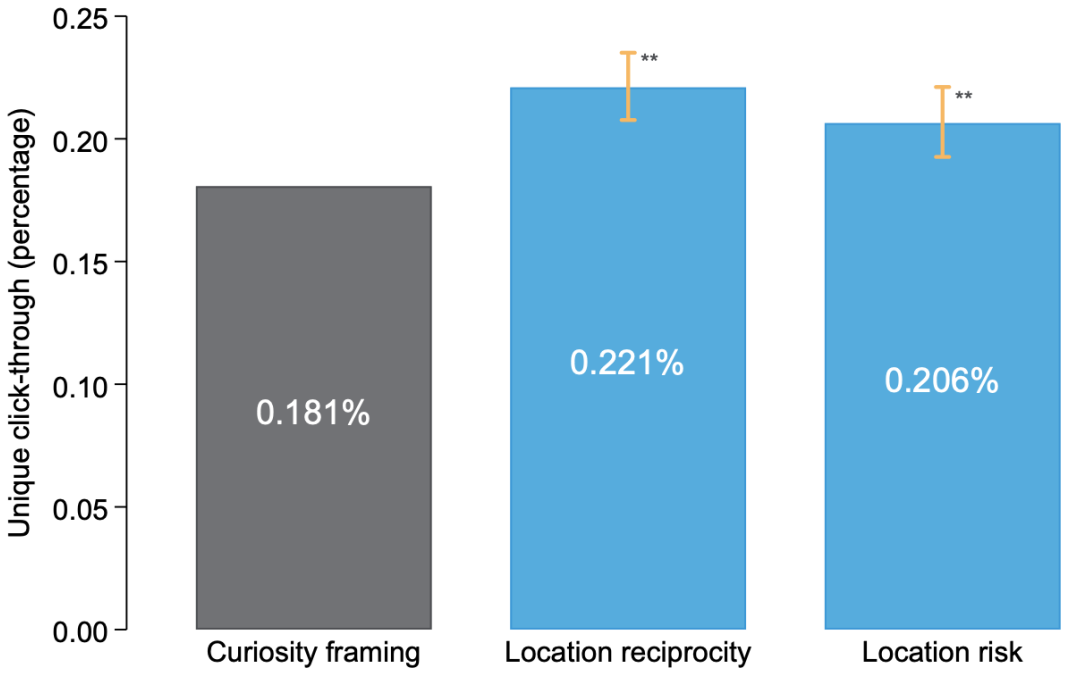
multiple times and/or seeing multiple ad variants)		
Reach (unique IP addresses shown the ad)	2,879,093	4,556,862
Unique clicks ('unique' in the sense that multiple clicks from the same IP address count only once)	5,705	3,099
Plays of the ad's video to completion	28,417	5,191

6.3.2 Results

Primary analysis

Among the flood action campaign ads, the location-specific reciprocity arm had the highest unique click-through rate (0.22%), which was significantly higher than the 'curiosity framing' arm. The location-specific 'risk' arm also had a unique click-through rate (0.21%) that was significantly higher than the 'curiosity framing' arm. (All differences significant at $p<0.01$.)

Figure 10: click-through by variant in the flood action campaign



n = 2,879,093

** p < 0.01, * p < 0.05, + p < 0.1 – thresholds adjusted for multiple (2) comparisons

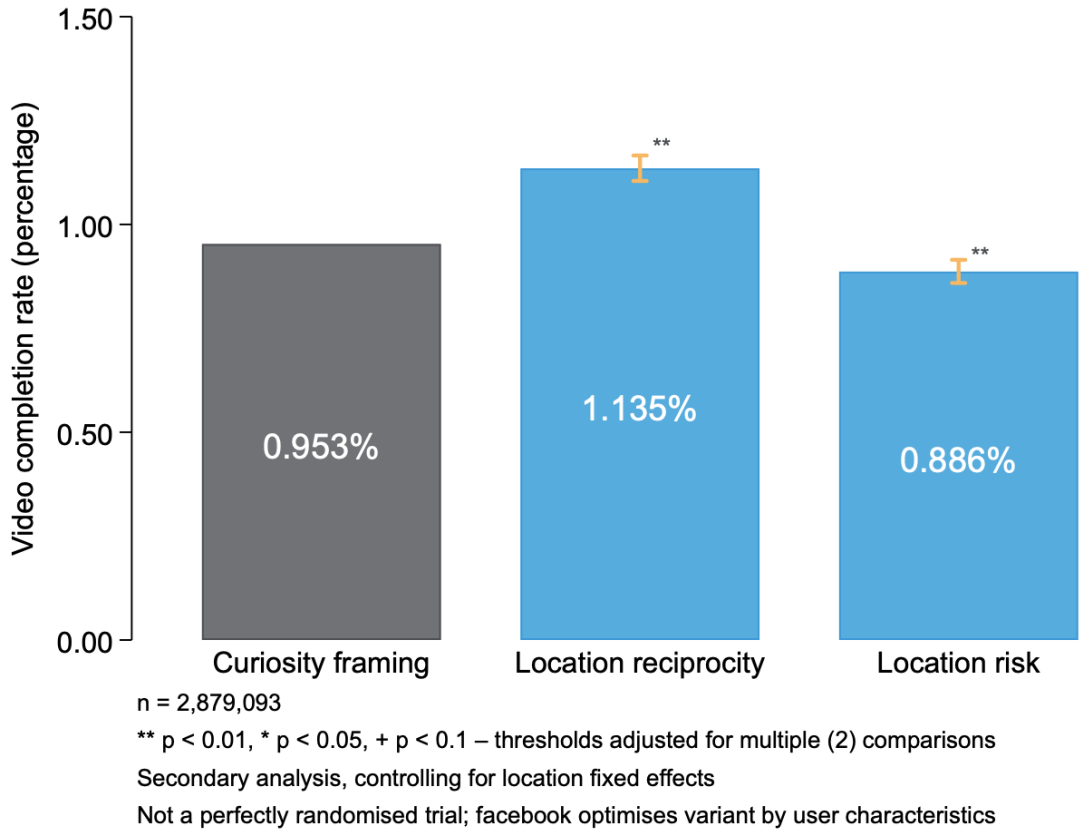
Primary analysis, controlling for location fixed effects

Not a perfectly randomised trial; facebook optimises variant by user characteristics

Secondary analysis

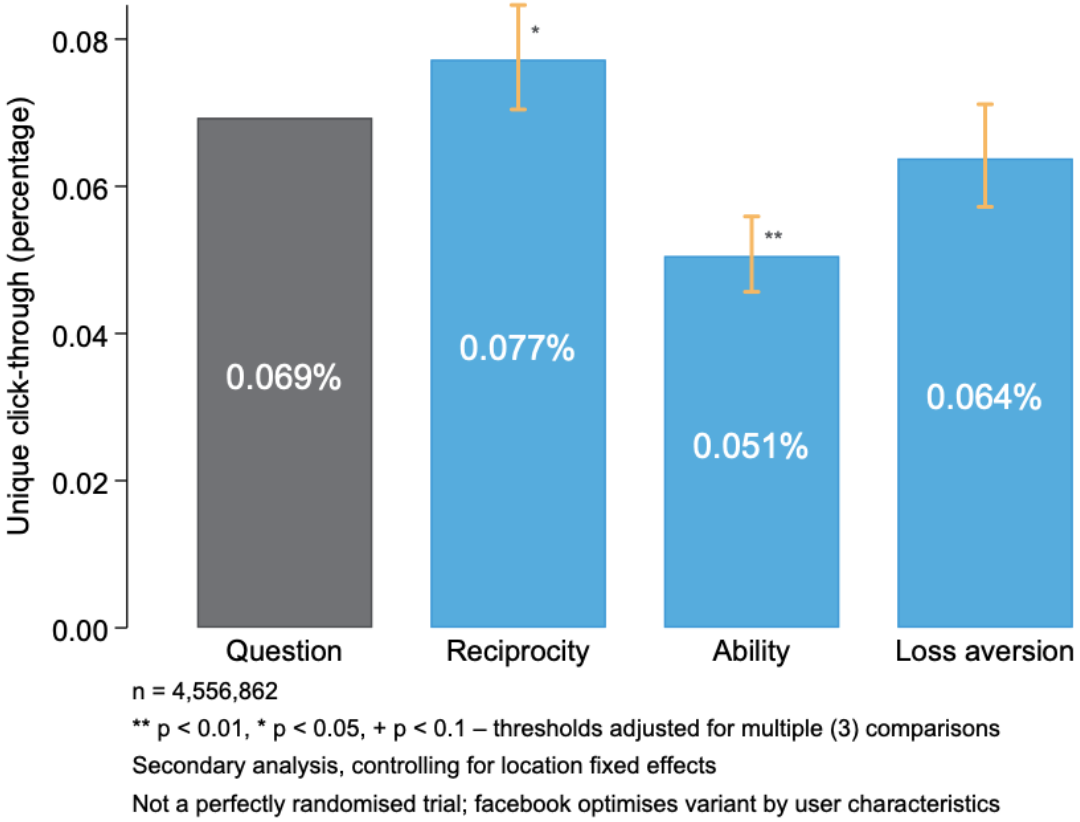
BIT also investigated video plays to completion in the flood action campaign, which are a proxy for the amount of attention a user gives an ad (an imperfect proxy, as the video starts playing automatically and can play to completion without any user intention). The location-reciprocity arm had the highest video-completion rate (1.14%), which was significantly higher than the video completion rate in the curiosity framing arm (0.95%). The location-risk arm had a video completion rate significantly lower than the curiosity framing arm (0.89%). (All differences significant at p<0.01.)

Figure 11: Video play to completion by variant in the flood action campaign



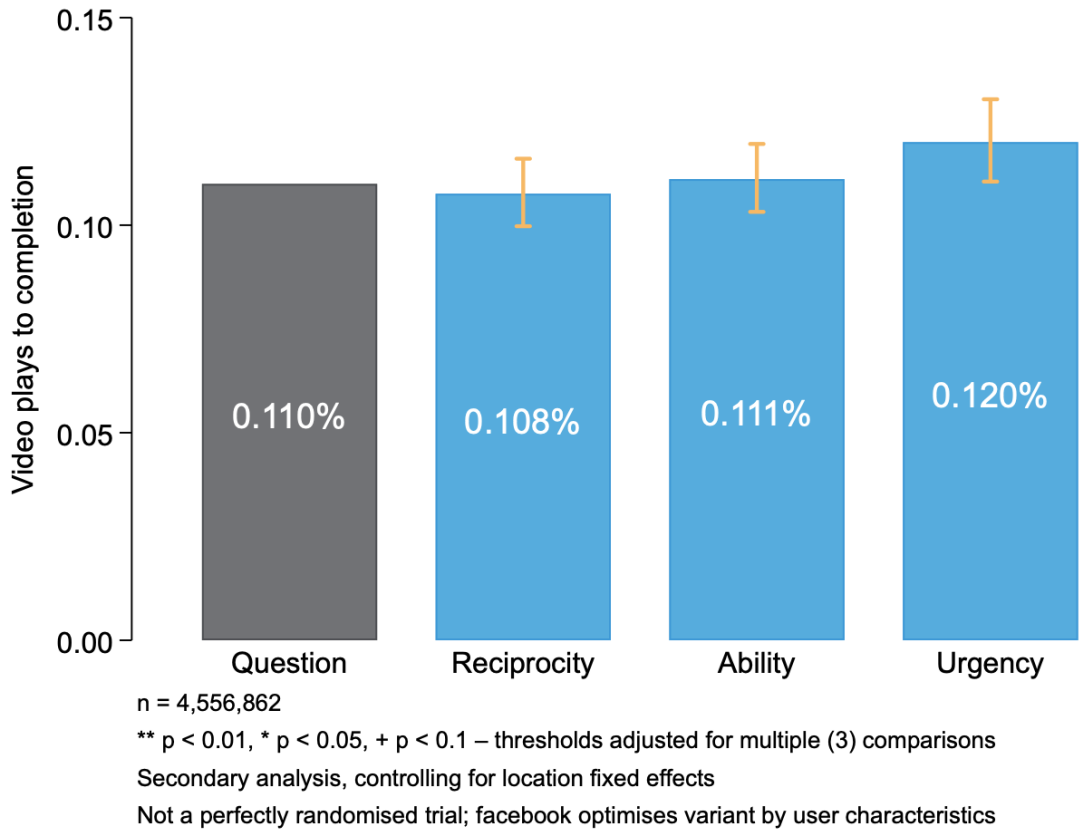
In the (effectively separate) trial related to the ads shown during flood action week (09 through 15 Nov 2020), the reciprocity arm had the highest click-through rate (0.08%), significantly higher than the question arm, which represented the 'control' in this trial (0.07%). The ability arm had a significantly lower clickthrough rate (0.05%) than the question arm. (All differences significant at $p<0.05$.)

Figure 12: Click-through by variant in flood action week trial



In analysing video play to completion in the flood action week trial, BIT did not find that any of the three variants had significantly more video play to completion than the control ('question') variant (after correcting significance thresholds for multiple comparisons).

Figure 13: Video plays to completion by variant in flood action week trial



6.4 Discussion

Our Target and Explore findings (see Sections 3 and 4) raised the potential value of highlighting the reciprocity between the government and householders, each of whom has an important role to play in investing in flood resilience. The project team were interested in testing the effect of using a reciprocity framing on outcomes of interest in a social media trial. While click-through and video plays are arguably distant from the ultimate outcomes of interest (making concrete plans and investments to improve a home's flood resilience), it is still promising to see the reciprocity message's strong performance is higher than the curiosity framing. Not only does it subtly convey an important message about shared responsibility; it also seems to garner higher engagement than other framings.

While the limitations of the message allocation mechanism mean that BIT were somewhat more likely to observe a significant result, the results here are precise enough that we are confident that the different messages did indeed have different effects and that we have measured these differences with reasonable precision.

7. Trial 3: Improve engagement with and usefulness of flood plans

7.1 Background

A flood plan is a document which helps homeowners to set out in advance what actions they should take in the event of a flood. EA, BIT, and WPI Economics hypothesise that flood plans can benefit homeowners in two ways:

- **Helping homeowners make the right decisions under pressure in the event of a flood:** the literature on implementation plans and intentions shows that making a plan for how one should react to a given situation, rather than improvising when under pressure, leads to better decision-making in the moment[51]. For example, research shows that using 'implementation intentions' (also known as 'if-then' plans) can help people to attend their vaccination appointments,[52] vote,[53] and exercise.[54] Filling out a flood plan can help homeowners to make effective decisions in the event of a flood as (1) they will have already thought about which actions to take; and (2) they will have a written document to refer to which reminds them what to do.
- **Prompting homeowners to reflect on flood risk more generally:** the act of filling out a flood plan may prompt respondents to reflect on flood risk more generally, helping them to take the risk of flooding more seriously and potentially consider installing other PFR measures.

During the Explore work, BIT and WPI Economics found that 46%-48% of respondents (across those who lived in and outside of high-risk areas) knew what a flood plan was, and just 14% of respondents had ever made a flood plan. More broadly, many respondents had low response-efficacy when it came to flood resilience - they did not feel that there were steps that they, as individuals, could take to effectively protect their property from flood damage. Instead, they felt that, given the weather was outside of their control, there was nothing they could do to protect against the impacts of flooding, or that interventions by the government were necessary. With this in mind, BIT and WPI Economics aimed to leverage flood plans to help homeowners to better understand and engage with the steps they can take to protect their property and possessions from flood damage.

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[51] Gollwitzer, Peter M. (1999) "Implementation intentions: Strong effects of simple plans." American psychologist (54)7. 493.
[52] Milkman, K. L., Beshears, J., Choi, J. J., Laibson, D. & Madrian, B. C. (2011). Using implementation intentions prompts to enhance influenza vaccination rates. Proceedings of the National Academy of Sciences, 108(26), 10415–10420.
[53] Nickerson, D. W., & Rogers, T. (2010). Do You Have a Voting Plan?: Implementation Intentions, Voter Turnout, and Organic Plan Making. Psychological Science, 21 (2), 194-199.
[54] Belanger-Gravel, A., Godin, G., & Amireault, S. (2011). A meta-analytic review of the effect of implementation intentions on physical activity. Health Psychology Review, 7(1), 23-54

EA currently hosts a template flood plan[55] on the gov.uk website that homeowners can fill out to plan the actions they would take in the event their home was flooded. The project team developed four new versions of the flood plan, each of which aimed to leverage insights from behavioural science to improve engagement with the plans.

7.2 Solution

The project team developed four new versions of the flood plan to address the behavioural barriers set out in 7.1.

7.2.1 Methodology

To develop the solutions, BIT conducted an internal workshop, applying (1) findings from the Explore phase; (2) BIT's standard frameworks EAST[56] and MINDSPACE[57]; and (3) in-house expertise to generate an initial set of ideas. BIT also incorporated feedback from EA and senior BIT colleagues to further iterate and refine the ideas.

7.2.2 Proposed solutions

This section describes the four revised versions of the flood plan, and the behavioural science techniques used. All four versions are included in the annex.

Treatment A: Simplified flood plan

BIT and WPI Economics aimed to simplify the flood plan as much as possible so that it was easy to understand and fill out. The goals of simplifying the steps were to:

- **Boost self-efficacy**[58] (i.e. participants' view of whether they are capable of carrying out the recommended steps to protect their home and belongings from flood damage). The project team hypothesised that making the steps easier to understand would make participants feel more confident in performing them.
- **Increase engagement** by making the flood plan easier to complete.

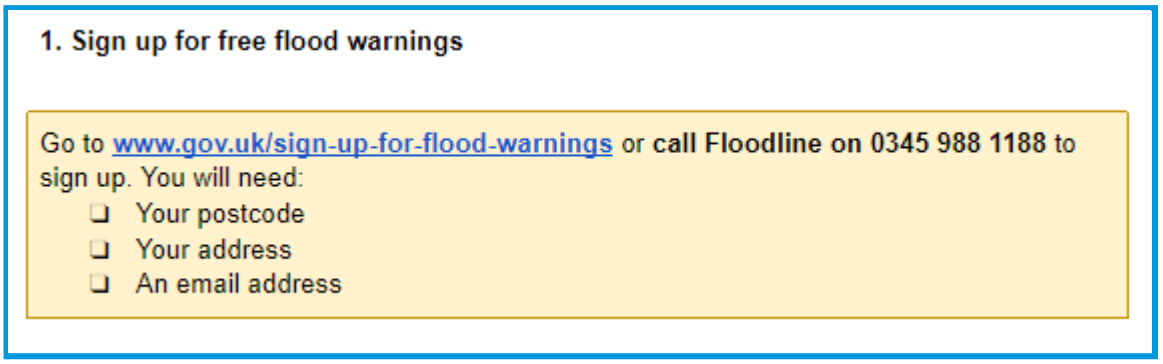
The project team simplified the plan using three approaches:

- **Removing extraneous content** such as rarely-need telephone numbers, unnecessary personal information, and details relevant only to businesses.

[55] Environment Agency, 'Personal Flood Plan', URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444659/LIT_4112.pdf]
[56] Behavioural Insights Team (2014). EAST: Four simple ways to apply behavioural insights.
[57] Dolan, P., Hallsworth, M., Halpern, D., King, D., & Vlaev, I. (2010). MINDSPACE: influencing behaviour for public policy.
[58] Rogers, R. W. (1975). "A protection motivation theory of fear appeals and attitude change". Journal of Psychology. 91 (1): 93–114

- **Improving the formatting** by 'chunking'[59] the plan into a series of clear sections and steps; adding checklists to make tasks feel less intimidating;[60] and colour coding[61] the recommended actions according to how they should be prioritised.
- **Adding supporting information** to ensure the plan was up-to-date and make it easier for respondents to fill out.

Figure 14: Excerpt from simplified flood plan

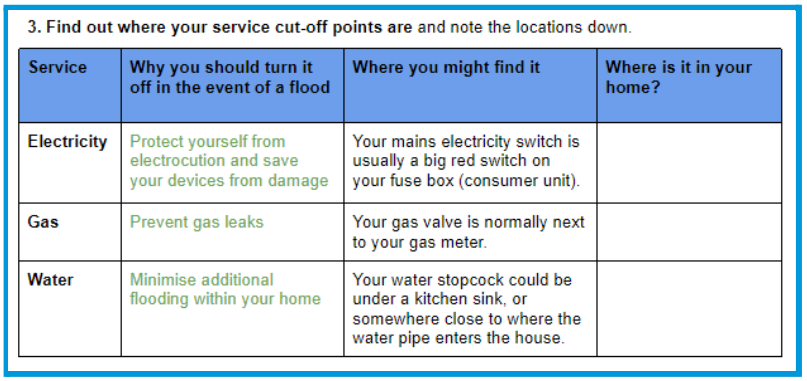


Treatment B: Context

BIT and WPI Economics' previous Explore work identified that many homeowners experience low 'response-efficacy'[62] when it comes to protecting their home from flooding; that is, they lack confidence that the recommended measures to protect their home would be effective and worthwhile. This can act as a behavioural barrier to taking appropriate action. The project team aimed to increase response-efficacy by giving explanations for each of the steps suggested within the plan, helping respondents to see the value of taking each action.

