Using videos in floods and bushfires to educate, signal risk, and promote protective action in the community

Paula Dootson a, Erica Kuligowski b,*, Scott Murray a

a Queensland University of Technology, 2 George Street, Brisbane, QLD 4001, Australia
b RMIT University, 124 La Trobe St, Melbourne VIC 3000, Australia

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ABSTRACT

Videos are commonly used by emergency services agencies in natural hazard emergencies to communicate to the public about the hazard, its possible risks, and to promote protective action. To evaluate the efficacy of the videos being disseminated and amplified during an event, this research examined the extent to which different types of videos trigger risk perceptions, promote protective action, and improve knowledge about the hazard and impact. The findings suggest a video containing a smaller number of facts is most useful at impacting the public response and appraisal, the style is not as useful for building hazard knowledge, risk perceptions, and protective action intentions. Finally, while footage of a bushfire triggers threat perceptions and some coping appraisal, the style is not as useful for building hazard knowledge. The research extends visual risk literacy knowledge and offers practical guidance for agencies operating in high-risk environments seeking to achieve behavioural compliance. The research argues videos will continue to be an important tool in the public information and warning milieu for any risk event.

1. Introduction

During the Black Summer bushfires (2019–2020) in Australia, harrowing footage circulated of a fire truck driving through a bushfire, engulfed in flames. The video was taken from inside the fire truck. The video from Fire and Rescue New South Wales made international news, showing the extreme bushfire conditions emergency services agencies were battling (FRNSW, 2019). It is not unusual for footage of a bushfire, or other hazard event like a cyclone or flood, to circulate during an emergency. Visuals, including videos, play an important role in the public information and warning ecosystem. Warnings offer the public point-in-time information about the impact of a hazard and offer guidance on what the public can do (AIDR, 2021). Public information is supplementary information provided to the public before, during, and after an event to support warnings and reduce the potential impact of an event on the community (AIDR, 2021). Visuals support both warnings and public information by communicating complex, scientific information to educate the public. Visuals can also communicate the possible risks of an event; and promote the desired protective action(s) (Mileti and Sorensen, 1990; Liu et al., 2020; Morss et al., 2018). Capturing and creating visual content for dissemination to media and the public is also an important process for emergency agencies to manage the prevalence of problematic visuals circulating during an event. These problematic visuals can include those that are manipulated, recycled from an old event, or are stock images not matching the threat of the current event, which can confuse and mislead the public’s response (Dootson et al., 2021). To combat this, some emergency agencies proactively release footage of a hazard captured by their operational teams (Dootson et al., 2021). Visuals thus serve a multitude of functions in a natural hazard emergency.

The primary goal of risk communication in natural hazard emergencies is to “prevent and mitigate harm from hazards by informing people about potential threats and empowering them to adopt protective measures” (Hicks et al., 2017, p. 138). During natural hazard emergencies, disseminating information designed to instil specific preparation and response behaviours is a strategic responsibility of emergency services agencies (Tippett et al., 2018). Thus, it is critical that agencies have empirical evidence for what visuals are helping or hindering their warning and public information communication to educate the public about the hazard, its possible risks, and to promote protective actions.

In this paper, we aim to examine the efficacy of videos used for risk communication in the natural hazard context of flood and bushfire. We
examine whether specific videos educate the public, signal risk, and/or promote protective actions. The outcomes of this research offer evidence to agencies about what type of video is appropriate, and when it is appropriate during a natural hazard emergency. Specifically, we sought to understand whether hazard knowledge was improved by a specific type of video, whether a specific type of video saw an increase in risk perceptions, and whether a specific type of video saw improved efficacy in preparatory and response actions and coping. In doing so, we offer three contributions to the fields of risk communication and emergency management.

First, we extend the existing research on the use of visuals to communicate risk via statistical graphics, cartography, and symbols (cf. Bostrom et al., 2008; Saunders, 1994; Sutton and Fischer, 2021; Roth 2017; Lipkus and Hollands 1999), by considering the value and efficacy of videos to signal risk alongside warning and public information messaging. The findings of this research address calls for research “to examine how textual and visual information may, or may not, interact on attitudinal and behavioural outcomes” (Flint & Feldman, 2016, p. 434). Secondly, we extend the research investigating the use of visual material in safety (cf. Guo et al., 2017; Stege et al., 2022) and risk (cf. Hicks et al., 2017) contexts by examining how videos are used in floods and bushfires. The research thus answers calls for a more user-centred approach to understanding how visuals communicating risk are informing decision-making in the community (Richards, 2019; Byerly Flint et al., 2022). Third, we offer practical insights for emergency management design of videos based on the primary goal of the risk communication at a particular stage of a flood or bushfire event. To date, there is no guidance available for emergency management agencies on how to effectively design video content for natural hazards like floods and bushfires to address the critical stages of warning comprehension and action: knowledge, risk perceptions, and protective action.