[59] Gobet, F., Lane, P., Croker, S., Cheng, P., Jones, G., Oliver, I. & Pine, J. (2001). Chunking mechanisms in human learning. TRENDS in Cognitive Sciences, 5(6), 236-243.
[60] Bergs, J., Hellings, J., Cleemput, I., Zurel, Ö., De Troyer, V., Van Hiel, M., ... & Vandijck, D. (2014). Systematic review and meta-analysis of the effect of the World Health Organization surgical safety checklist on postoperative complications. British Journal of Surgery, 101(3), 150-158.
[61] Mehta, R., & Zhu, R. J. (2009). Blue or red? Exploring the effect of color on cognitive task performances. Science, 323(5918), 1226-1229.
[62] Rogers, R. W. (1975). "A protection motivation theory of fear appeals and attitude change". Journal of Psychology. 91 (1): 93–114

Figure 15: Excerpt from 'context' flood plan



3. Find out where your service cut-off points are and note the locations down.

Service	Why you should turn it off in the event of a flood	Where you might find it	Where is it in your home?
Electricity	Protect yourself from electrocution and save your devices from damage	Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).	
Gas	Prevent gas leaks	Your gas valve is normally next to your gas meter.	
Water	Minimise additional flooding within your home	Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.	

Treatment C: Images

During focus groups conducted throughout the Explore phase, participants mentioned that they would find it helpful if there were visual aids included in the flood plan. The project team hypothesised that including pictures and symbols might support engagement with the flood plan in two ways:

- **Supporting participants with low reading ability:** evidence shows that images can improve text comprehension amongst those with low reading ability.[63] Therefore, the project team hypothesised that illustrating the suggested actions could improve comprehension.
- **Making the flood plans more salient:** the behavioural science literature tells us that one is more likely to act on a piece of information when their attention is drawn towards it.[64]

[63] Holmqvist Olander, M., Wennås Brante, E., & Nyström, M. (2017). The Effect of Illustration on Improving Text Comprehension in Dyslexic Adults. Dyslexia (Chichester, England), 23(1), 42–65.
[64] Dolan, P., Hallsworth, M., Halpern, D., King, D., & Vlaev, I. (2010). "MINDSPACE: Influencing behaviour through public policy" Institute for Government and Cabinet Office

Figure 16: Excerpt from 'images' flood plan

3. Find out where your electricity, gas, and water cut-off points are and note the locations down.

Service	Where you might find it	Where is it in your home?
Electricity	 Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).	
Gas	 Your gas valve is usually next to your gas meter.	
Water	 Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.	

Treatment D: Future self

Our Explore work found that most homeowners considered their risk of flooding to be low. This is likely to negatively impact homeowners' motivation to complete a flood plan: they won't be sufficiently motivated to plan for a flood if they feel flooding is unlikely to affect them. The project team aimed to make the risk of flooding more salient by having participants complete a short exercise before completing the version of the flood plan developed for Treatment A (i.e. the simplified version). During the exercise, participants were encouraged to reflect on what it would be like if their house was flooded (see Appendix 3 for the exercise in full).

When developing the exercise, the project team applied two behavioural strategies to increase the salience of flooding risk:

- **Addressing present bias**[65] [66] by including rhetorical questions which prompted participants to empathise with their hypothetical 'future self' who might experience a flood, making the risk of flooding more salient. This built on previous work by BIT which found that asking young people to reflect on what their life would be like when they retired made them more inclined to increase their pension contributions.[67]

[65] Green, L., Fry, A.F., Myerson, J. (1994). Discounting of delayed rewards: A life-span comparison. Psychological Science, 5(1).
[66] Zauberman, G., Kim, B. K., Malkoc, S. A. & Bettman, J. R. (2009). Discounting time and time discounting: Subjective time perception and intertemporal preferences. Journal of Marketing Research 46(4), 543-556.
[67] Dutta-Powell, Ravi., Cornel, Pieter. (2020) Nudging for Retirement: Results from an experiment by the Behavioural Insights Team, in partnership with Scottish Widows, Behavioural Insights Team https://www.bi.team/wp-content/uploads/2020/09/BIT-Scottish-Widows-Nudging-for-retirement-report-18-Sep.pdf

- **Increasing the salience of negative aspects of flooding** so that participants are more motivated to prepare for a flood by completing the flood plan.

Figure 17: Excerpt from 'future self' exercise

Flooding can be sudden and mean losing possessions, being forced out of your home, and lengthy repair works. It's tough - and can also be difficult for children, pets, and other dependents.

Take a moment now to think about what it would be like for you and (if applicable) others who you live with if your home was flooded.

7.3 Trial design and results

This section covers the design and results of an online experiment to test how effective each of the new flood plan designs were compared to (1) no flood plan at all; and (2) EA's current flood plan.

7.3.1 Trial design

This experiment was run as a six-arm online randomised controlled trial (RCT), as shown in table 14 below. First, participants were asked to fill out one of the five flood plans (or a survey about environmental issues if they were in Control A). Once they had filled out the flood plan, they were given the option to download a PDF copy of the flood plan - BIT later used the download rates to measure behavioural intent to use the plan going forward. They then answered a series of multiple-choice questions; remaining outcome measures were based on their answers to these questions. Participants were financially incentivised to take part in the trial.

Table 14: Control and treatment arms

Condition	Description
Control A	**'Pure' control**: No flood plan presented. Instead, participants filled out a survey about attitudes to environmental issues which are not related to flooding (as a time-filler) before responding to the key outcome questions. Note that not all questions were asked of this group, because some make no sense if a flood plan has not been completed.
Control B	**Current flood plan:** Current government personal flood plan[68] on a single, interactive web page.
Treatment A	**Simplified:** A simplified and streamlined version of the flood plan.

[68] Environment Agency, 'Personal Flood Plan', URL: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/444659/LIT_4112.pdf]

Treatment B	**Context**: The same as Treatment A, but also included a justification for each suggested action.
Treatment C	**Images**: An adapted version of Treatment A – with added illustrations and icons where appropriate, and some elements of the flood plan (e.g. the contact list) shortened to make room for the images.
Treatment D	**Future self exercise**: Participants completed a short exercise which prompted them to reflect on what it would be like to be flooded (see Appendix 3 to read the exercise in full). After they have completed the exercise, participants are shown the flood plan described in Treatment A.

Sample selection and eligibility

The final sample size for analysis was 3,866. Data collection began on 24th of February and closed on 22nd of March 2021.

BIT recruited a representative sample of the UK with respect to gender, age bracket, income bracket, location, and dwelling type; we excluded participants who did not own their own properties. Allocation to treatment was randomised, where randomisation was stratified on participants' answer to a question about whether they had ever experienced flooding in their property (the purpose of stratification was to ensure balance on this important variable between trial arms).

Outcome measures

The project team pre-specified the trial's primary, secondary, and exploratory outcome measures. These were measured via survey questions which participants answered after they had completed the flood plans (or, in the case of Control A, the environmental attitudes survey). Table 15 below sets out the primary and secondary outcomes collected (exploratory outcomes are detailed in the annex: section 9.2.3).

Table 15: Trial 3 primary and secondary outcome measures

Measure[69]	Definition
Primary	
Self-reported usefulness**	"I would recommend this flood plan to a friend." "I found it useful to fill out this flood plan." 0 - Complete disagreement; 100 - Complete agreement[70]

[69] Measures marked with '**' were only asked of participants who had completed a flood plan (i.e. Control B or one of the treatment conditions)
[70] Note that these 0-100 scales were always preceded by the comment: "How strongly do you agree with the following statements, from 0 (complete disagreement) to 100 (complete agreement)?"

Secondary	
Comprehension	Test respondents on key concepts relating to flood preparedness. Correct answers are bolded. 1. Which of the following should you disconnect in the event of a flood? Tick all that apply. ● WiFi ● **Electricity** ● **Gas** ● **Water supply** ● Landline connection 2. Which of the following items should be included in a flood kit? Tick all that apply. ● **Medication** ● Cosmetics ● **Torch** ● Vitamin supplements ● Birth certificate ● Books and other entertainment ● **Food** ● Flare ● Life jackets ● **Water** 3. If there is a flood warning in your area, what should you do with your important documents? Tick all that apply. ● Scan them and upload to your computer ● **Put them in polythene bags and move to safety** ● Hide them out of sight within your home ● Give them to a neighbour for safekeeping ● Ensure they are organised/filed correctly ● Keep them about your person at all times 4. Which of the following methods can you use to accurately establish the imminent flood risk in your area? Tick all that apply. ● **Check a reliable weather app or website, like the Met Office** ● Contact your local Environment Agency representative ● **Tune into your local radio station** ● Look outside of your window to check water levels around your home ● Contact your local MP ● The survey for your house ● **Sign up to free text, email, or phone alerts from Floodline**

Download rates of flood plan** (behavioural intent)	After completing the flood plan, respondents were given the option to download a PDF version of their completed plan.
Subjective Preparedness for a flood after filling in a flood plan**	“This document has made me feel better prepared for if my home is flooded.” 0 - Complete disagreement; 100 - Complete agreement
Exploratory	
Sense of responsibility	“Who is more responsible for protecting your home from flood damage – the homeowner or the government?” 0 Homeowner / 1 Mostly homeowner / 2 Equally responsible / 3 Mostly government / 4 Government
Response-efficacy for protecting home	“I feel that there are actions that, if taken, would protect my home against flooding.” 0 - Complete disagreement; 100 - Complete agreement
Response-efficacy for protecting belongings	“I feel that there are actions that, if taken, would protect my belongings against flooding.” 0 - Complete disagreement; 100 - Complete agreement
Self-efficacy for protecting Home	“I feel able to carry out the steps that would protect my home against flooding.” 0 - Complete disagreement; 100 - Complete agreement
Self-efficacy for protecting Belongings	“I feel able to carry out the steps that would protect my belongings against flooding.” 0 - Complete disagreement; 100 - Complete agreement
Risk perception	“Flooding is a risk I should seriously consider.” 0 - Complete disagreement; 100 - Complete agreement
Engagement**	Proportion of text fields filled in by respondents.
Network impacts**	“How likely are you to speak to other members of your household about your flood plan?” 0 Very unlikely - 100 Very likely
New ideas**	“Has completing this flood plan given you ideas for things to do in the case of a flood that you hadn’t thought of before?” 0 No / 1 Yes

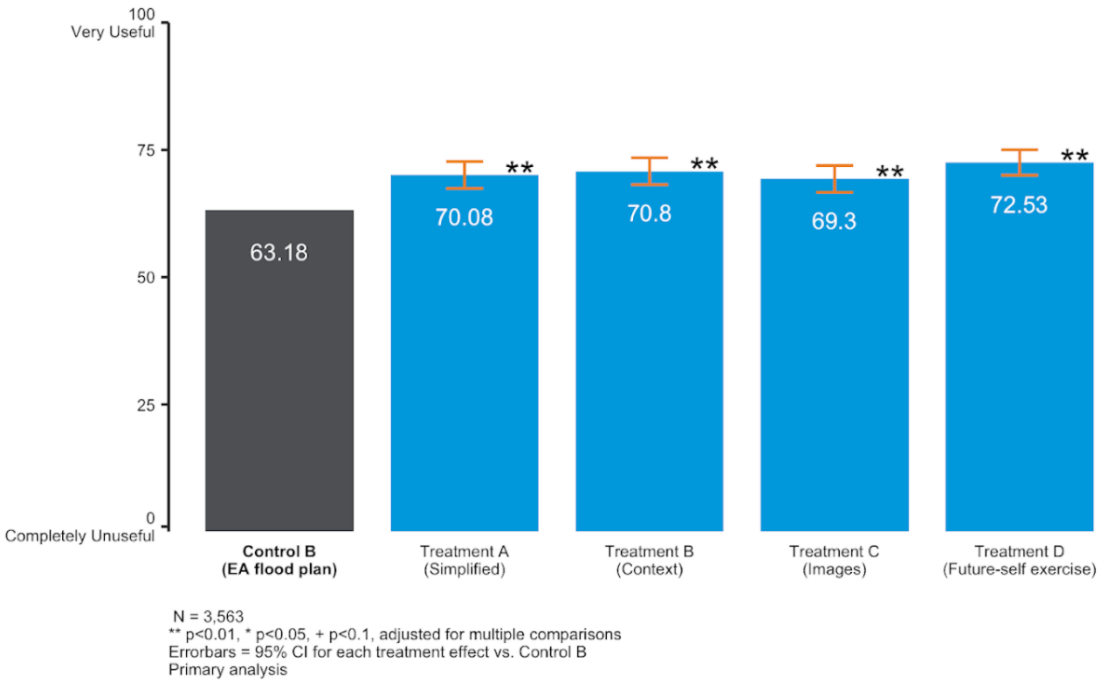
Practical usage**	"How do you intend to store your flood plan? Tick all that apply" 0 Print and display somewhere prominent (e.g. fridge) / 1 Print and keep somewhere safe / 2 Save on mobile phone / 3 Save on computer / 4 I do not intend to store my flood plan
Additional suggestions from respondents**	"Can you think of any ways the flood plan document could be improved? Please leave any thoughts below." (open text box)

7.3.2 Results

Primary analysis: self-reported usefulness

All four of the new flood plans increased the self-reported usefulness score compared to the EA flood plan, which scored 63.18. This effect was highly statistically significant across all four treatment arms. Compared to the EA flood plan, Treatment A increased self-reported usefulness by 10.9%, Treatment B by 12.1%, Treatment C by 9.7%, and Treatment D by 14.8%.

Figure 18: Usefulness of flood plan, by treatment arm



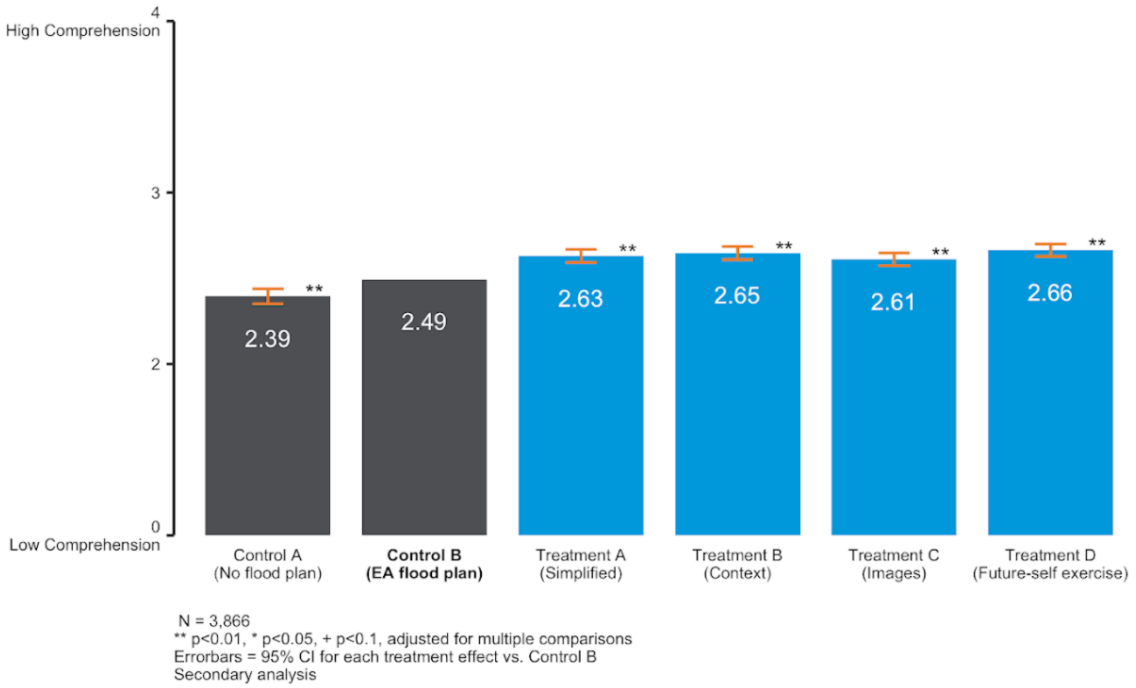
Secondary analysis

Secondary analysis compared the impact of the flood plans on three outcome measures: comprehension, download rates of the flood plan, and subjective preparedness for a flood.

Comprehension of actions to take in the event of a flood

BIT tested participants on what actions they should take in the event of a flood by asking them to answer four multiple-choice questions. All four of the trial arms improved participants' comprehension scores compared to those in Control B. This effect was highly significant across all four trial arms. There was little variation in average scores across the treatment arms; Treatment D performed the best with 2.66, while Treatment C performed the worst with 2.61. Participants in Control B (who had completed the EA flood plan) performed significantly better than those in Control A (who did not complete a flood plan at all).

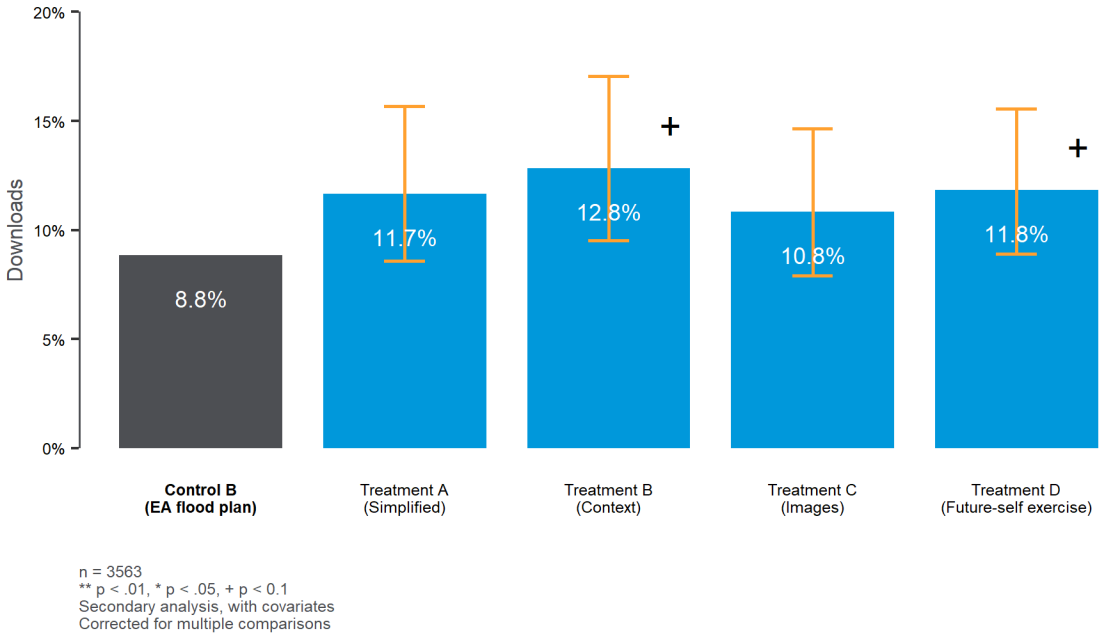
Figure 19: Comprehension of actions to take in a flood, by treatment arm



Download rates of the flood plan

After completing the flood plan, participants were given the option to download a PDF copy of the completed version for their own use. Treatment B (context) and Treatment D (future-self exercise) both had higher download rates than the control - an increase of 45% and 34% respectively. This suggests that the treatments led to a substantial improvement in engagement with the flood plans.

Figure 20: Rate of flood plan download, by treatment arm

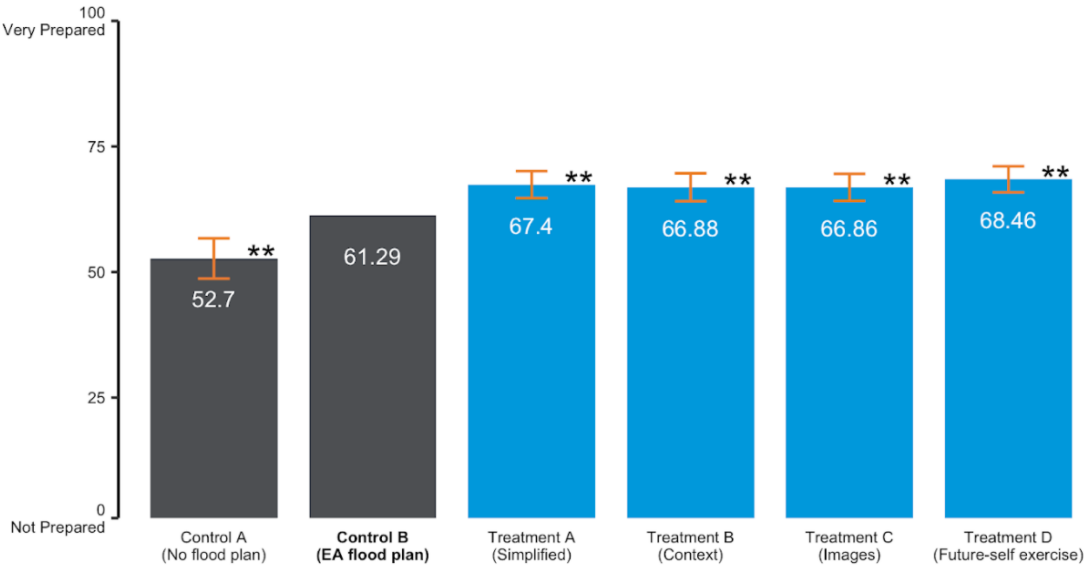


n = 3563
** p < .01, * p < .05, + p < 0.1
Secondary analysis, with covariates
Corrected for multiple comparisons

Subjective preparedness for a flood

All four of the treatment conditions significantly increased participants' rating of whether completing the flood plan made them feel more prepared for their home being flooded (where 0 = it had not helped at all; and 100 = it had helped a lot). The best-performing flood plan was Treatment D (future self), which scored 68.46: an increase of 11.7% compared to Control B (which scored 61.29). Participants who completed any flood plan, including the EA flood plan, scored their preparedness significantly higher than participants in Control A, who did not see a flood plan at all.

Figure 21: Preparedness for flood, by treatment arm



N = 3,866
** p<0.01, * p<0.05, + p<0.1, adjusted for multiple comparisons
Errorbars = 95% CI for each treatment effect vs. Control B
Secondary analysis

Exploratory analysis

Our exploratory findings are included in full in Appendix 5. The key findings were as follows:

- **Completing a flood plan made respondents feel more strongly that homeowners should be responsible for protecting their home in the event of a flood, rather than the government.** While participants who did not see a flood plan had an average score of 2.8 (where 0 = the homeowner is completely responsible; and 5 = the government is completely responsible), participants who did see a flood plan had scores ranging from 2.03 to 2.25. Interestingly, Treatment D caused participants to lean more towards government responsibility compared to Control B.
- **Treatments A, B, and D increased response-efficacy for securing personal belongings in the event of a flood.** Treatment D led to the greatest increase (4.3%). Completing the EA flood plan led to a 9.1% increase in response-efficacy compared to completing no flood plan at all.
- **Treatment D led to a 4.4% increase in self-efficacy for securing the home in the event of a flood.** No other treatment arms had a significant impact on this measure. Completing the EA flood plan led to a 15.3% increase in self-efficacy compared to not completing a flood plan.
- **All four treatment arms led to a significant increase in self-efficacy for securing personal belongings in the event of a flood.** Treatment D performed the best, with a 6.7% increase compared to the EA flood plan. Participants who completed the EA flood plan recorded 15.9% higher self-efficacy than those who did not complete one at all.
- **Treatments A, B, and D led to an increase in perceived likelihood of experiencing a flood (compared to the EA flood plan).** This increase was greatest for Treatment D, at 7.5%.
- **All four treatment arms led to a higher proportion of completed text fields than the EA flood plan.** While participants who completed the EA flood plan filled out on average 25.6% of text fields, the average proportion of text fields completed by those in the treatment groups ranged from 38.2% (Treatment C) to 43.2% (Treatment A).
- **Participants in all four treatment arms reported a higher intention to discuss the flood plan with their networks than those who completed the EA flood plan.** Participants in Treatment B reported the strongest intention.

7.4 Discussion

Impact of the treatment conditions

All four of the revised flood plans were perceived to be more useful than the existing flood plan. While Treatment D performed directionally better than the other three, there was little variation in general between the treatment conditions (this was also true for two of the secondary outcome measures: comprehension of actions to undertake in the event of a flood and feeling of preparedness for the event of a flood). This indicates that the simplifications to the flood plan were the most important factor in improving the key outcome measures of interest, while additional changes had only marginal or no additional benefits on usefulness,

comprehension, and preparedness. It may be that the further changes to the simplified flood plan in Treatments B (context) and Treatment C (images) increased the complexity of the plans, therefore negating any benefits of the additional content / changes. This supports the findings of the first trial (see 5.3.2): that keeping informational content as simple as possible is often the most effective way to improve communications.

However some further differences emerge when looking at other outcomes. Only Treatments B (context) and D (future self) significantly increased engagement with flood plans as measured by download rates of completed plans. This measure was intended to give a true behavioural measure of how likely participants were to actually use each of the flood plans tested. While it's difficult to draw strong conclusions given the weak significance of this result, it's worth noting that both of these treatments were intended to improve participants' *motivation* to complete or use the flood plans (as opposed to simply making the plan simpler to use). It may be that simplification is most important for helping users complete, understand, and find the plan useful, but additional motivation is required for users to actually want to download and use the completed plan.

The story so far is that simplification is driving much of the improvement, and giving people context (Treatment B) or putting them through a 'future self' exercise (Treatment D) provides only marginal improvements, particularly on download rates of the completed plan. They may therefore be worth adopting, subject to the ease of doing so. To help provide further guidance on which version of the plan to adopt, it may be useful to examine some of the subtler differences.

Treatment D performed directionally better than the other flood plans in both the primary, and two of the secondary outcome measures. It also performed the best across the exploratory response and self-efficacy measures; indeed, it was the only treatment to (1) significantly increase response-efficacy for securing personal belongings; and (2) increase self-efficacy for securing the home (albeit with weak significance). This gives indicative support for the hypothesis that prompting homeowners to empathise with their future self is effective at improving engagement with and the usefulness of the flood plans.

Interestingly, Treatment D was the only treatment to make participants feel less strongly that homeowners should be responsible for protecting their possession in the event of a flood (rather than the government). It's worth noting that, although significant, this difference was very small in size. It may be that, having completed the 'future self' exercise, the risk of flooding felt more salient and urgent to these participants, and therefore they felt that the government had a greater duty to support with flood response.

Treatment C (images) often performed slightly worse than the other flood plans, indicating that including illustrations is not effective at improving the flood plans. However, it is worth noting that, when creating this version, the project team removed some of the flood plan content so that there was room for the images (ensuring that the flood plan fitted on two pages). It was also not within the scope of this project to hire a designer to support with creating and implementing images in an engaging way. With this in mind, the use of images

may be worth exploring further when it comes to communicating with homeowners about flooding.

Impact of completing a flood plan

A key insight across the findings is that all of the flood plans, including the EA one, led to a significant improvement in most of the outcome measures compared to when participants did not complete a flood plan. Notably, filling out a flood plan increased homeowners' comprehension of actions to take in the event of a flood and feelings of preparedness for the event of a flood. The exploratory findings indicate that filling out a flood plan also increases response-efficacy and self-efficacy with respect to securing both personal belongings and the home.

A particularly interesting finding is that all flood plans, including the EA version, made respondents feel more strongly that homeowners should be responsible for protecting their home in the event of a flood, rather than the government. This indicates that the act of filling out a flood plan has a meaningful impact on how responsible homeowners feel. This may be linked to the finding that filling out a flood plan also increases response-efficacy and self-efficacy: if homeowners feel that they are capable of taking meaningful action to protect their home from flooding, they will feel a greater sense of personal responsibility.

8. Recommendations

Changing communications in line with behavioural science can be an effective way to improve take-up of measures to improve flood resilience. Based on trial results, BIT and WPI Economics recommend that EA should:

- **Incorporate elements of the EA beta 'How to plan ahead for flooding' webpage into the official government page.** Trial 1 showed that this version improved participants' response-efficacy, increased their sense of resource-adequacy, and increased their awareness of PFR measures compared to the GDS-managed gov.uk webpage. Each of the BIT-designed variants performed similarly to the EA beta page, and so elements of them could be adopted, or not. Most notably, the social modelling arm showed some benefits to participants' awareness of PFR measures.
- **Apply reciprocity framing in communications** where possible. In both the trial comparing ad variants during the flood action campaign from October 2020 through March 2021, and in the trial comparing ad variants during flood action week in November 2020, the ad variant with a reciprocity framing performed best. While click-through and video plays are arguably distant from the ultimate outcomes of interest (making concrete plans and investments to improve a home's flood resilience), it is still promising to see the reciprocity message's strong performance. Not only does it subtly convey an important message about shared responsibility; it also seems to garner higher engagement than other framings.
- **Host the 'context' version of the flood plan on the gov.uk website going forward.** This version performed the most consistently well across the primary and secondary outcome measures (apart from Treatment D, the 'future self' treatment) and would be the most straightforward to implement on the gov.uk website in the short term.
- **Further explore how a 'future self' exercise might be implemented within the gov.uk 'personal flood plan' webpage, and/or consider how prompts to think about what it would be like to experience a flood might be integrated into other PFR-related communications.** While it may be challenging to implement an interactive exercise on the gov.uk website, EA could include a short paragraph encouraging participants to reflect on the impact of flooding on their future self on the flood plan webpage. EA could also explore opportunities to test the impact of similar communications via social media, local flood plans, community outreach, and video communications. This could involve collaborating with other groups e.g. local authorities, flood forums, and the pathfinder projects.
- **Continue to promote flood plans to help homeowners prepare for flooding.** Trial 3's findings demonstrate that completing a flood plan leads to improvements across key outcomes related to flooding, including sense of preparedness, knowledge of which actions to take in the event of a flood, response-efficacy, and self-efficacy. With this in mind, EA should continue to encourage homeowners to complete flood plans.

9. Appendices

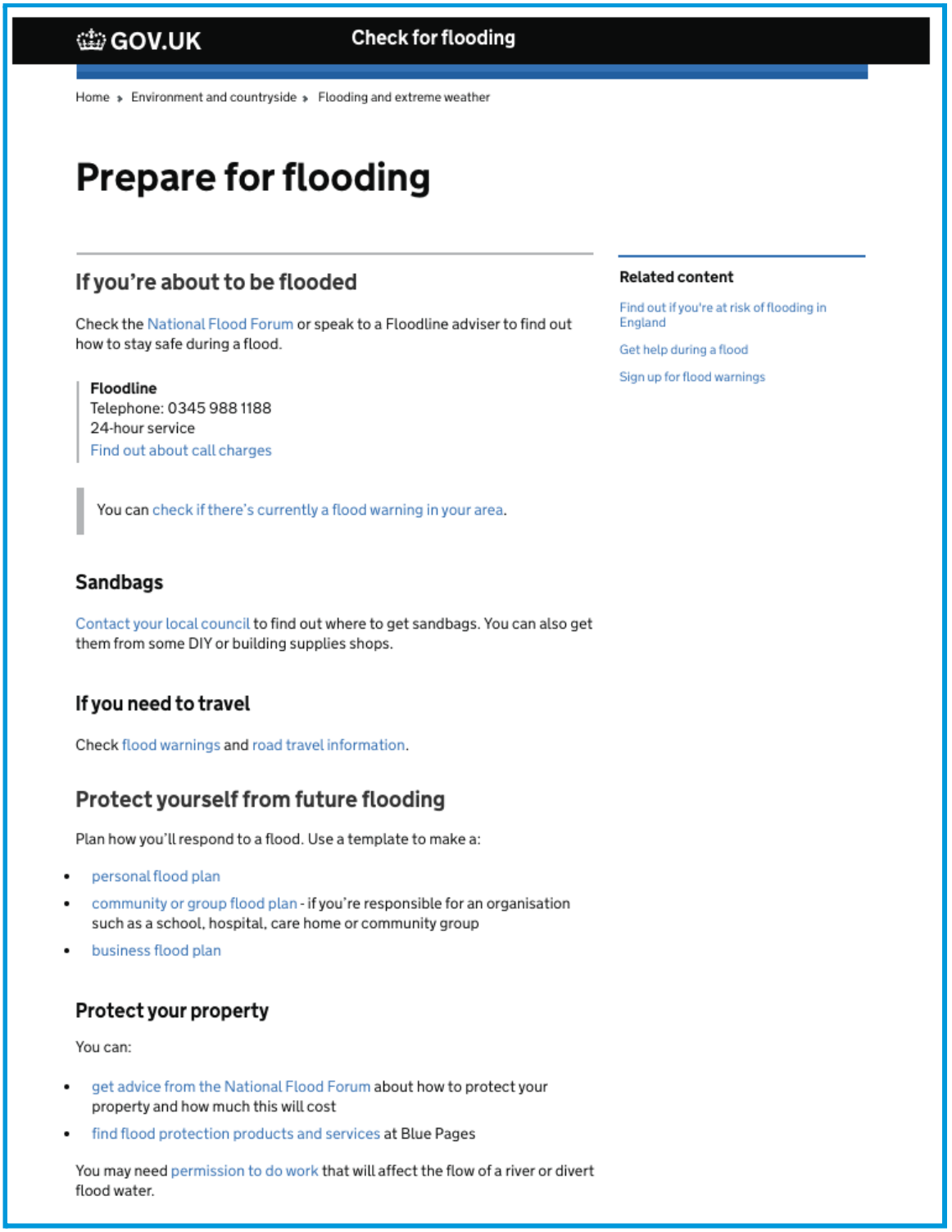
Appendix 1: Trial 1 interventions

The full study materials (the six versions participants saw) are set out in table 16 below:

Table 16: Links to full study materials

Condition	Link
Control A	(No materials - this was the 'pure control')
Control B	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=2
Control C	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=3
Treatment A1	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=4
Treatment A2	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=5
Treatment B	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=6
Treatment C	https://trial.predictiv.co.uk/materials/preview.php?survey=422988&page=page&treatment=7

Control B: Gov.uk (GDS-managed) page



GOV.UK Check for flooding

Home › Environment and countryside › Flooding and extreme weather

Prepare for flooding

If you're about to be flooded

Check the National Flood Forum or speak to a Floodline adviser to find out how to stay safe during a flood.

Floodline
Telephone: 0345 988 1188
24-hour service
Find out about call charges

You can check if there's currently a flood warning in your area.

Sandbags

Contact your local council to find out where to get sandbags. You can also get them from some DIY or building supplies shops.

If you need to travel

Check flood warnings and road travel information.

Protect yourself from future flooding

Plan how you'll respond to a flood. Use a template to make a:

- personal flood plan
- community or group flood plan - if you're responsible for an organisation such as a school, hospital, care home or community group
- business flood plan

Protect your property

You can:

- get advice from the National Flood Forum about how to protect your property and how much this will cost
- find flood protection products and services at Blue Pages

You may need permission to do work that will affect the flow of a river or divert flood water.

Related content

Find out if you're at risk of flooding in England

Get help during a flood

Sign up for flood warnings

If you own a riverside property

If you own property next to a watercourse, for example a river, culvert, brook or mill stream, you must:

- maintain river beds and banks
- not obstruct the water flow

Read guidance on the rights and responsibilities of owning a riverside property.

Contact the Environment Agency if you have questions about your responsibilities.

> **Environment Agency**
> enquiries@environment-agency.gov.uk
> Telephone: 03708 506 506
> Monday to Friday, 8am to 6pm
> Find out about call charges

If your property's next to a canal

Contact the Canal and River Trust to check who's responsible for maintaining the canal.

If you have a disability or need extra help

Ask your council if you can be put on a list to get extra help during a flood.

Citizens Advice can help make sure you'll get support if your energy supply is affected.

Ask Floodline to send flood warnings to a friend or relative on your behalf.

> **Floodline**
> Telephone: 0345 988 1188
> 24-hour service
> Find out about call charges

Get insurance

You can:

- find lower-cost home insurance through Flood Re if you're in a flood-risk area
- get insurance advice from the National Flood Forum
- find a broker that specialises in properties that are difficult to insure

Get evidence of flood risk

Contact the Environment Agency if your insurer asks for evidence of your flood risk.

> **Environment Agency**
> enquiries@environment-agency.gov.uk
> Telephone: 03708 506 506
> Monday to Friday, 8am to 6pm
> Find out about call charges

You'll get a letter within 20 days. It's free for individuals and businesses.

If you've done work on your property

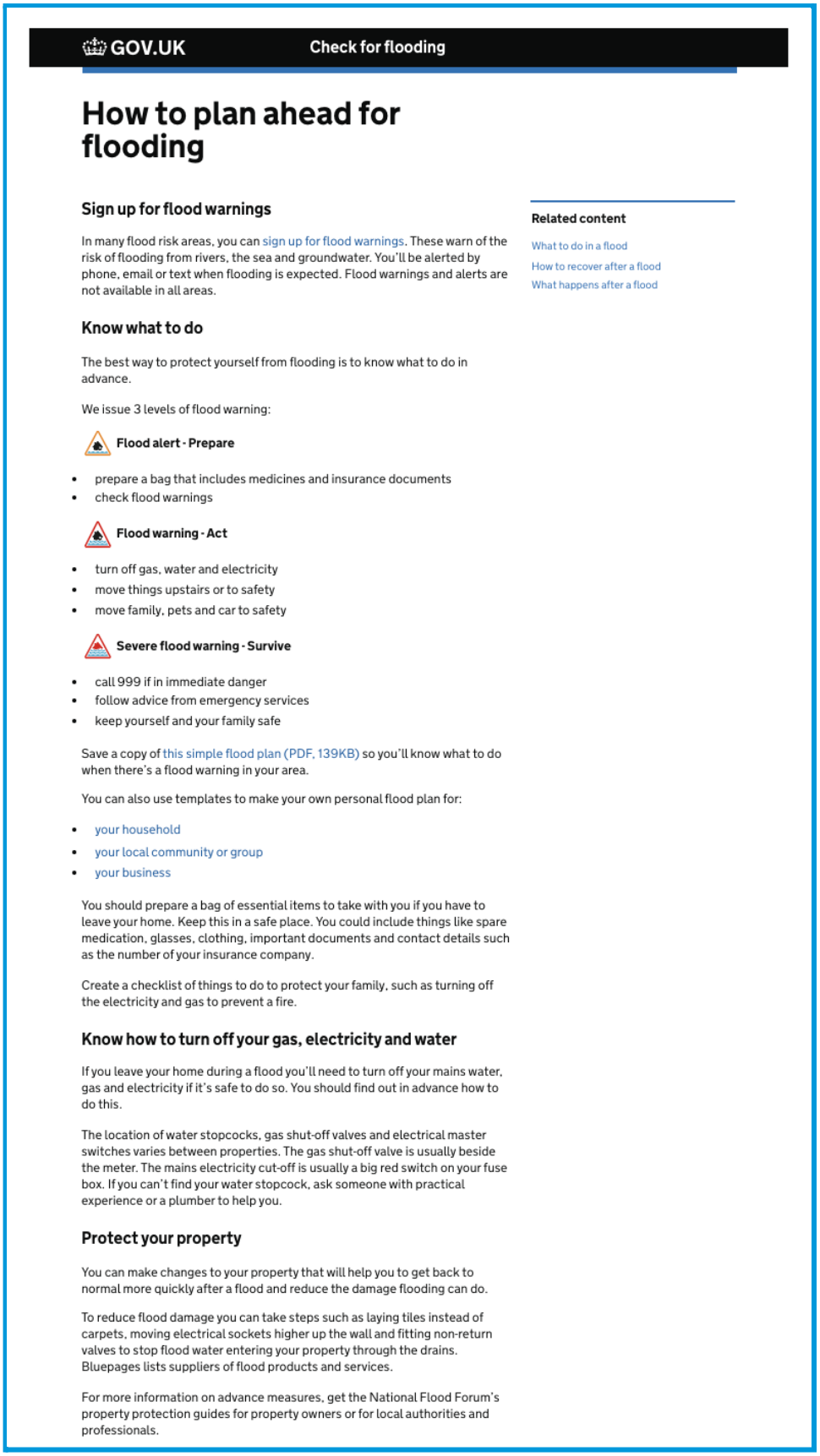
You or a surveyor can complete a Flood Risk Report. This will tell insurers or buyers how the work has reduced the flood risk.

Explore the topic

Flooding and extreme weather

Flooding and coastal change

Control C: EA beta ‘How to plan ahead for flooding’ page



GOV.UK Check for flooding

How to plan ahead for flooding

Sign up for flood warnings

In many flood risk areas, you can sign up for flood warnings. These warn of the risk of flooding from rivers, the sea and groundwater. You'll be alerted by phone, email or text when flooding is expected. Flood warnings and alerts are not available in all areas.

Related content

What to do in a flood
How to recover after a flood
What happens after a flood

Know what to do

The best way to protect yourself from flooding is to know what to do in advance.

We issue 3 levels of flood warning:

Flood alert - Prepare

- prepare a bag that includes medicines and insurance documents
- check flood warnings

Flood warning - Act

- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive

- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

Save a copy of this simple flood plan (PDF, 139KB) so you'll know what to do when there's a flood warning in your area.

You can also use templates to make your own personal flood plan for:

- your household
- your local community or group
- your business

You should prepare a bag of essential items to take with you if you have to leave your home. Keep this in a safe place. You could include things like spare medication, glasses, clothing, important documents and contact details such as the number of your insurance company.