2. Visuals in risk communication

2.1. Types of visuals in risk communication

Visual representations of risk have focused on six core areas, including statistical graphics, (e.g., pie charts, graphs, probabilities); cartography (e.g., maps), symbols (e.g., icons, emojis, shapes); infographics (e.g., diagrams, composite graphics); models (e.g., 3D renderings or computer models); and pictures (e.g., illustrations, photographs, GIFs, videos) (Bostrom et al., 2008; Saunders, 1994; Sutton and Fischer, 2021; Roth 2017; Lipkus & Hollands 1999). While a stream of research has examined visual risk literacy in relation to the visual representation of probabilities and other numerical risk measures that are “notoriously difficult to understand” (Amidon et al., 2021; Richards, 2019; Stege et al., 2022, p. 105721), there is an opportunity to expand visual risk literacy to other types of visuals like footage of natural hazard emergencies, where risk is inferred. Hicks et al. (2017) found video, specifically, to be an effective hazard knowledge-building tool in the geophysical context of volcano eruptions. The authors focused on the use of oral history and storytelling about volcanoes, in video form, to trigger further information seeking about preparatory risk reduction and protective action. The films were co-produced with the community, showing familiar faces and places. “The films, and the process of social learning, helped to: a) motivate people to actively seek hazard and risk information; b) empower people to turn that new knowledge into risk-reducing actions, and c) strengthen the resilience of individuals, communities and institutions who manage risk.” (p. 150). In this research, we examine whether videos of a live natural hazard emergency will influence risk perceptions, educate, and/or promote protective action intentions, alongside other styles of videos discussed below.

2.2. Visuals for attention, knowledge, and compliance

The risk communication goals before and during a natural hazard emergency are to stay informed, acknowledge a threat and prepare to take protective action, and then to finally focus on action. These align with the three levels of warnings in the Australian Warning System: Advice (limited sense of urgency, informative about potential threat), Watch and Act (sense of urgency, with time to prepare a response), and Emergency Warning (great sense of urgency, requiring an almost immediate response) (AWS, 2022). Warnings and public information are tools providing information about an event, influencing behaviour, and offering a reminder to cue relevant information about the hazard that the recipient may or may not have already known (Laughey and Wogaler, 2014). Laughey and Wogaler’s (2014) Attention, Knowledge, Compliance (AKC) Framework argues for risk communication to be effective it must focus on affecting “knowledge by promoting encoding, enhancing knowledge, and/or cueing existing knowledge to make the individual aware of the hazard, consequences and what to do to avoid the hazard” (p. 5). Visuals in many forms have historically been found to support enhancing knowledge, offering cues, and making people aware of threats and consequences of a risk-event and what protective actions must be taken, thereby to increase public comprehension and compliance with warnings (Dallo et al., 2022).

The first stage of the AKC Framework is focused on getting the public’s attention (Laughey and Wogaler, 2014). Visuals, in comparison to textual information, are faster at grabbing attention, and are processed faster than textual information (Hart and Feldman, 2016). Further, visuals are more likely to be amplified during a risk-based event on social media (Sutton et al., 2019), increasing the likelihood of the public attending to the information. Thus, visuals are a critical component to warning and public information message design, to attract the community’s attention.

The second phase of the AKC Framework is focused on the acquisition, retention, and application of knowledge (Laughey and Wogaler, 2014). During a natural hazard emergency, or any event with imminent threat, there is limited time for the public to follow more traditional learning processes and instead the application of knowledge about the hazard, the threat, and what action to take, needs to be applied rapidly (Frisby et al., 2013). Visuals can be effective at rapidly relaying simplified information about complex processes, situations, and events (Dai et al., 2021; Sutton and Fischer, 2021), making relevant information more salient, credible, and can improve learning and memory (Mortensen et al., 2017; Zhao et al., 2018; Hart and Feldman, 2016; Feldman and Hart, 2018). In a study on forest fires, visuals were found to be effective at making bushfire information more attractive and easier to follow than non-visualised information (Zimmerman et al., 2006). Visuals thus aid the knowledge stage of the AKC Framework.

Finally, to facilitate the third stage of the AKC Framework, compliance, the community needs to perceive a threat, feel competent in their ability to cope with the threat, and subsequently take protective action (Laughey and Wogaler, 2014; Lindell and Perry, 2012). Visuals can be useful in clearly explaining what the risk is (Klein et al., 2021), convincing people of the risk associated with a hazard (Raffiana et al., 2022), improving risk understanding (Garcia-Retamero and Cokely, 2017), localising and personalising the risk information, (Richards and Jacobson, 2022; Kostelnick, 2016), and generating stronger physiological and emotional responses in comparison to textual information (Hart and Feldman, 2016; Loewenstein et al., 2001). To convert these risk perceptions into compliant, protective action, the individual needs to perceive they could undertake the protective actions listed in the warning message (self-efficacy), whether the protective actions would be effective at protecting themselves, their property, and/or their family (response-efficacy), and whether they would incur a cost undertaking the protective actions listed (response cost) (Grothmann and Reusswig, 2006). In line with Protective Motivation Theory (Rogers, 1975), a high threat appraisal of the natural hazard emergency combined with a high coping appraisal of how to respond to the natural hazard emergency, achieves the compliance stage of the AKC Framework.

Visuals can also encourage and empower people to take protective actions, showing familiar faces and places.

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action through their persuasive and emotional appeals (Sleigh et al., 2021; King, 2015; Sontag and Barnes, 2017). A stream of research to date has focused on how a range of visuals, support, personalise, and translate warnings and public information messages during an event to encourage behavioural compliance with a desired protective action (e.g., Ali et al., 2019; Gao et al., 2016; Frisby et al., 2013; Hart and Feldman, 2016; MacPherson-Krutsiky et al., 2020). Frisby et al. (2013) found that instructional communication that incorporated a blend of concrete examples, people’s experiences, expert opinions, and directive actions would be more beneficial at reaching audiences to increase perceived self-efficacy (coping appraisal) and promote protective action. In this research, we examine whether incorporating a blend of concrete examples, people’s experiences, expert opinions, and directive actions will influence protective action intentions across preparatory and response behaviour in floods and bushfires.

In this research we are guided by the research question: How can videos help improve community (a) knowledge about a hazard, (b) perceptions of the hazard’s risk, and (c) protective action intentions across preparatory and response behaviour?

3. Method

To examine the efficacy of videos used in natural hazard emergencies to educate the public, signal risk perceptions, and/or promote protective action, a questionnaire was designed for the Australian public, encompassing both quantitative and qualitative questions, using real videos submitted by Australian emergency services agencies as stimuli.

3.1. Video stimuli

The videos used in this research were sourced from Australian emergency services agencies and news organisations via the Bushfire and Natural Hazards Cooperative Research Centre network of partners. Fourteen agencies provided over 70 videos (plus associated libraries) to choose from. Two shortlisting processes were undertaken to arrive at the videos to include in the study1. Following Frisby et al.’s (2013) work on instructional communication in crises, four key characteristics were sought after in the videos: evidence of concrete examples, people’s experiences, expert opinions, and specific directive actions. The aim was to have a spread of videos illustrating a range of these characteristics to evaluate their efficacy in achieving one (or more) of the three outcomes of interest for the research: knowledge, risk perceptions, and protective action. The first shortlisting involved two of the authors independently watching the videos and labelling them as ‘yes’, ‘maybe’, or ‘no’ depending on the researcher’s assessment of relevance and appropriateness to the research question. For example, videos labelled as ‘no’ tended to be either public relations content, too long in duration, or content was too specific to an event or region. Videos that were deemed as potentially too triggering for participants were also excluded2. The ‘maybe’ categorisations included duplications of similar videos for a second round of shortlisting, or the video that warranted further clarification between the authors. The independent shortlisting was followed by a collaborative discussion of all the ‘maybe’ categorisations and where there was disagreement in categorisations between the researchers. A second round of shortlisting was completed in two stages, independently first, then collaboratively. The final set of stimuli (N = 17 videos) came from nine organisations. The characteristics present in the videos are summarised in Table 1. Each video comprises a blend of communication elements. Appendix A provides detailed, yet de-

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1 The project had budget constraints such that no more than 20 stimuli could be tested.
2 The research needed to be assessed as low risk under the National Statement on Ethical Conduct in Human Research to execute the project in the timeframe of the funding arrangements.