Create a checklist of things to do to protect your family, such as turning off the electricity and gas to prevent a fire.

Know how to turn off your gas, electricity and water

If you leave your home during a flood you'll need to turn off your mains water, gas and electricity if it's safe to do so. You should find out in advance how to do this.

The location of water stopcocks, gas shut-off valves and electrical master switches varies between properties. The gas shut-off valve is usually beside the meter. The mains electricity cut-off is usually a big red switch on your fuse box. If you can't find your water stopcock, ask someone with practical experience or a plumber to help you.

Protect your property

You can make changes to your property that will help you to get back to normal more quickly after a flood and reduce the damage flooding can do.

To reduce flood damage you can take steps such as laying tiles instead of carpets, moving electrical sockets higher up the wall and fitting non-return valves to stop flood water entering your property through the drains. Bluepages lists suppliers of flood products and services.

For more information on advance measures, get the National Flood Forum's property protection guides for property owners or for local authorities and professionals.

Check your insurance

Make sure you have insurance to protect your home or business. If you have buildings and contents insurance, check if flood damage is included.

If you rent your home, it's your responsibility to protect your belongings.

If you're finding it difficult to get your property insured for flooding, the National Flood Forum may be able to help.

The Flood Re scheme works with some insurance providers to reduce the cost of insuring certain homes against flooding.

Bookmark flood forecasting websites

Keeping a list of useful web pages can save time when you want to check:

- the weather
- flood warnings
- local river and sea levels

Find out where you'll get help

Areas prone to flooding may already have flood groups and community hubs where you can find food, clothing, shelter and advice during a flood. Some areas have community flood wardens - volunteers who monitor a specific local area and inform its residents when flooding is likely.

Visit the National Flood Forumor call them on 01299 403 055 for help in finding local support. You can also try searching for local flood groups on social media.

If you live near a watercourse

There is specific guidance If you own property or live beside:

- a river
- a canal

Built by the Environment Agency

Treatment A1: Social modelling version of EA beta (young couple)

GOV.UK Check for flooding

Plan ahead for flooding

We live in Yorkshire, and our home was flooded last year. I didn't think it could happen to us. We don't live near a river, and I didn't think we were at risk.

The flood caused huge amounts of damage - £28,000 in repairs. We had to throw away furniture we'd inherited from my mum. And repairing the floors, walls, and electrics took over 3 months, while we had to live in hotels and with friends. It was incredibly stressful. I wouldn't wish it on anyone.

I wasn't ready for it. But having been through all this we now realise there's actually quite a lot you can do. It's just like installing burglar alarms, locks, and fire alarms - it's on us to protect our home.

If it happens again, I'm feeling much more ready."

- Mr and Mrs Park, Yorkshire

Related content

What to do in a flood
How to recover after a flood
What happens after a flood

The Government is investing in protecting areas at risk of flooding. Like Mr and Mrs Park, many households are learning how to protect their home from flooding and taking action, too.

Here's what Mr and Mrs Park did to protect their home

1. We signed up for flood warnings

Flood warnings alert you at times when there is increased risk of flooding from rivers, the sea and groundwater. You'll be alerted by phone, email or text when flooding is expected.

Flood warnings are not available in all areas, and don't warn against all types of flooding risks (such as surface water, and water coming up through drains), so you should still take other precautions.

2. Luckily, we had good insurance. Do you?

Check your building and contents insurance to make sure you're covered for flood damage. If you're a renter, it's your responsibility to protect your belongings.

If you're finding it difficult to get your property insured for flooding, the National Flood Forum may be able to help.

3. We created a flood plan - we now feel much better prepared

Create a flood plan

This will ensure you're ready if a flood comes. It's a simple document, but will help you know what to do, and have all the important details to hand.

Planning ahead

Be prepared to move valuables upstairs. Quick action can save valuable and sentimental items.

Clear debris out of drains and gullies to help water flow away.

Clearing leaves and other blockages away reduces the risk of water overflowing into your house.

Learn how to turn off your gas, electricity and water. In the event of a flood, you should turn these off, particularly if you need to leave your home.

Your gas valve is usually next to your gas meter.

Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).

Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.

4. We've better protected our home from flood damage – get a flood survey to find out how to protect yours

A flood survey will tell you what you can do to your home to reduce the risk of flood damage

The right measures will depend on the type of property and its construction method, and the types of flooding that might impact you.

It is therefore recommended that you get a **flood survey** for expert guidance.

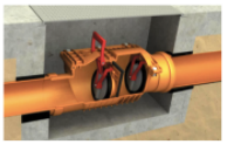
The Blue Pages has a list of recommended surveyors.

What might the surveyor recommend?

There are a lot of measures that can help.

Replacing a floor can be very expensive. Replacing carpet with tiles means your floor won't get damaged by water.

Electrical damage is also costly to repair, and can be dangerous. Raising electrical sockets keeps them away from flood water.



Non-return valves stop water coming up toilets and sinks.

Raised door seals and flood shields stop water coming into the home.

"To stop water getting in, we've now got raised door thresholds, and have installed non-return valves on the drains to stop water coming back up the toilets and sinks."

If any water does get in, it will cause less damage, because I've now laid tiles instead of carpet. We've also had the electrical sockets moved a little higher up the wall, and re-plastered with waterproof plaster designed to withstand flood water.

I wish we'd done all this before. But at least if we're flooded again, at worst it'll just be a big job to clean up. But that doesn't cost anything, and would take me 3 days rather than 3 months."

- Mr and Mrs Park, Yorkshire

5. We're ready to act in a flood

If you receive a flood warning, act swiftly and follow the guidance.

Flood alert - Prepare

- prepare a bag that includes medicines and insurance documents
- check flood warnings

Flood warning - Act

- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive

- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

Treatment A2: Social modelling version of EA beta (older couple)

GOV.UK Check for flooding

Plan ahead for flooding

We live in Yorkshire, and our home was flooded last year. I didn't think it could happen to us. We don't live near a river, and I didn't think we were at risk.

The flood caused huge amounts of damage - £28,000 in repairs. We had to throw away furniture we'd inherited from my mum. And repairing the floors, walls, and electrics took over 3 months, while we had to live in hotels and with friends. It was incredibly stressful. I wouldn't wish it on anyone.

I wasn't ready for it. But having been through all this we now realise there's actually quite a lot you can do. It's just like installing burglar alarms, locks, and fire alarms - it's on us to protect our home.

If it happens again, I'm feeling much more ready."

- Mr and Mrs Park, Yorkshire

The Government is investing in protecting areas at risk of flooding. Like Mr and Mrs Park, many households are learning how to protect their home from flooding and taking action, too.

Here's what Mr and Mrs Park did to protect their home

1. We signed up for flood warnings

Flood warnings alert you at times when there is increased risk of flooding from rivers, the sea and groundwater. You'll be alerted by phone, email or text when flooding is expected.

Flood warnings are not available in all areas, and don't warn against all types of flooding risks (such as surface water, and water coming up through drains), so you should still take other precautions.

2. Luckily, we had good insurance. Do you?

Check your building and contents insurance to make sure you're covered for flood damage. If you're a renter, it's your responsibility to protect your belongings.

If you're finding it difficult to get your property insured for flooding, the National Flood Forum may be able to help.

3. We created a flood plan - we now feel much better prepared

Create a flood plan

This will ensure you're ready if a flood comes. It's a simple document, but will help you know what to do, and have all the important details to hand.

Planning ahead

Be prepared to move valuables upstairs. Quick action can save valuable and sentimental items.

Clear debris out of drains and gullies to help water flow away.

Clearing leaves and other blockages away reduces the risk of water overflowing into your house.

Learn how to turn off your gas, electricity and water. In the event of a flood, you should turn these off, particularly if you need to leave your home.

Your gas valve is usually next to your gas meter.

Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).

Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.

Related content

What to do in a flood

How to recover after a flood

What happens after a flood

4. We've better protected our home from flood damage – get a flood survey to find out how to protect yours

A flood survey will tell you what you can do to your home to reduce the risk of flood damage

The right measures will depend on the type of property and its construction method, and the types of flooding that might impact you.

It is therefore recommended that you get a **flood survey** for expert guidance.

The Blue Pages has a list of recommended surveyors.

What might the surveyor recommend?

There are a lot of measures that can help.

Replacing a floor can be very expensive. Replacing carpet with tiles means your floor won't get damaged by water.

Electrical damage is also costly to repair, and can be dangerous. Raising electrical sockets keeps them away from flood water.

Non-return valves stop water coming up toilets and sinks.

Raised door seals and flood shields stop water coming into the home.

"To stop water getting in, we've now got raised door thresholds, and have installed non-return valves on the drains to stop water coming back up the toilets and sinks."

If any water does get in, it will cause less damage, because I've now laid tiles instead of carpet. We've also had the electrical sockets moved a little higher up the wall, and re-plastered with waterproof plaster designed to withstand flood water.

I wish we'd done all this before. But at least if we're flooded again, at worst it'll just be a big job to clean up. But that doesn't cost anything, and would take me 3 days rather than 3 months."

- Mr and Mrs Park, Yorkshire

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- check flood warnings

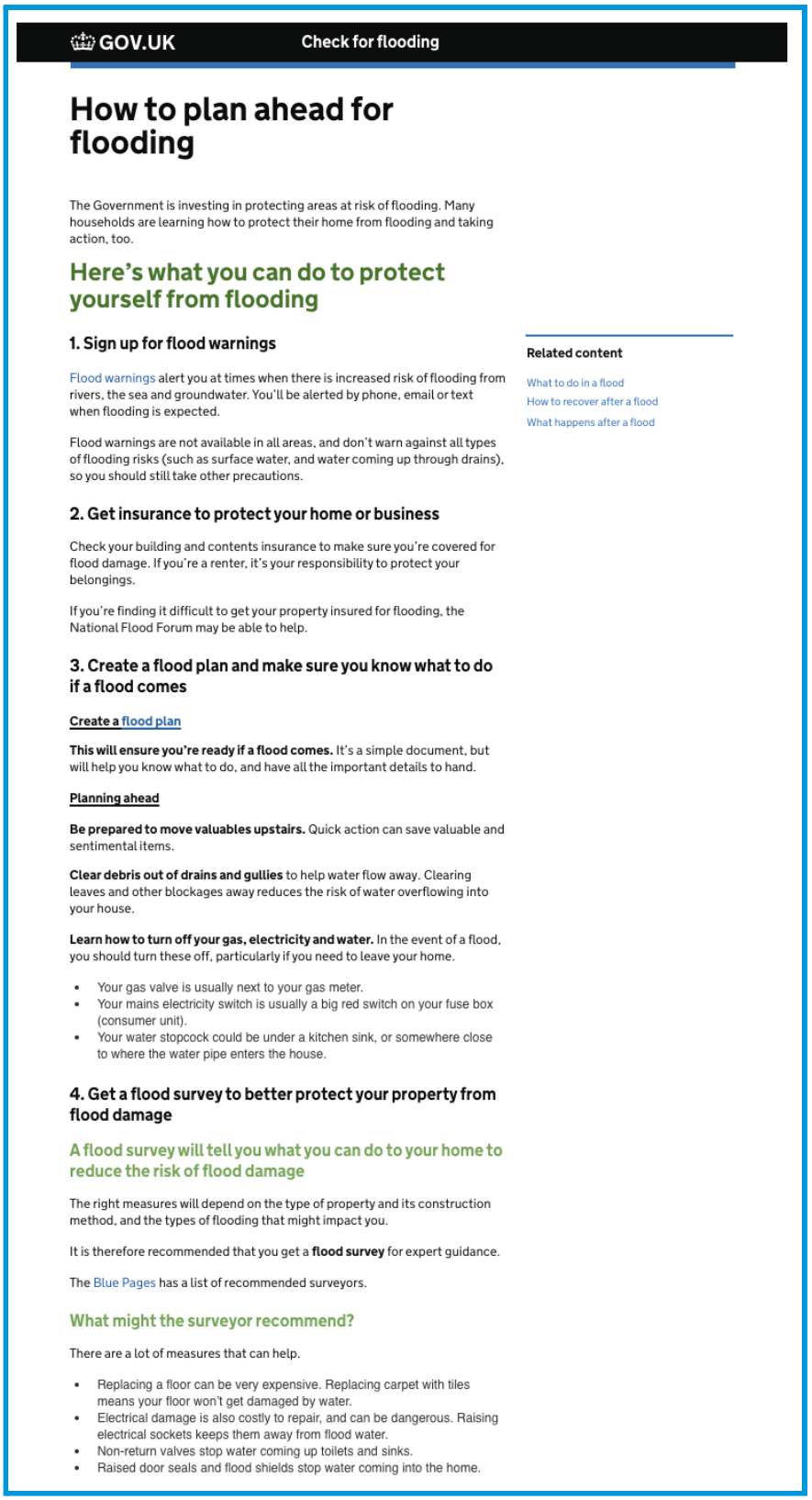
Flood warning - Act

- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive

- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

Treatment B: Enhanced beta (text only)



GOV.UK Check for flooding

How to plan ahead for flooding

The Government is investing in protecting areas at risk of flooding. Many households are learning how to protect their home from flooding and taking action, too.

Here's what you can do to protect yourself from flooding

1. Sign up for flood warnings

Flood warnings alert you at times when there is increased risk of flooding from rivers, the sea and groundwater. You'll be alerted by phone, email or text when flooding is expected.

Flood warnings are not available in all areas, and don't warn against all types of flooding risks (such as surface water, and water coming up through drains), so you should still take other precautions.

2. Get insurance to protect your home or business

Check your building and contents insurance to make sure you're covered for flood damage. If you're a renter, it's your responsibility to protect your belongings.

If you're finding it difficult to get your property insured for flooding, the National Flood Forum may be able to help.

3. Create a flood plan and make sure you know what to do if a flood comes

Create a flood plan

This will ensure you're ready if a flood comes. It's a simple document, but will help you know what to do, and have all the important details to hand.

Planning ahead

Be prepared to move valuables upstairs. Quick action can save valuable and sentimental items.

Clear debris out of drains and gullies to help water flow away. Clearing leaves and other blockages away reduces the risk of water overflowing into your house.

Learn how to turn off your gas, electricity and water. In the event of a flood, you should turn these off, particularly if you need to leave your home.

- Your gas valve is usually next to your gas meter.
- Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).
- Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.

4. Get a flood survey to better protect your property from flood damage

A flood survey will tell you what you can do to your home to reduce the risk of flood damage

The right measures will depend on the type of property and its construction method, and the types of flooding that might impact you.

It is therefore recommended that you get a **flood survey** for expert guidance.

The Blue Pages has a list of recommended surveyors.

What might the surveyor recommend?

There are a lot of measures that can help.

- Replacing a floor can be very expensive. Replacing carpet with tiles means your floor won't get damaged by water.
- Electrical damage is also costly to repair, and can be dangerous. Raising electrical sockets keeps them away from flood water.
- Non-return valves stop water coming up toilets and sinks.
- Raised door seals and flood shields stop water coming into the home.

Related content

What to do in a flood
How to recover after a flood
What happens after a flood

5. Act when you receive a flood warning

If you receive a flood warning, act swiftly and follow the guidance.

Flood alert - Prepare

- prepare a bag that includes medicines and insurance documents
- check flood warnings

Flood warning - Act

- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive

- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

Built by the Environment Agency

Treatment C: Enhanced beta (text + images)

GOV.UK Check for flooding

How to plan ahead for flooding

The Government is investing in protecting areas at risk of flooding. Many households are learning how to protect their home from flooding and taking action, too.

Here's what you can do to protect yourself from flooding

1. Sign up for flood warnings

Flood warnings alert you at times when there is increased risk of flooding from rivers, the sea and groundwater. You'll be alerted by phone, email or text when flooding is expected.

Flood warnings are not available in all areas, and don't warn against all types of flooding risks (such as surface water, and water coming up through drains), so you should still take other precautions.

2. Get insurance to protect your home or business

Check your building and contents insurance to make sure you're covered for flood damage. If you're a renter, it's your responsibility to protect your belongings.

If you're finding it difficult to get your property insured for flooding, the National Flood Forum may be able to help.

3. Create a flood plan and make sure you know what to do if a flood comes

Create a flood plan

This will ensure you're ready if a flood comes. It's a simple document, but will help you know what to do, and have all the important details to hand.

Planning ahead

Be prepared to move valuables upstairs. Quick action can save valuable and sentimental items.

Clear debris out of drains and gullies to help water flow away.

Clearing leaves and other blockages away reduces the risk of water overflowing into your house.

Learn how to turn off your gas, electricity and water. In the event of a flood, you should turn these off, particularly if you need to leave your home.

Your gas valve is usually next to your gas meter.

Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).

Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.

Related content

What to do in a flood
How to recover after a flood
What happens after a flood

4. Get a flood survey to better protect your property from flood damage

A flood survey will tell you what you can do to your home to reduce the risk of flood damage

The right measures will depend on the type of property and its construction method, and the types of flooding that might impact you.

It is therefore recommended that you get a **flood survey** for expert guidance.

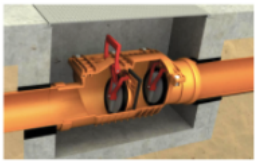
The Blue Pages has a list of recommended surveyors.

What might the surveyor recommend?

There are a lot of measures that can help.

Replacing a floor can be very expensive. Replacing carpet with tiles means your floor won't get damaged by water.

Electrical damage is also costly to repair, and can be dangerous. Raising electrical sockets keeps them away from flood water.



Non-return valves stop water coming up toilets and sinks.

Raised door seals and flood shields stop water coming into the home.

5. Act when you receive a flood warning

If you receive a flood warning, act swiftly and follow the guidance.

Flood alert - Prepare

- prepare a bag that includes medicines and insurance documents
- check flood warnings

Flood warning - Act

- turn off gas, water and electricity
- move things upstairs or to safety
- move family, pets and car to safety

Severe flood warning - Survive

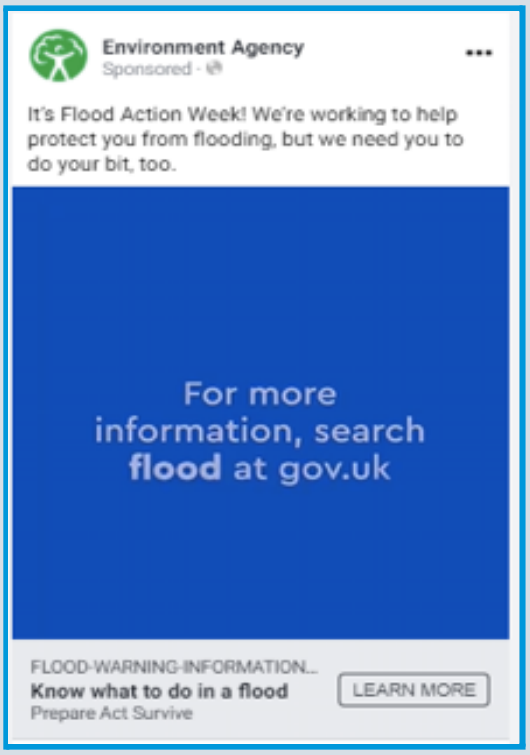
- call 999 if in immediate danger
- follow advice from emergency services
- keep yourself and your family safe

Appendix 2: Trial 2 interventions

Table 17: Trial 2 interventions

Condition	Screenshot
Flood action campaign	
Control: Curiosity framing	
Treatment 1: Location reciprocity	

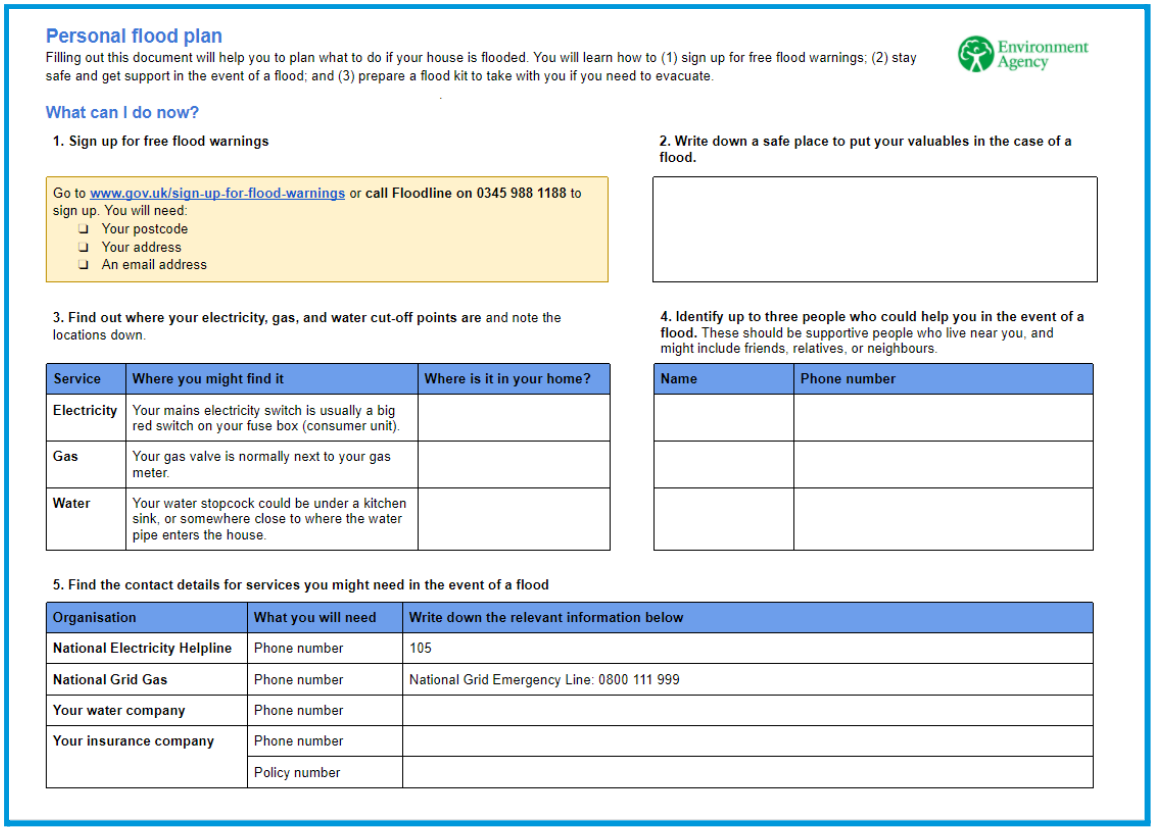
Treatment 2: Location risk	
Flood action *week*	
Control: Question	

Treatment 1: Reciprocity	
Treatment 2: Ability	

Treatment 3: Loss aversion

Appendix 3: Trial 3 interventions

Treatment A: Simplified flood plan



Personal flood plan

Filling out this document will help you to plan what to do if your house is flooded. You will learn how to (1) sign up for free flood warnings; (2) stay safe and get support in the event of a flood; and (3) prepare a flood kit to take with you if you need to evacuate.

Environment Agency

What can I do now?

1. Sign up for free flood warnings

Go to www.gov.uk/sign-up-for-flood-warnings or **call Floodline on 0345 988 1188** to sign up. You will need:

- ❑ Your postcode
- ❑ Your address
- ❑ An email address

2. Write down a safe place to put your valuables in the case of a flood.

3. Find out where your electricity, gas, and water cut-off points are and note the locations down.

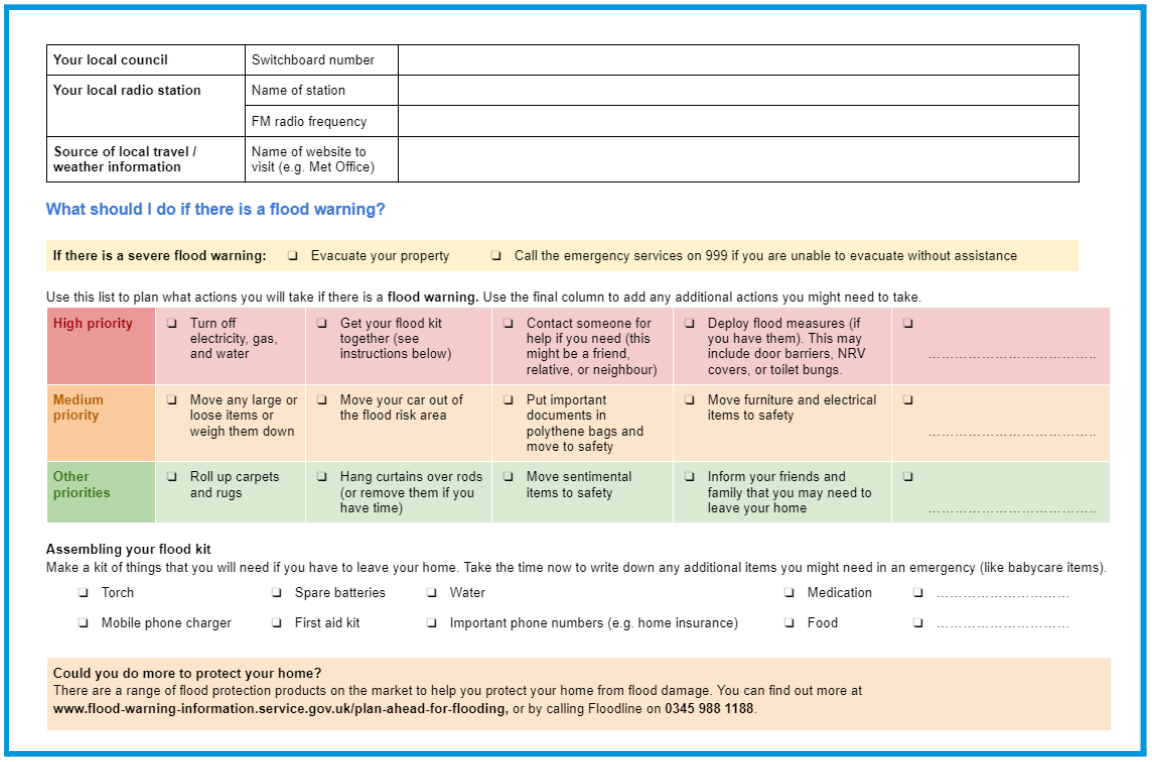
Service	Where you might find it	Where is it in your home?
Electricity	Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).	
Gas	Your gas valve is normally next to your gas meter.	
Water	Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.	

4. Identify up to three people who could help you in the event of a flood. These should be supportive people who live near you, and might include friends, relatives, or neighbours.

Name	Phone number

5. Find the contact details for services you might need in the event of a flood

Organisation	What you will need	Write down the relevant information below
National Electricity Helpline	Phone number	105
National Grid Gas	Phone number	National Grid Emergency Line: 0800 111 999
Your water company	Phone number	
Your insurance company	Phone number	
	Policy number	



Your local council	Switchboard number	
Your local radio station	Name of station	
	FM radio frequency	
Source of local travel / weather information	Name of website to visit (e.g. Met Office)	

What should I do if there is a flood warning?

If there is a severe flood warning: ❑ Evacuate your property ❑ Call the emergency services on 999 if you are unable to evacuate without assistance

Use this list to plan what actions you will take if there is a **flood warning.** Use the final column to add any additional actions you might need to take.

High priority	❑ Turn off electricity, gas, and water	❑ Get your flood kit together (see instructions below)	❑ Contact someone for help if you need (this might be a friend, relative, or neighbour)	❑ Deploy flood measures (if you have them). This may include door barriers, NRV covers, or toilet bungs.	❑ .....
Medium priority	❑ Move any large or loose items or weigh them down	❑ Move your car out of the flood risk area	❑ Put important documents in polythene bags and move to safety	❑ Move furniture and electrical items to safety	❑ .....
Other priorities	❑ Roll up carpets and rugs	❑ Hang curtains over rods (or remove them if you have time)	❑ Move sentimental items to safety	❑ Inform your friends and family that you may need to leave your home	❑ .....

Assembling your flood kit

Make a kit of things that you will need if you have to leave your home. Take the time now to write down any additional items you might need in an emergency (like babycare items).

❑ Torch ❑ Spare batteries ❑ Water ❑ Medication ❑ .....

❑ Mobile phone charger ❑ First aid kit ❑ Important phone numbers (e.g. home insurance) ❑ Food ❑ .....

Could you do more to protect your home?

There are a range of flood protection products on the market to help you protect your home from flood damage. You can find out more at **www.flood-warning-information.service.gov.uk/plan-ahead-for-flooding,** or by calling Floodline on **0345 988 1188**.

Treatment B: Context

Personal flood plan

Filling out this document will help you to plan what to do if your house is flooded. You will learn how to (1) sign up for free flood warnings; (2) stay safe and get support in the event of a flood; and (3) prepare a flood kit to take with you if you need to evacuate.

Environment Agency

What can I do now?

1. Sign up for free flood warnings You will receive real-time alerts (via phone, text, or email) on the flood risk in your area, so that you can better protect yourself and your home.

Go to www.gov.uk/sign-up-for-flood-warnings or **call Floodline on 0345 988 1188** to sign up.
You will need:
- ❑ Your postcode
- ❑ Your address
- ❑ An email address

2. Write down a safe place to put your valuables in the case of a flood. This will protect them from water damage.

3. Find out where your service cut-off points are and note the locations down.

Service	Why you should turn it off in the event of a flood	Where you might find it	Where is it in your home?
Electricity	Protect yourself from electrocution and save your devices from damage	Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).	
Gas	Prevent gas leaks	Your gas valve is normally next to your gas meter.	
Water	Minimise additional flooding within your home	Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.	

4. Identify up to three people who could help you in the event of a flood. These should be supportive people who live near you, and might include friends, relatives, or neighbours. In the event of a flood, they can help to keep you safe, offer support, move possessions out of harm's way, and find somewhere else to stay if necessary.

Name	Phone number

5. Find the contact details for services you might need in the event of a flood

Organisation	You might need this organisation to:	What you will need	Write down the relevant information below
National Electricity Helpline	Report an electrical hazard or power cut	Phone number	105
National Grid Gas	Report a gas leak	Phone number	National Grid Emergency Line: 0800 111 999
Your water company	Report an overflowing sewer	Phone number	
Your insurance company	Alert your provider that you may need to claim for flooding damages, and determine next steps	Phone number	
		Policy number	
Your local council	Access temporary council accommodation if necessary	Switchboard number	
Your local radio station	Access important updates about the flood risk in your area	Name of station	
		FM radio frequency	
Source of local travel / weather information	Learn about flood levels and related travel issues in your area	Name of website to visit (e.g. Met Office)	

What should I do if there is a flood warning?

In the event of a flood, carrying out the steps below will keep you safe and minimise flood damage.

If there is a severe flood warning: ❑ Evacuate your property ❑ Call the emergency services on 999 if you are unable to evacuate without assistance

Use this list to plan what actions you will take if there is a **flood warning.** Use the final column to add any additional actions you might need to take.

High priority	❑ Turn off electricity, gas, and water	❑ Get your flood kit together (see instructions below)	❑ Contact someone for help if you need (this might be a friend, relative, or neighbour)	❑ Deploy flood measures (if you have them). This may include door barriers, NRV covers, or toilet bungs.	❑ .....
Medium priority	❑ Move any large or loose items or weigh them down	❑ Move your car out of the flood risk area	❑ Put important documents in polythene bags and move to safety	❑ Move furniture and electrical items to safety	❑ .....
Other priorities	❑ Roll up carpets and rugs	❑ Hang curtains over rods (or remove them if you have time)	❑ Move sentimental items to safety	❑ Inform your friends and family that you may need to leave your home	❑ .....

Assembling your flood kit

Make a kit of things that you will need if you have to leave your home. Use the checklist below to assemble your kit. Take the time now to write down any additional items you might need in an emergency (like babycare items).

❑ Torch ❑ Spare batteries ❑ Water ❑ Medication ❑ .....
❑ Mobile phone charger ❑ First aid kit ❑ Important phone numbers (e.g. home insurance) ❑ Food ❑ .....

Could you do more to protect your home?
There are a range of flood protection products on the market to help you protect your home from flood damage. You can find out more at **www.flood-warning-information.service.gov.uk/plan-ahead-for-flooding,** or by calling Floodline on **0345 988 1188**.

Treatment C: Images

Personal flood plan

Filling out this document will help you to plan what to do if your house is flooded. You will learn how to (1) sign up for free flood warnings; (2) stay safe and get support in the event of a flood; and (3) prepare a flood kit to take with you if you need to evacuate.

Environment Agency

What can I do now?

1. Sign up for free flood warnings

Go to www.gov.uk/sign-up-for-flood-warnings or **call Floodline on 0345 988 1188** to sign up. You will need:

- ❑ Your postcode
- ❑ Your address
- ❑ An email address

2. Identify up to three people who could help you in the event of a flood. These should be supportive people who live near you, and might include friends, relatives, or neighbours.

Name	Phone number

3. Find out where your electricity, gas, and water cut-off points are and note the locations down.

Service	Where you might find it	Where is it in your home?
Electricity	 Your mains electricity switch is usually a big red switch on your fuse box (consumer unit).	
Gas	 Your gas valve is usually next to your gas meter.	
Water	 Your water stopcock could be under a kitchen sink, or somewhere close to where the water pipe enters the house.	

4. Find the contact details for services you might need in the event of a flood

Organisation	What you will need	Write down the relevant information below
National Electricity Helpline	Phone number	105
National Grid Gas	Phone number	National Grid Emergency Line: 0800 111 999
Your water company	Phone number	
Your local council	Switchboard number	
Your insurance company	Phone number	
	Policy number	

What should I do if there is a flood warning?

If there is a severe flood warning: ❑ Evacuate your property ❑ Call the emergency services on 999 if you are unable to evacuate without assistance

Use this list to plan what actions you will take if there is a **flood warning.** Use the final column to add any additional actions you might need to take.

High priority	❑ Turn off electricity, gas, and water	❑ Get your flood kit together (see instructions below)	❑ Contact someone for help if you need (this might be a friend, relative, or neighbour)	❑ Deploy flood measures (if you have them). This may include door barriers, NRV covers, or toilet bungs.	❑ .....
Medium priority	❑ Move any large or loose items or weigh them down	❑ Move your car out of the flood risk area	❑ Put important documents in polythene bags and move to safety	❑ Move furniture and electrical items to safety	❑ .....
Other priorities	❑ Roll up carpets and rugs	❑ Hang curtains over rods (or remove them if you have time)	❑ Move sentimental items to safety	❑ Inform your friends and family that you may need to leave your home	❑ .....

Assembling your flood kit

Make a kit of things that you will need if you have to leave your home. Use the checklist below to assemble your kit. Take the time now to write down any additional items you might need in an emergency (like babycare items).

- ❑ First aid kit
- ❑ Food
- ❑ Bottled water
- ❑ Medication
- ❑ Phone charger
- ❑ Torch
- ❑ Spare batteries
- ❑ Important phone numbers (e.g. home insurance)
- ❑ .....
- ❑ .....

Could you do more to protect your home?

There are a range of flood protection products on the market to help you protect your home from flood damage. You can find out more at **www.flood-warning-information.service.gov.uk/plan-ahead-for-flooding,** or by calling Floodline on **0345 988 1188**.

Treatment D: Future self exercise

After completing the online exercise below, participants went on to complete the 'simplified flood plan' (i.e. the plan used in Treatment A).

Table 18: Online exercise

Question number	Format	Question / answers
1	Participants are presented with image and statement	Flooding can be sudden and mean losing possessions, being forced out of your home, and lengthy repair works. It's tough - and can also be difficult for children, pets, and other dependents. Take a moment now to think about what it would be like for you and (if applicable) others who you live with if your home was flooded. 
2	Text submission	*Imagine that there is flooding in your area. Water has started to enter your home, and is rising. You hear an announcement on the radio that residents in your area are being advised to evacuate as soon as possible.* You don't have long to get out - what three items would you quickly take with you? Please fill in your answers as quickly as you can! ❏ [Open text box] ❏ [Open text box] ❏ [Open text box]
3	Checkbox submission	When a flood is imminent and you need to evacuate, you have to think quickly to choose which things to rescue. But it's hard to remember everything under pressure - you might forget important items like medication, warm clothes, and drinking water. This is why having a plan can make a huge difference in the event of a flood. Now you have extra time to think, would you choose to take different items with you if your house was flooded? ❏ Yes ❏ No
4	Participants presented with statement	*You discover that there has been serious flood damage to your home, and extensive repairs are required. You (and any*

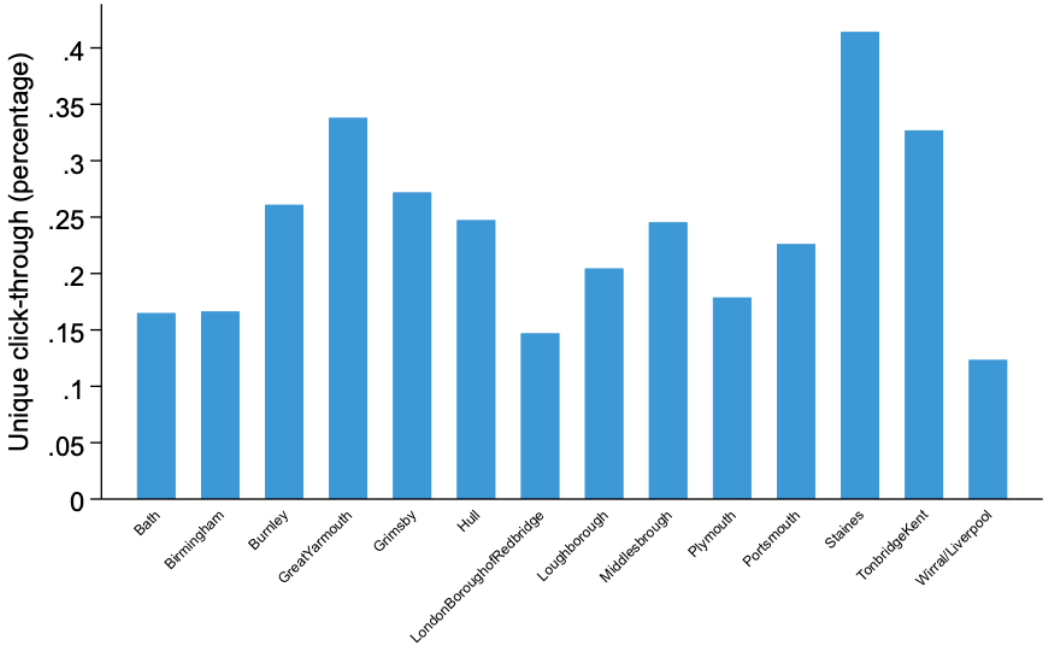
		dependents) must find somewhere else to live for at least four weeks. Where would you stay? Take some time to think about this now.

Appendix 4: Trial 2 exploratory results

In addition to analysing clickthrough and video play to completion by variant, BIT also examined these outcomes by location. Although these exploratory analyses were interesting, we did not detect meaningful patterns.