3.2. Questionnaire

A questionnaire was developed to measure the efficacy of the videos against triggering risk perceptions, promoting protective action, and educating the participants about the hazard. The questionnaire involved five sections and took approximately 15-minutes to complete. First, participants were asked about their current risk for a particular hazard type (bushfire or flood or both) to direct them to an appropriate trigger warning message. The second section of the questionnaire included pre-stimuli questions on source credibility (Morrow and Gladwin, 2014), general risk perceptions (Ho et al., 2008), preparatory actions, and general coping measures (Grothmann & Reussig, 2006). Further, in section two, to test their knowledge about bushfires and floods, participants were presented with a series of statements (some true, some false) and asked to nominate each statement as either ‘characteristic of a bushfire/flood’ or ‘not characteristic of a bushfire/flood’. These statements included common myths about bushfires and floods, complementing existing research on misconceptions about tornadoes (Hoekstra et al., 2011; Donner et al., 2012; Klockow et al., 2014; Jauernic and Van Den Broeke, 2016) and earthquakes (Whitney et al., 2004). The third section of the questionnaire presented the participants with the video to watch. Participants were not able to progress to the next stage of the survey without having watched the video. The fourth section of the questionnaire comprised post-stimuli questions on comprehension, the extent to which they noticed one of more of the message elements in the video (Frisby et al., 2013), comprehension of what the video was about (Drupsteen and Boustras, 2016), emotions (Yang, 2012), perceived risk (Bosco, 2015; Rickard et al., 2017), protective action intentions (designed for purposes of this study), and coping appraisal (Grothmann & Reussig, 2006). This portion of the questionnaire was developed from existing theory on warning message construction as summarised by Lindell and Perry (2004), Wood et al. (2018) and Yang et al. (2014). To test if the video changed participant’s self-reported hazard knowledge, after watching each video participants were presented with their original hazard knowledge selections and were given the option to (a) make no changes, (b) change their classification of a statement from ‘characteristic’ to ‘not characteristic’, or (c) change their classification of a statement from ‘not characteristic’ to ‘characteristic’. Please see Appendix B for a list of the knowledge statements for bushfires and floods. The fifth and final section of the questionnaire asked for demographic information: gender, age, state they lived, education, language spoken at home, insurance, experience as a current or previous member of an emergency service agency, past hazard experience and preparation. A copy of the questionnaire is available on request.

3.3. Respondents

A total of N = 1563 (N_bushfire = 882; N_flood=681) participants were surveyed across the 17 stimuli, with approximately N = 90 participants for each stimulus. Participants were recruited by the Qualtrics market research panel. All the participants were over 18 years old, living in Australia, with an approximate even split across gender (57% identified as female, 0.2% other), and state as outlined in Table 2 (ABS, 2020). Nine percent (N = 135) of the respondents reported that someone in their household was a current or previous member of an emergency service agency (e.g., bushfire and emergency services), either as an employee or a volunteer (N_bushfire = 9%; N_flood = 8%). Ninety-two percent of the sample spoke English as their primary language at home. See Table 2 for a summary and comparison with Australian population statistics (ABS 2021; 2022).
This research was approved by the university’s Human Research Ethics Committee, approval number 2000000485.

3.5. Analysis

This study’s analysis was conducted in three stages. First, the knowledge efficacy of the videos involved assessing whether knowledge about the hazard increased or decreased after watching the video. This meant counting the number of statements a participant had characterized correctly pre-stimuli, then counting the number of positive changes (i.e., changing an incorrectly characterized statement to a correct categorization) made after exposure to the stimuli, to allow for a calculation of total correct categorizations post stimuli. A McNemar’s test was used in this analysis since the dependent variable was
dichotomous (i.e., correct or incorrect answer). For each knowledge fact, and by video stimuli, the test compares the numbers of respondents who changed their answer – from either correct to incorrect or incorrect to correct – to determine whether the positive or negative change was significant after viewing the video. In cases where the sum of the numbers of respondents who changed their answer (correctly or incorrectly) was <25, which was the case for most videos and facts, an exact binomial test (two-tailed) was used. Second, the efficacy of the videos triggering risk perceptions, as well as coping appraisal, was tested using a paired sample t-test to test pre- and post-stimuli risk perceptions of the threat and severity of floods and bushfires and perceived coping appraisal on how to respond. Third, the influences the videos had on promoting protective action intentions was analysed using simply count analysis to compare the number of preparatory and response protective actions participants indicate they would undertake pre- and post-stimuli, across the 17 videos. Qualitative insights were also analysed when participants were asked to reflect on the purpose and content of the video. The insights are reported across the relevant sections whether they pertain to videos impacting knowledge, risk perceptions, or protective action intentions.