Click-through by location in the flood action campaign

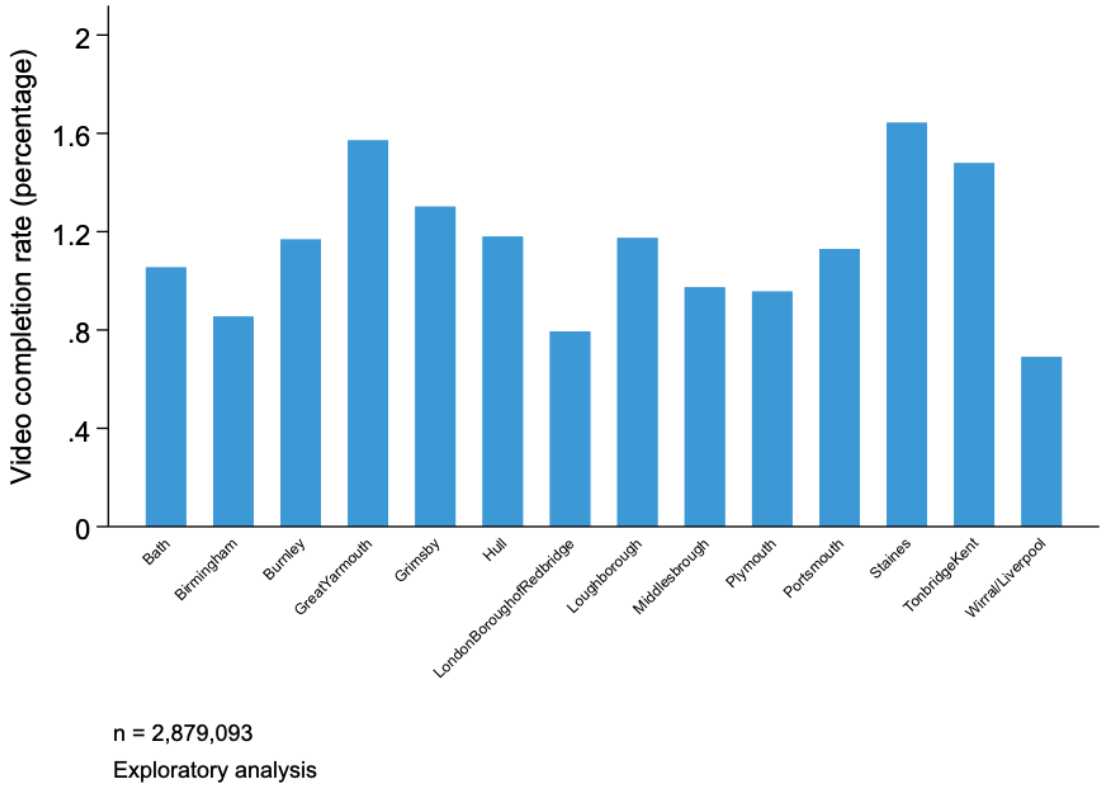
Figure 22: click-through by location in the flood action campaign



n = 2,879,093
Exploratory analysis

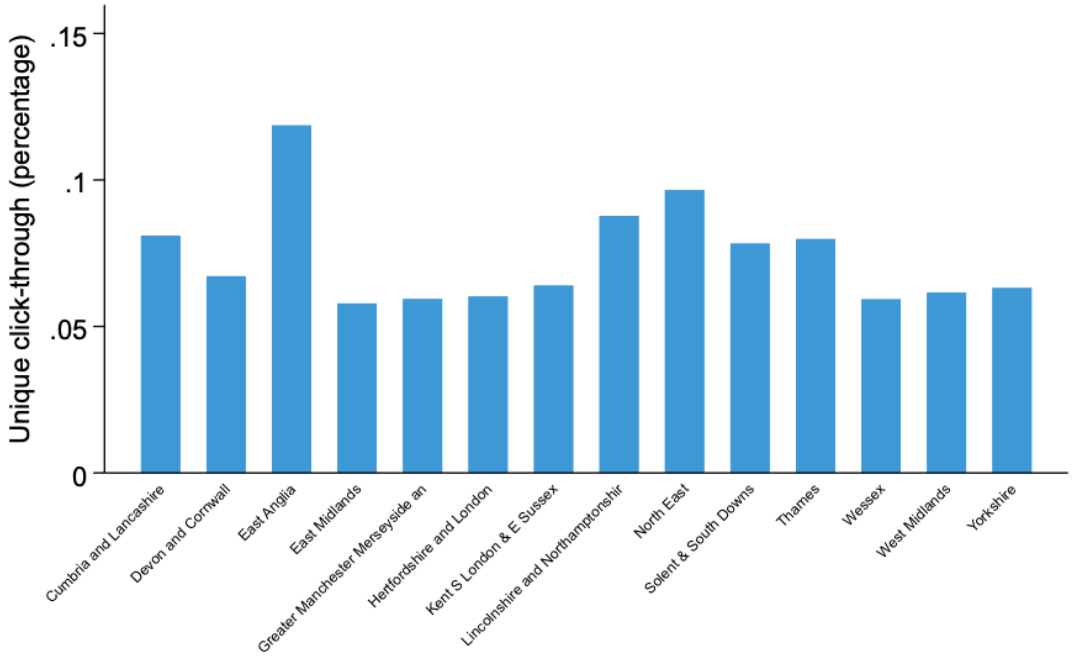
Video play to completion by location in the flood action campaign

Figure 23: video play to completion by location in the flood action campaign



Click-through by location in flood action week

Figure 24: click-through by location in flood action week



n = 4,556,862

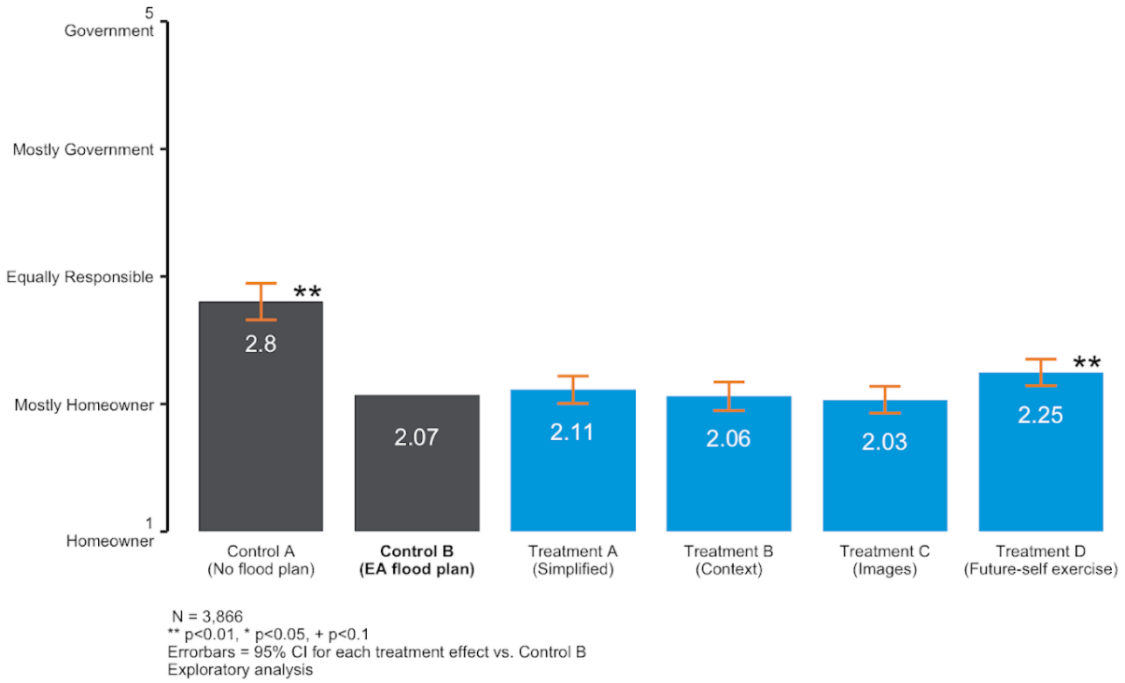
Exploratory analysis

Appendix 5: Trial 3 exploratory results

Perceived responsible actor in the event of a flood

The perceived responsibility of the government in the event of a flood was significantly higher in Control A (no flood plan) compared to Control B (EA flood plan), suggesting that exposure to a flood plan increases the perceived personal responsibility of protecting the home. Interestingly, Treatment D caused participants to lean more towards government responsibility compared to the control condition.

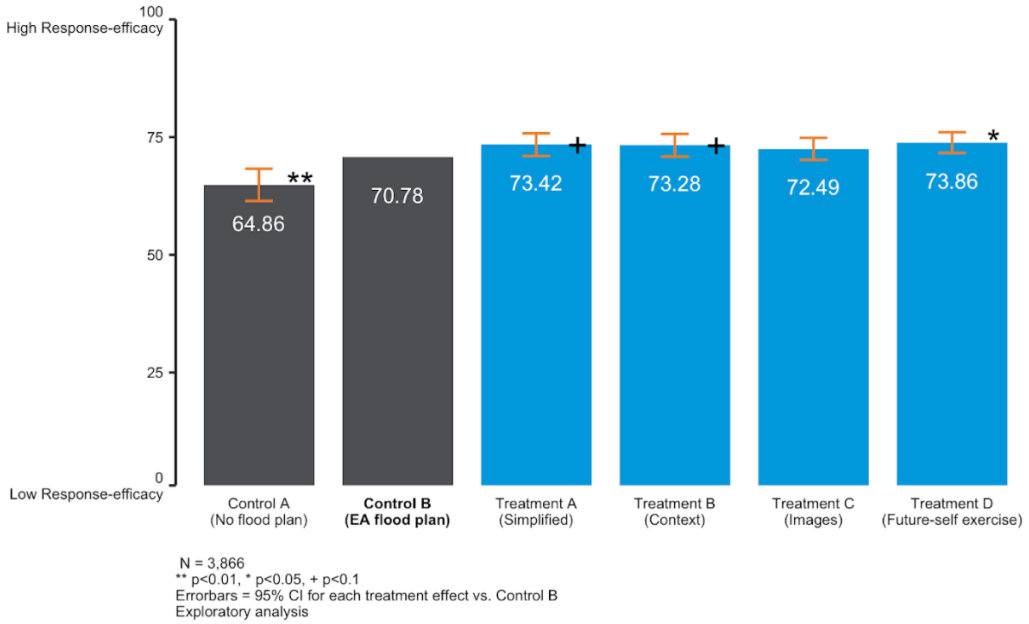
Figure 25: Perceived responsible actor in the event of a flood, by treatment arm



Response-efficacy for securing personal belongings in the event of a flood

Response-efficacy for securing personal belongings was significantly lower in those participants who did not complete a flood plan (Control A) than in those who completed the current EA flood plan (Control B). Participants in Control D (who completed the future self exercise) reported a significant 4.3% increase in self-efficacy compared to Control B.

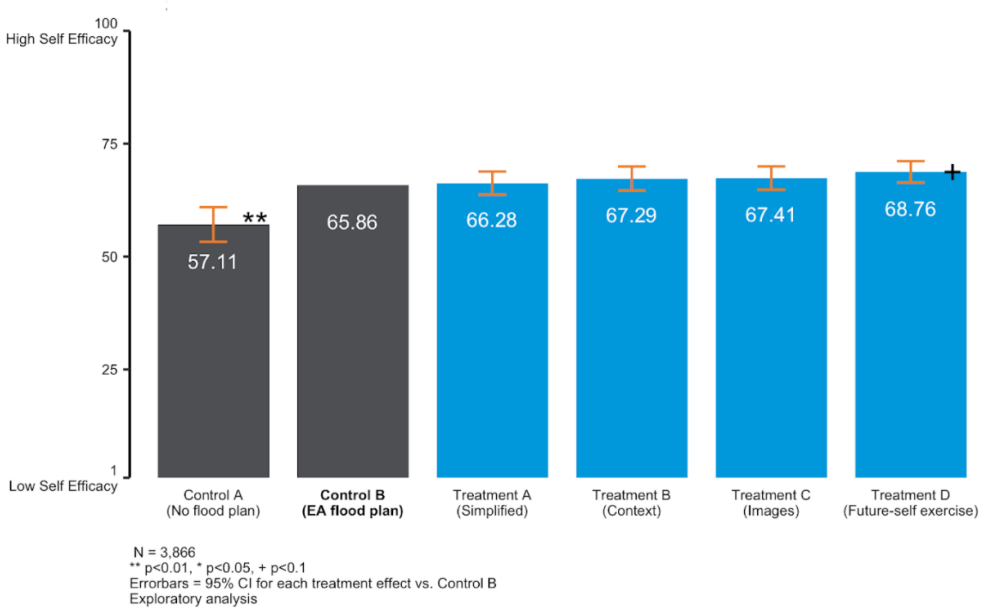
Figure 26: Response-efficacy for securing personal belongings in the event of a flood, by treatment arm



Self-efficacy for securing home in the event of a flood

Self-efficacy for securing the home was significantly lower in those participants who did not complete a flood plan (Control A) than in those who completed the current EA flood plan (Control B). Participants who completed the 'futures self' exercise (Treatment D) reported higher self-efficacy, but this result had low significance.

Figure 27: Self-efficacy for securing home in the event of a flood, by treatment arm

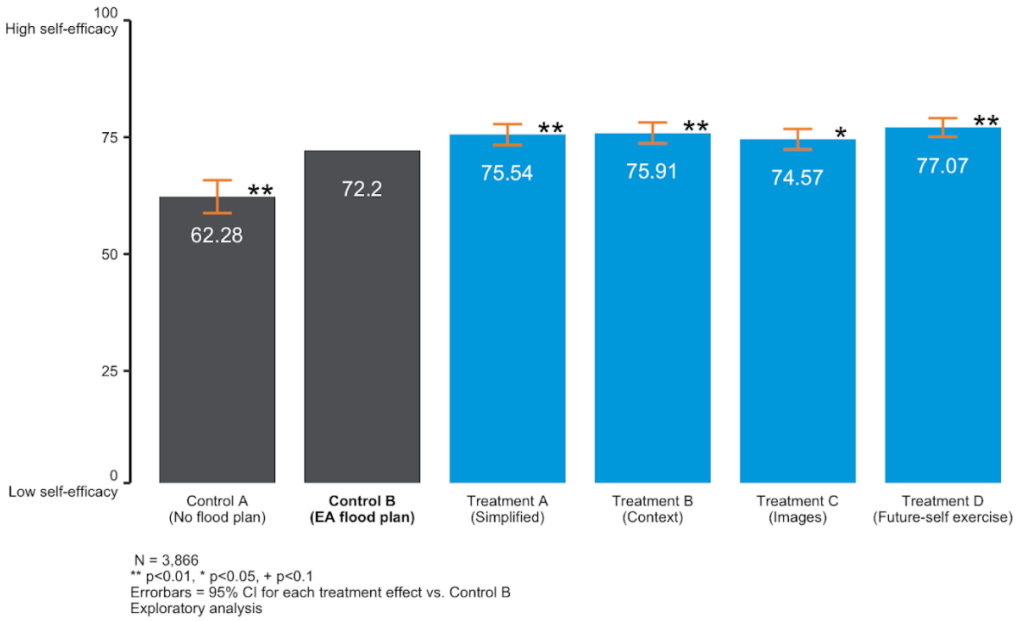


Self-efficacy for securing personal belongings in the event of a flood

Self-efficacy for securing personal belongings from flooding was significantly lower in those participants who did not complete a flood plan (Control A) than in those who completed the current EA flood plan (Control B).

Participants who were in any of the treatment conditions scored significantly higher compared to the EA version (Control B). Treatment D scored the highest.

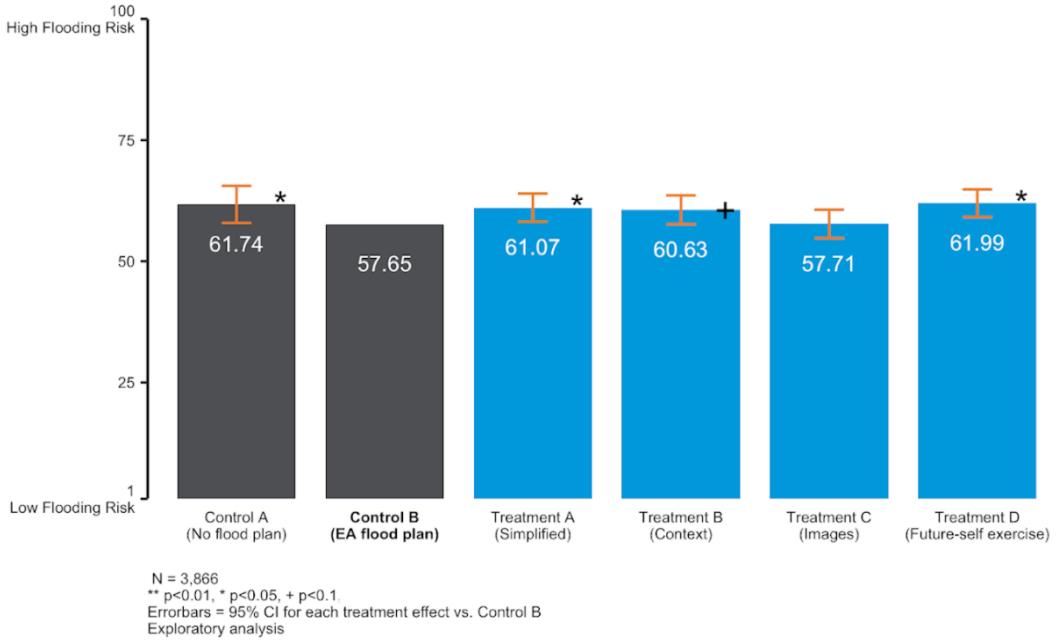
Figure 28: Self-efficacy for securing personal belongings in the event of a flood, by treatment arm



Perceived likelihood of experiencing a flood

Participants who had completed the EA flood plan (Control B) rated their risk of experiencing a flood as lower than those who had not completed a flood plan at all (Control A). Treatments A and B reported higher perceived risk of flooding than Control B.

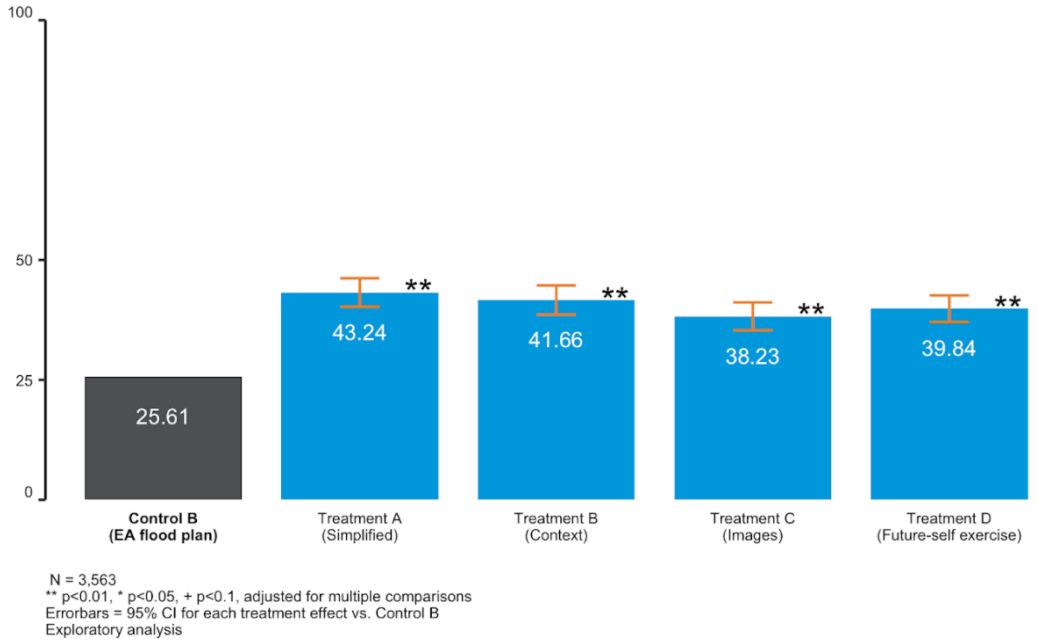
Figure 29: Perceived likelihood to of experiencing a flood, by treatment arm



Proportion of text fields completed in the flood plan

As each flood plan had a different number of text fields, BIT measured the proportion of text fields completed. Participants in all of the treatment conditions had significantly higher completion rates compared to Control B. Treatment A had the highest completion rate.

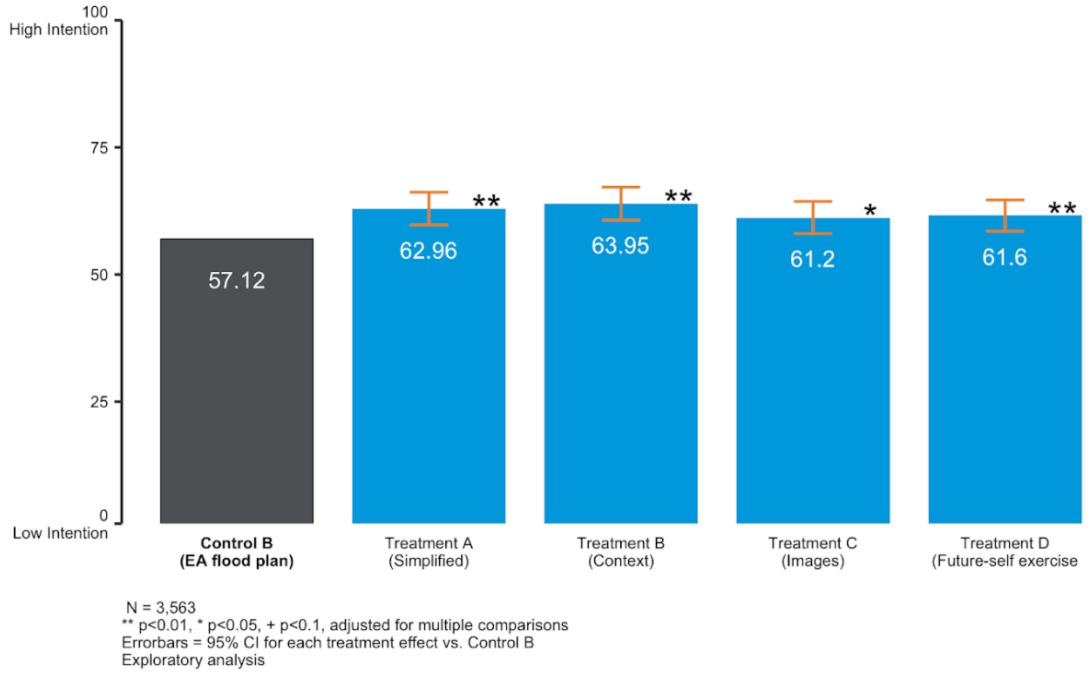
Figure 30: Proportion of text fields completed in flood plan, by treatment arm



Intention to discuss flood plan with personal network

Participants in all four of the treatment conditions reported higher intention to discuss their flood plan with their personal network than Control B. Participants in Treatment B reported the strongest intention.

Figure 31: Intention to discuss flood plan with personal network, by treatment arm



10. Technical annex

10.1 Explore methodologies

10.1.1 Focus groups and interviews

WPI, in collaboration with BIT and EA, conducted a series of focus groups and interviews to provide in-depth insights into individuals' experiences with flooding. Participants were homeowners above the age of 18.

For the focus groups, depending on their experiences with flooding, participants were divided into three groups: 1) had been flooded (1 group); 2) had not been flooded, but signed up to flood warnings or had spoken to their surveyor about their flood risk (2 groups); and 3) had not been flooded, but had spoken to family and friends about flooding (2 groups).

In addition, three individuals who had experienced recent flooding were recruited for 1-to1 interviews. As these interviews were an in-depth exploration into an individual's experience of flooding it was deemed appropriate to conduct these outside of a group setting.

Finally, 10 expert stakeholder interviews provided the perspective of individuals who engage with flooding on a professional level. These included academics, officials, pathfinders, flood groups, and those representing the property care and insurance sectors.

10.1.2 Online survey

The survey was launched on Predictiv, BIT's in-house survey and experimentation platform. The sample consisted of homeowners above the age of 18 and was nationally representative on age, income, and gender. Whilst the survey did not use random sampling in the data collection, it did run the survey with two different groups:

- A national representation of participants based on location, age, income, and gender (n=1,021), and
- Participants living in English counties that are at higher risk of flooding (n=1,012), also nationally representative on income, age, and gender.

This allowed for over-sampling of participants at higher risk of flooding, as these were the likely target audience for future interventions. However, sampling groups were not used for subgroup analysis purposes i.e. risk comparison groups for analysis were based on actual location data collected from all participants rather than sampling groups.

Subgroup analyses to determine whether responses differed significantly between groups were identified prior to analysis to minimise bias. Three subgroup comparisons were analysed: 1) participants living in high-risk vs. low-risk counties; 2) participants with previous experience of flooding vs. not; and 3) high- vs low-income bands. T-tests were conducted, with differences considered significant at 5% or 1% significance levels.

Limitations Participants were not randomly sampled; anyone meeting the eligibility criteria were given the option to participate. This introduces some degree of selection bias towards those who complete online surveys or have an interest in flooding. Therefore, caution should be taken in extrapolating results across the English population. However, as the sample was large and nationally representative robust comparisons between groups could be conducted.

Additionally, due to the large number of comparisons conducted it is possible that a certain number of significant differences discovered are a result of chance ('false-positives'). BIT opted not to carry out multiple comparison corrections, since we are not making any claims about the truly significant nature of observed differences – rather, the results seek to indicate broad trends to help inform the types of interventions which are most likely to be effective for certain audiences. Nevertheless, the high ratio of significant results found to overall comparisons made suggest most are valid and robust.

10.2 Trial methodologies

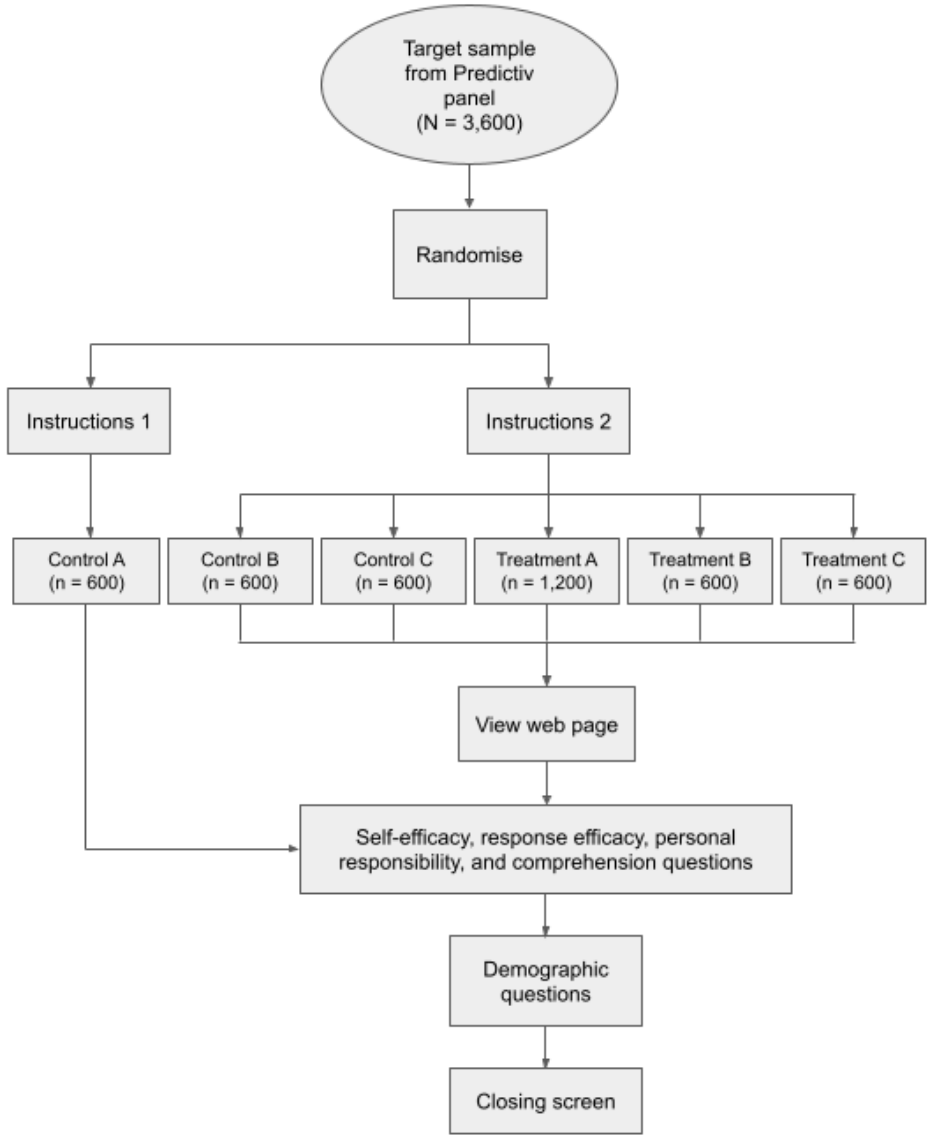
10.2.1 Trial 1: Improve 'How to plan ahead for flooding' webpage

This experiment was conducted entirely online using the Predictiv platform. Participants in the study were selected to participate in this experiment through the panel survey website on which they were registered. Participants were randomly allocated into one of the six trial arms and were taken through several stages:

- **Instructions**: Participants are instructed that they will view information[71] and be asked a series of questions afterward. Participants can spend as much time as they want viewing the web page.
- **Information**: *(except true control group)* The web page displays information about PFR measures that individual homeowners can take.
- **Outcome measures**: *(all participants)* Participants are asked a series of questions to ascertain the following:
    - Primary: A measure of 'combined' self-efficacy and response-efficacy for implementing PFR measures
    - Secondary: Self-efficacy for implementing PFR measures
    - Secondary: Response-efficacy for implementing PFR measures
    - Exploratory: Perception of personal responsibility for implementing PFR measures
    - Exploratory: Awareness of PFR measures
- **Additional demographic questions**: Next, participants are given one additional demographic question (dwelling type) that could influence the participant's stated intentions as well as their response to the intervention material.

[71] Except participants assigned to the true control (no web page), who are only instructed to answer the series of questions.

Figure 32: Trial 1 design



BIT determined eligibility using one screening criterion (managed by the panel):

Question	**Eligible answers**	**Ineligible answers**
Homeowner	Yes	No; Prefer not to say

The final sample size for analysis was 4,196. Data collection began on 28th Jan and closed on 20th Feb. In total, there were 6,467 entrants to the experiment. After removing entrants with missing RIDs (a unique participant identifier), invalid or duplicate IP addresses, 6,067 remained. Of these, 615 participants did not complete the survey; another 1,256 failed the attention check, and so were dropped from analysis, leaving 4,196 valid responses.

BIT tested for differential attrition across trial arms among participants who started but did not complete this experiment. From a linear regression there was no evidence for differential attrition due to drop-outs. A separate linear regression tested whether there were differential rates of termination from the survey attention check across arms; coefficient estimates were all statistically insignificant (table A2).

BIT also conducted balance checks on the final analysis sample using chi-squared tests for (categorical) covariates. Arms were balanced on all covariates (see Table 1).

This gives us confidence that drop-out happens in a way that is not related to treatment condition; for this reason, dropping respondents who have not completed the survey from the experiment does not preclude the causal interpretation of treatment effects.

Table 19: Balance check results for categorical covariates.

Covariate	Percentage per arm						*p* values	Balanced
	Control A (n=597)	Control B (n=629)	Control C (n=606)	Treatment A (n=1,177)	Treatment B (n=597)	Treatment C (n=590)		(Yes/No)
Previous flooding experience							>.10	Yes
Yes, within the last 12 months	12.1	12.9	13.7	11.4	9.7	11.0		
Yes, more than 12 months ago	16.4	17.0	14.9	16.3	16.9	14.1		
No	69.6	69.3	70.5	71.6	72.0	72.9		
Don't know	1.65	0.8	0.8	0.7	1.3	2.0		
Gender							>.10	Yes
Male	51.4	51.7	50.3	51.8	52.1	48.0		
Female	48.6	48.3	49.7	48.2	47.9	52.0		
Age							>.10	Yes
18-24 years	25.4	23.6	21.6	24.1	24.0	22.9		
25-54 years	51.7	52.3	53.6	52.5	48.1	53.6		
55-65 years	22.9	24.1	24.8	23.4	28.0	23.6		
Income							>.10	Yes
Above median	48.2	50.7	48.4	48.0	47.6	46.4		
Below median	42.4	40.4	41.5	42.2	45.1	45.4		
Prefer not to say	9.4	8.9	10.1	9.8	7.4	8.1		

Location							>.10	Yes
London	17.6	14.7	15.1	16.0	18.4	13.7		
South and East	36.2	36.1	32.3	32.9	36.0	31.7		
Midlands	20.3	19.1	22.3	22.3	19.6	23.7		
North	25.8	30.0	30.3	28.8	26.0	30.8		
Urban location							>.10	Yes
Rural	21.3	23.8	20.9	22.6	23.8	23.2		
Suburban	49.8	53.3	51.4	52.5	50.3	52.0		
Urban	28.9	22.9	27.6	24.9	26.0	24.7		
Education							>.10	Yes
Degree	39.7	37.6	35.3	39.0	33.3	39.5		
No degree	57.6	58.9	61.6	59.1	64.2	58.8		
Prefer not to say	2.7	3.5	3.0	1.9	2.5	1.7		
Ethnicity							>.10	Yes
White	78.2	83.5	82.1	82.5	82.2	84.1		
Asian	11.9	10.1	9.2	9.4	8.7	8.8		
Black	4.0	2.1	2.5	3.0	3.4	2.5		
Mixed/ Other	5.9	4.3	6.2	5.1	5.7	4.6		
Home dwelling type							>.10	Yes
Detached house	31.0	28.7	31.2	28.2	26.8	31.7		
Semi detached house	37.7	41.7	36.7	41.0	36.7	38.0		
Terraced house	19.4	21.9	20.9	20.5	23.5	20.8		
Ground floor flat	4.3	3.1	3.4	2.9	3.9	3.1		
Flat above ground floor	5.7	3.6	5.5	5.8	6.4	4.6		
Other	1.9	0.8	2.3	1.7	2.8	1.9		

In the rest of this trial's methodology section, BIT provides further details on the outcomes by treatment and associated regressions.

Table 20: Descriptive statistics for primary outcome

	Control A	Control B	Control C	Treatment A	Treatment B	Treatment C

	n=597	n=629	n=606	n=1177	n=597	n=590
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Perceived ability to protect against flood damage (0-100)	66.66 (24.88)	69.98 (21.56)	70.31 (22.16)	68.24 (22.27)	70.73 (22.05)	71.36 (20.88)

Table 21: Regression output for primary outcome - p-values corrected for multiple comparisons (3)

Outcome (Perceived ability to protect against flood damage (0-100))	**Coefficient** (reference = Control C)			
	Constant	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	57.32** (5.64)	-1.91 (1.11)	0.55 (1.27)	0.88 (1.24)
Standard covariates	Yes			
Custom covariates	Yes			
R squared	0.095			
Observations	4,196			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (3) comparisons with the Benjamini-Hochberg procedure.

Table 22: Descriptive statistics for secondary outcomes

	Control A n=597	Control B n=629	Control C n=606	Treatment A n=1177	Treatment B n=597	Treatment C n=590
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Self-efficacy	60.50 (25.12)	68.23 (22.87)	70.23 (22.77)	67.78 (23.41)	69.81 (23.65)	69.38 (23.10)
Response-efficacy	65.69 (23.04)	70.75 (22.92)	75.11 (20.57)	76.96 (20.41)	75.48 (21.37)	75.83 (21.45)
Resource adequacy	60.70 (25.91)	63.93 (25.79)	67.53 (23.93)	65.63 (24.71)	67.93 (24.34)	67.01 (24.38)

Table 23: Regression output for self-efficacy - p-values corrected for multiple comparisons (9)

Outcome (Self-efficacy)	**Coefficient** (reference = Control C)

	Constant	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	65.82** (5.06)	-2.49 (1.14)	-0.35 (1.35)	-1.19 (1.33)
Standard covariates	Yes			
Custom covariates	Yes			
R squared	0.089			
Observations	4,196			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (9) comparisons with the Benjamini-Hochberg procedure.

Table 24: Regression output for response-efficacy - p-values corrected for multiple comparisons (9)

Outcome (Response-efficacy)	**Coefficient** (reference = Control C)			
	Constant	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	55.37** (5.21)	1.77 (0.98)	0.24 (1.17)	0.81 (1.17)
Standard covariates	Yes			
Custom covariates	Yes			
R squared	0.144			
Observations	4,196			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (9) comparisons with the Benjamini-Hochberg procedure.

Table 25: Regression output for resource-adequacy: p-values corrected for multiple comparisons (9)

Outcome (Resource-adequacy)	**Coefficient** (reference = Control C)			
	Constant	Treatment A	Treatment B	Treatment C

Coefficient (Standard error)	62.76** (5.43)	-1.64 (1.20)	0.39 (1.39)	-0.21 (1.39)
Standard covariates	Yes			
Custom covariates	Yes			
R squared	0.091			
Observations	4,196			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (9) comparisons with the Benjamini-Hochberg procedure.

Table 26: Descriptive statistics for exploratory outcomes

	Control A n=597	**Control B n=629**	**Control C n=606**	**Treatment A n=1177**	**Treatment B n=597**	**Treatment C n=590**
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Number of PFR measures referenced (unprompted)	1.64 (1.57)	1.64 (1.36)	2.07 (2.12)	2.93 (2.82)	2.32 (2.27)	2.26 (2.27)
Perceived responsibility of household vs government	2.39 (1.07)	2.26 (1.04)	2.15 (1.08)	2.10 (1.01)	2.14 (1.07)	2.22 (1.08)
Number of mentioned PFR measures identified	3.53 (1.23)	3.65 (1.18)	3.80 (1.25)	4.07 (1.17)	3.92 (1.20)	3.96 (1.17)
Number of non-PFR measures incorrectly identified	0.44 (0.69)	0.40 (0.66)	0.39 (0.65)	0.35 (0.64)	0.39 (0.65)	0.36 (0.63)
Number of unmentioned PFR measures identified	1.34 (0.73)	1.38 (0.69)	1.40 (0.73)	1.41 (0.72)	1.42 (0.67)	1.41 (0.71)

Table 27: Regression output for number of unprompted PFR measures referenced

	Coefficient (reference = Control C)					
	Constant	Control A	Control B	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	0.36 (0.35)	-0.39** (0.10)	-0.42** (0.10)	0.86** (0.11)	0.23+ (0.12)	0.18 (0.12)

Standard covariates	Yes
Custom covariates	Yes
R squared	0.183
Observations	4,196

Table 28: Regression output for perceived responsibility of household vs government

Outcome (perceived responsibility: 1 (Household) - 5 (Government)	**Coefficient** (reference = Control C)					
	Constant	Control A	Control B	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	2.38** (0.25)	0.20** (0.06)	0.09 (0.06)	-0.07 (0.05)	-0.03 (0.06)	0.06 (0.06)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.067					
Observations	4,196					

** p< 0.01, * p<0.05; + p<0.1.

Table 29: Regression output for number of PFR measures correctly identified

	Coefficient (reference = Control C)					
	Constant	Control A	Control B	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	2.80** (0.26)	-0.25** (0.07)	-0.16* (0.07)	0.26** (0.06)	0.12+ (0.07)	0.17* (0.07)
Standard covariates	Yes					
Custom covariates	Yes					

R squared	0.121
Observations	4,196

** p< 0.01, * p<0.05; + p<0.1.

Table 30: Regression output for number of non-PFR measures incorrectly identified

	Coefficient (reference = Control C)					
	Constant	Control A	Control B	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	0.61** (0.14)	0.04 (0.04)	0.02 (0.04)	-0.03 (0.03)	0.01 (0.04)	-0.01 (0.04)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.095					
Observations	4,196					

** p< 0.01, * p<0.05; + p<0.1.

Table 31: Regression output for number of unmentioned PFR measures identified

	Coefficient (reference = Control C)					
	Constant	Control A	Control B	Treatment A	Treatment B	Treatment C
Coefficient (Standard error)	0.084** (0.16)	-0.05 (0.04)	-0.01 (0.04)	0.01 (0.04)	0.04 (0.04)	0.02 (0.04)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.069					
Observations	4,196					

** p< 0.01, * p<0.05; + p<0.1.

Table 32: list of words for exploratory analysis of unprompted awareness of PFR measures

Word	Measure that uses that word
debris	Clear debris out of drains and gullies
dranes	Clear debris out of drains and gullies
drain	Clear debris out of drains and gullies
drains	Clear debris out of drains and gullies
gullies	Clear debris out of drains and gullies
gulies	Clear debris out of drains and gullies
gullys	Clear debris out of drains and gullies
stopcock	Turn off water
water	Turn off water
gas	Turn off gas valve
electricity	Turn off electricity
mains	Turn off electricity
electrisity	Turn off electricity
elektricity	Turn off electricity
elekrtisity	Turn off electricity
electricitty	Turn off electricity
ellectricity	Turn off electricity
repaint	Repaint brickwork with a water-resistant mortar
waterproof	Repaint brickwork with a water-resistant mortar
mortar	Repaint brickwork with a water-resistant mortar
morter	Repaint brickwork with a water-resistant mortar
bricks	Repaint brickwork with a water-resistant mortar
stand	Raise appliances on plinths
plinths	Raise appliances on plinths
high	Raise appliances on plinths
raise	Raise appliances on plinths
survey	flood survey
audit	flood survey
plan	flood plan
precious	move valuable items upstairs
sentimental	move valuable items upstairs
valuables	move valuable items upstairs
valuble	move valuable items upstairs

valubles	move valuable items upstairs
valuable	move valuable items upstairs
shelving	move valuable items upstairs
shelves	move valuable items upstairs
tiles	replace carpet with tiles
carpet	replace carpet with tiles
sockets	raise electrical sockets
sokets	raise electrical sockets
plugs	raise electrical sockets
plug	raise electrical sockets
valv	non-return valves
valve	non-return valves
valves	non-return valves
NRV	non-return valves
seal	raised door seals and flood shields
shield	raised door seals and flood shields
door	raised door seals and flood shields
Flood Doors	raised door seals and flood shields
flood kit	Assemble flood kit
floodkit	Assemble flood kit
essential items	Assemble flood kit
spare medication	Assemble flood kit
medication	Assemble flood kit
documents	Assemble flood kit
warnings	Sign up for flood warnings
warnigs	Sign up for flood warnings
insurance	get flood insurance
Flood Re	get flood insurance
broker	get flood insurance
Air brick	Air Brick Protection
Airbrick	Air Brick Protection
sand bags	sandbags
sandbags	sandbags
Bluepages	bluepages
Blue pages	bluepages
river beds	maintain river beds and banks

riverbeds	maintain river beds and banks
banks	maintain river beds and banks
Floodline	Ask Floodline to send flood warnings to a friend or relative on your behalf
skirting boards	Water-resistent skirting boards
skirtingboards	Water-resistent skirting boards
varnish	Varnish wooden skirting boards
basement	Flood proof basement (tanking)
tanking	Flood proof basement (tanking)
tank basement	Flood proof basement (tanking)
landscaping	landscape area outside home to divert water away
seal	seal exterior walls
quick release	quick release internal doors
quick-release	quick release internal doors
sealed bags	protect valuables with sealable bags
door thresholds	get door thresholds raised above flood level
barriers	install flood barriers

10.2.2 Trial 2: Increase click-through traffic to key web content from social media ads

Regression outputs

Table 33: Logit regression outputs for primary analysis (clickthrough in flood action campaign)

Outcome (Click-through)	**Coefficient** (reference = 'Curiosity framing' arm)		
	Constant	Location reciprocity	Location risk
Coefficient (Standard error)	-6.527** (0.0845)	0.202** (0.0317)	0.133** (0.0352)
Location fixed effects	Yes		
Pseudo R squared	0.0080		
Observations (reach)	2,879,093		

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (2) comparisons with the Benjamini-Hochberg procedure.

Table 34: Secondary analysis (video plays to completion in flood action campaign) logit regression output

Outcome (Video play to completion)	**Coefficient** (reference = 'Curiosity framing' arm)		
	Constant	Location reciprocity	Location risk
Coefficient (Standard error)	-4.600** (0.0337)	0.160** (0.0139)	0.177** (0.0139)
Location fixed effects	Yes		
Pseudo R squared	0.0065		
Observations (reach)	2,879,093		

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (2) comparisons with the Benjamini-Hochberg procedure.

Table 35: Secondary analysis (clickthrough in flood action week) logit regression output

Outcome (Click-through)	**Coefficient** (reference = 'Question' arm)			
	Constant	Reciprocity	Ability	Loss aversion
Coefficient (Standard error)	-6.902** (0.0832)	0.108* (0.0469)	-0.316** (0.0517)	-0.0830 (0.0557)
Location fixed effects	Yes			
Pseudo R squared	0.0032			
Observations (reach)	4,556,862			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (3) comparisons with the Benjamini-Hochberg procedure.

Table 36: Secondary analysis (video play to completion in flood action week) logit regression output

Outcome (Video play to completion)	**Coefficient** (reference = 'Question' arm)

	Constant	Reciprocity	Ability	Loss aversion
Coefficient (Standard error)	-6.639** (0.0653)	-0.0219 (0.0386)	0.0103 (0.0376)	0.0876 (0.0422)
Location fixed effects	Yes			
Pseudo R squared	0.0018			
Observations (reach)	4,556,862			

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (3) comparisons with the Benjamini-Hochberg procedure.

10.2.3 Trial 3: Improve engagement with and usefulness of flood plans

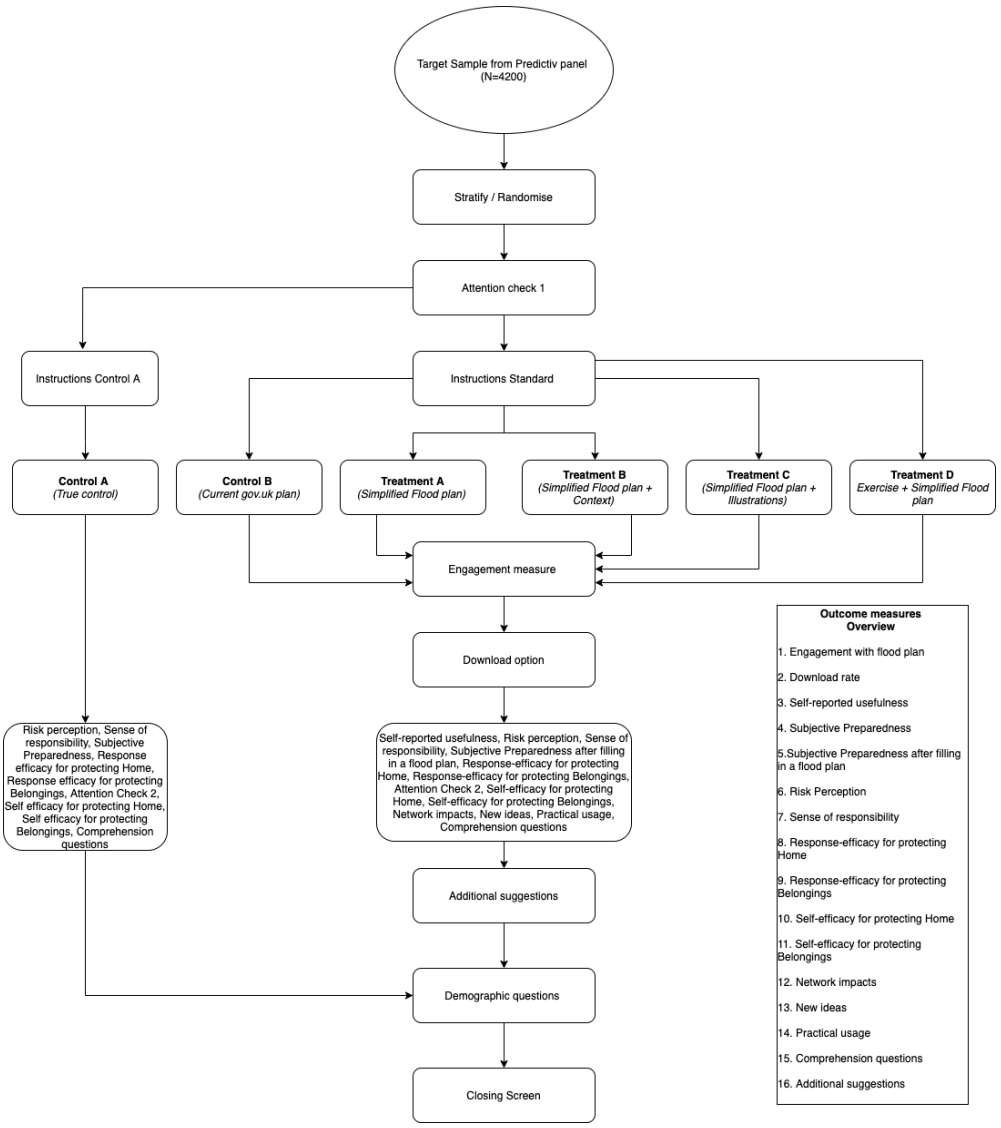
The third part of the Trial phase was a second online randomised controlled trial (RCT) to understand the impact of the different flood plans that the project team developed; and inform the future development of interventions to ultimately increase engagement with flood resilience measures among UK homeowners.

The project team conducted the trial on Predictiv (www.predictiv.co.uk), an online platform for running behavioural experiments built by BIT and home-owners were eligible for the trial.

To obtain a baseline measure, some participants were randomly allocated to a control group where they did not see a flood plan, but completed a different exercise of similar length and complexity (Control A). The second control group saw the current gov.uk version of the flood plan designed by EA (Control B).

Other participants were allocated to four different treatment groups, each including a version of a flood plan informed by additional behavioural insights. The group allocated to Treatment A saw a simplified plan with a more intuitive and easy-to-use structure. The following two groups saw the same flood plan as in Treatment A, complemented by a justification for each action that is proposed in the plan (Treatment B) or by illustrations and icons where appropriate (Treatment C). The last group (Treatment D) saw an image of a flood with a statement about the potential impact of flooding and encouraging them to think about the consequences for them and their families. After reading the statement, participants are asked to write down three items they would take with them in case of a flood, under an undefined self-imposed time constraint. Once participants have submitted their answers, they were asked to reconsider their previous answers, and say whether they would make the same choice now they have had more time to consider. Finally, participants read a statement about the hypothetical damage on their home after the described flood. They were encouraged to take some time to think about where they would stay. After they completed the exercise, participants were shown the flood plan described in Treatment A.

Figure 33: Trial 3 design



Participants in the Treatment Groups and in Control B were asked questions to measure their perceived value of a flood plan. The primary outcome measure was self-reported usefulness of the flood plan, measured by:

- A mean self-rated agreement with the statement “I would recommend this flood plan to a friend.” and “I found it useful to fill out this flood plan.”

Several secondary outcomes asked to either Control B / the Treatment Groups only (**) or to all groups, including Control A:

- A measure of comprehension or knowledge about the key concepts relating to flood preparedness
- The behavioural intent to use a flood plan, based on download rates**
- A measure of the subjective preparedness for a flood after filling in a flood plan**
- A measure of the subjective preparedness for a flood without seeing a flood plan

And several exploratory outcomes:

- The engagement rate with the respective flood plan based on character count**
- A measure of who participants believe is responsible to protect the home from a flood
- The response-efficacy for protecting the home
- The response-efficacy for protecting belongings
- The self-efficacy for protecting the home
- The self-efficacy for protecting the belongings
- The risk perception for the possibility of a flood
- The likelihood of speaking with the personal network about a flood plan**
- A measure of how participants intend to store the flood plan**
- A measure to understand if the flood plan has given participants new ideas**
- A text field for participants to make additional suggestions

The final sample size for analysis was 3,866. Data collection began on 24th of February and closed on 22nd of March. In total, there were 8,293 entrants to the experiment. After removing entrants with missing RISN numbers, missing RID's (a unique participant number), missing Refurl numbers, and duplicated IP addresses, 6,067 remained. Of these, 3252 participants did not complete the survey; another 791 failed the attention check, and so were dropped from analysis, leaving 3,866 valid responses.

BIT tested for differential attrition across trial arms among participants who started but did not complete this experiment. From a linear regression there was evidence for differential attrition due to drop-outs. A separate linear regression tested whether there were differential rates of termination from the survey attention check across arms; coefficient estimates were all statistically insignificant. To verify the robustness of the treatment effect estimates to differential attrition, BIT ran separate regressions for the primary and secondary outcomes adjusted by inverse probability weights, which made the arms more comparable in terms of observable and collected covariates; BIT implemented this procedure using the 'twang' R library. These robustness checks did not yield qualitatively different estimates of the significance nor magnitudes of effect sizes found in the main analysis. Therefore, BIT is confident that dropping respondents who have not completed the survey from the experiment does not meaningfully diminish the causal interpretation of the estimated treatment effects.

BIT also conducted balance checks on the final analysis sample using chi-squared tests for (categorical) covariates. There was some evidence of imbalance on age, income, education level, and urbanicity between arms (see Table 1). Since BIT controls for all measured covariates in the regression specifications, treatment effect estimates remain robust to any imbalance on observable variables.

One limitation to these results is that approximately 50% of participants dropped out during the course of the experiment, or failed the attention check. Thus, these results may not generalise exactly to the full population, especially those who are less conscientious or pay less attention to "admin" tasks. There is no reason to believe that this would change which version of the flood plan is most effective, but the overall level of effectiveness and/or the baseline may be different for this group.

Table 37: Balance check results for categorical covariates.

Covariate	Percentage per arm						*p* values	Balanced (Yes/No)
	Control A (n=303)	Control B (n=1074)	Treatment A (n=598)	Treatment B (n=570)	Treatment C (n=594)	Treatment D (n=727)		
Previous flooding experience							<.10	No
Yes, within the last 12 months	10.89	14.80	14.54	10.87	15.15	13.34		
Yes, more than 12 months ago	10.89	13.12	11.87	13.85	12.45	11.00		
No	76.56	71.41	72.74	74.56	71.54	75.24		
Don't know	1.65	0.65	0.83	0.70	0.84	0.41		
Gender							>.10	Yes
Male	44.9	52.2	52.3	51.0	47.6	50.5		
Female	54.8	47.5	47.7	48.4	52.0	49.4		
Other								
Age							>.10	Yes
18-24 years	8.25	12.29	9.87	9.47	11.11	9.35		
25-54 years	51.15	60.98	58.36	56.49	56.56	58.32		
55-65 years	40.59	26.62	31.77	34.03	32.32	32.32		
Income							<.05	No
Above median	57.4	65.7	64.5	63.15	66.66	66.16		
Below median	39.3	30.4	31.9	34.6	28.6	30.3		
Prefer not to say	3.3	3.9	3.5	2.3	4.7	3.6		
Location							>.10	Yes
London	16.5	16.4	14.2	15.6	15.8	16.9		
South and East	36.0	35.9	36.7	40.0	37.9	36.6		
Midlands	17.8	21.8	20.4	18.3	22.5	20.0		
North	29.7	25.7	28.5	25.43	23.73	26.4		
Urban location							<.10	No
Rural	23.1	20.4	26.6	24.9	24.2	23.2		
Suburban	55.7	49.1	47.8	48.0	47.6	51.7		
Urban	21.1	30.3	25.6	27.0	28.1	25.0		

Education							<.10	No
Degree	38.3	48.2	47.5	48.2	48.1	49.65		
No degree	59.7	50.9	51.8	51.2	48.1	49.7		
Prefer not to say	1.9	0.8	0.7	0.5	0.7	0.7		
Ethnicity							>.10	Yes
White	83.8	86.0	87.4	84.7	86.2	87.3		
Asian	8.2	8.4	5.8	8.0	6.4	6.7		
Black	2.9	1.4	1.8	3.1	2.8	2.0		
Mixed/ Other	4.9	4.0	4.8	4.0	4.5	3.8		
							>.10	Yes

In the rest of this trial's methodology section, BIT provides further details on the outcomes by treatment and associated regressions.

Table 38: mean and standard deviation for primary outcome

	Control A (n=303)	**Control B (n=1074)**	**Treatment A (n=598)**	**Treatment B (n=570)**	**Treatment C (n=594)**	**Treatment D (n=727)**
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Self-reported usefulness of a flood plan (0-100)	NaN (NaN)	63.18 (27.76)	70.45 (25.15)	71.49 (25.14)	70.01 (25.50)	73.05 (25.13)

Table 39: Regression output for primary outcome

Outcome (Self-reported usefulness of a flood plan (0-100))	**Coefficient** (reference = Control B)				
	Constant	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	35.03** (7.90)	6.90** (1.34)	7.62** (1.34)	6.12** (1.34)	9.34** (1.27)
Standard covariates	Yes				
Custom covariates	Yes				
R squared	0.082				

Observations	3,563

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple (3) comparisons with the Benjamini-Hochberg procedure.

Table 40: Descriptive statistics for secondary outcomes

	Control A (n=303)	Control B (n=1074)	Treatment A (n=598)	Treatment B (n=570)	Treatment C (n=594)	Treatment D (n=727)
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Comprehension	2.42 (0.32)	2.49 (0.39)	2.64 (0.40)	2.66 (0.40)	2.62 (0.41)	2.68 (0.40)
Subjective Preparedness (with and without flood plan)	53.0 (31.46)	61.28 (28.26)	67.32 (25.31)	67.15 (26.90)	67.49 (26.15)	68.72 (26.55)
Download rate	NaN (Nan)	8.8 (2.8)	11.1 (3.1)	13.1 (3.3)	11.7 (3.2)	12.6 (3.8)

Table 41: Regression output for Comprehension

Outcome (Comprehension)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	1.94** (0.090)	-0.099** (0.022)	0.137** (0.019)	0.153** (0.019)	0.116** (0.019)	0,170** (0.018)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.210					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple comparisons with the Benjamini-Hochberg procedure.

Table 42: Regression output for Preparedness

Outcome (Preparedness)	**Coefficient** (reference = Control B)

	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	50.227** (8.03)	-8.590** (2.04)	6.108** (1.37)	5.595** (1.41)	5.575** (1.36)	7,172** (1.32)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.076					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple comparisons with the Benjamini-Hochberg procedure.

Table 43: Regression output for Downloads

Outcome (Download rate))	**Coefficient** (reference = Control B)				
	Constant	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	-3.747 (1.025)	0.308 (0.308)	0.415+ (0.171)	0.223 (0.176)	0.322+ (0.161)
Standard covariates	Yes				
Custom covariates	Yes				
R squared	0.076				
Observations	3,563				

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has been adjusted for multiple comparisons with the Benjamini-Hochberg procedure.

Table 44: Descriptive statistics for exploratory outcomes 1

	Control A (n=303)	**Control B (n=1074)**	**Treatment A (n=598)**	**Treatment B (n=570)**	**Treatment C (n=594)**	**Treatment D (n=727)**
Outcome	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Perceived Responsibility	2.81 (1.12)	2.07 (1.05)	2.04 (1.00)	2.06 (1.11)	2.10 (1.05)	2.25 (1.11)
Response-efficacy for protecting home	62.30 (27.27)	64.85 (25.69)	65.58 (25.47)	65.60 (25.51)	64.30 (25.70)	65.64 (25.41)

Response-efficacy for protecting belongings	65.48 (26.98)	70.77 (24.11)	73.16 (22.47)	73.64 (22.87)	73.85 (23.17)	74.39 (21.76)
Self-efficacy for protecting home	57.23 (30.56)	65.85 (25.70)	67.73 (25.09)	66.93 (25.87)	66.42 (25.25)	68.75 (24.81)
Self-efficacy for protecting belongings	63.17 (28.36)	72.19 (23.23)	75.28 (21.06)	76.40 (21.07)	76.23 (21.92)	77.85 (19.53)
Risk perception of the event of a flood	60.71 (31.03)	57.65 (31.25)	58.09 (30.79)	60.39 (30.45)	60.35 (29.85)	61.15 (30.91)
Proportional character count typed into flood plan	NaN (NaN)	141.79 (183.19)	87.84 (81.38)	122.36 (105.80)	124.82 (105.61)	112.63 (98.43)
Communication with the community	NaN (NaN)	57.12 (32.55)	61.52 (31.32)	63.52 (32.34)	62.36 (32.44)	61.33 (32.88)

Table 45: Descriptive statistics for exploratory outcomes 2

	Control B (n=1074)	Treatment A (n=598)	Treatment B (n=570)	Treatment C (n=594)	Treatment D (n=727)
Storage of a flood plan	**%**	**%**	**%**	**%**	**%**
Print and display somewhere (e.g. fridge)	21.50	21.90	19.64	23.40	17.19
Print and keep somewhere safe	30.91	31.93	33.33	29.79	30.39
Save on mobile phone	25.88	31.43	26.66	27.44	33.83
Save on computer	29.05	28.26	31.92	28.28	27.92
I do not intend to store my flood plan	34.35	32.44	31.57	33.50	32.59

Table 46: Descriptive statistics for exploratory outcomes 3

	Control B (n=1074)	Treatment A (n=598)	Treatment B (n=570)	Treatment C (n=594)	Treatment D (n=727)
New Ideas gained through the flood plan	**%**	**%**	**%**	**%**	**%**
Yes	67.22	69.06	76.49	74.57	75.79
No	25.60	26.42	19.64	20.87	18.98
Don’t know	7.16	4.51	3.85	4.54	5.22

Table 47: Regression output for Perceived Responsibility

Outcome (Perceived Responsibility)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	2.191** (0.27)	0.729** (0.71)	0.037 (0.05)	-0.013 (0.06)	-0.040 (0.05)	0,174** (0.05)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.084					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has not been adjusted for multiple comparisons.

Table 48: Regression output for response-efficacy to protect home from flooding

Outcome (Response-efficacy for protecting the home from flooding)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	60.097** (6.67)	-2.366 (1.69)	-0.382 (1.32)	0.754 (1.34)	0.323 (1.32)	0,974 (1.24)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.052					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has not been adjusted for multiple comparisons.

Table 49: Regression output for Response-efficacy to protect belongings from flooding

Outcome (Response -efficacy for protecting belongings from flooding)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	57.841** (6.10)	-5.920** (1.55)	2.641+ (1.21)	2.501+ (1.22)	1.714 (1.21)	3,080* (1.13)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.05					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has not been adjusted for multiple comparisons.

Table 50: Regression output for self-efficacy to protecting the home from a flood

Outcome (Self- efficacy for protecting the home from flooding)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	47.897** (6.71)	-8.749** (1.71)	0.423 (1.33)	1.429 (1.35)	1.548 (1.33)	2,901+ (1.25)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.059					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has not been adjusted for multiple comparisons.

Table 51: Regression output for self-efficacy to protecting the belongings from a flood

Outcome (Self- efficacy for protecting the belongings from flooding)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	60.946** (6.71)	-9.912** (1.71)	3.344** (1.33)	3.712** (1.35)	2.375* (1.33)	4.874** (1.25)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.059					
Observations	3,866					

** p< 0.01, * p<0.05; + p<0.1. Statistical significance has not been adjusted for multiple comparisons.

Table 52: Regression output for perceived likelihood to experience a flood

Outcome (Risk perception of the event of a flood)	**Coefficient** (reference = Control B)					
	Constant	Control A	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	66.969** (6.71)	4.083* (1.71)	3.416* (1.33)	2.979+ (1.35)	0.052 (1.33)	4.336* (1.25)
Standard covariates	Yes					
Custom covariates	Yes					
R squared	0.059					
Observations	3,866					

Table 53: Regression output for proportion of text fields completed in flood plan

Outcome (Proportion of text fields	**Coefficient** (reference = Control B)

completed in the flood plan)					
	Constant	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	1.068** (8.17)	17.623** (1.51)	16.049** (1.54)	12.619** (1.51)	14.227** (1.42)
Standard covariates	Yes				
Custom covariates	Yes				
R squared	0.123				
Observations	3,563				

Table 54: Regression output for intention to discuss flood plan with personal network

Outcome (Communication with the community about the flood plan)	**Coefficient** (reference = Control B)				
	Constant	Treatment A	Treatment B	Treatment C	Treatment D
Coefficient (Standard error)	49.690** (8.83)	5.837** (1.63)	6.826** (1.66)	4.078* (1.64)	4.477** (1.54)
Standard covariates	Yes				
Custom covariates	Yes				
R squared	0.093				
Observations	3,563				