4. Results

4.1. Knowledge

Data on responses to the pre-video question on flood and bushfire knowledge shows that the Australian sample generally had a good grasp of hazard information initially. On average (Table 3), participants correctly answered approximately 64% of their knowledge questions for flood and 72% of their knowledge questions for bushfire. Despite the higher baseline knowledge of bushfires of the participants, three statements were included in the survey containing common misconceptions about bushfires (e.g., ‘a house can explode when it catches on fire’ (RFS, 2020), ‘the speed of a bushfire is best slowed by reducing the number of trees’, and ‘leaves are the major source of embers’ (CSIRO, 2020)). These common myths saw the lowest pre-stimuli correct categorisations, reinforcing that these statements remain misconceptions in the community. A self-reported 40% of respondents indicated the video changed their understanding of floods, while 25% of respondents indicated the video changed their understanding of bushfires.

To examine if the videos were eliciting a statistically significant change in hazard knowledge a McNemar’s test was conducted. Of particular interest were the positive changes that respondents made to their answers, (from an incorrect to a correct categorisation of the fact). While analysis was performed on all fact and video pairs, Table 3 shows results for only those statements where less than 75% of sample categorised that fact correctly pre-video. In turn, for the flood participants, facts 2, 6, 8, 9, and 12–15 and for the bushfire sample, facts 2–4, 6–12 were omitted from Table 3. These were omitted since it is unclear if their results (most of which were non-significant) were attributed to the video or the lower numbers of people eligible to positively change their answers (post-video). The greyed-out cells indicate that a fact was not relevant to a particular video; however, if significance was found, it is listed in the appropriate greyed cell.

For the flood context, Videos 1, 2, 4, and 6 were associated with positive, significant changes in responses to hazard knowledge questions, such that participants changed their incorrect answer to a hazard knowledge question to a correct answer after watching the video. Videos 1, 2, and 4 represented the same type of video, which contained multiple facts presented by an expert accompanied by infographics and actual event footage at specific points in time (Table 1). Video 6 also contained facts – this time only one fact – presented by an expert (Table 1). All three videos visually demonstrated the facts (e.g., showed a car floating away; rising flood water).

Beyond the re-categorisations of facts from incorrect to correct because of the videos, the impact of the video on knowledge was also explored by collecting qualitative observations from participants. Participants made several observations after watching the flood videos, including but not limited to:

- I was surprised by what little water it took for it to be dangerous to drive your car through
- It made me realise flooding is more serious than I thought

Table 3

Changes in fact categorisations post-stimuli.

<table>
<thead>
<tr>
<th>Facts</th>
<th>Video (count correct change/count incorrect change)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1 [F] 1 m or more of water is necessary to float a car (15 cm)</td>
<td>17/</td>
</tr>
<tr>
<td>3 [F] There are three types of riverine flooding: minor, moderate, and major. Evacuation may be required in major flooding events, but never in minor or moderate flooding events (major and moderate flooding events.)</td>
<td>6/4</td>
</tr>
<tr>
<td>4 [F] Authorities advise people that it is ok to drive through floodwaters (to never drive through floodwaters)</td>
<td>2/9</td>
</tr>
<tr>
<td>5 [F] Flash floods occur within minutes of heavy rainfall (within 6 h)</td>
<td>11/</td>
</tr>
<tr>
<td>7 [F] Dam flooding is the most common type of flooding in Australia (Riverine)</td>
<td>3/5</td>
</tr>
<tr>
<td>10 [F] Fires are the second most deadly natural hazard in Australia (Floods)</td>
<td>12/</td>
</tr>
<tr>
<td>11 [F] In the last 10 years, 10% of Australian deaths due to floods were in cars (50%)</td>
<td>7/</td>
</tr>
<tr>
<td>1 [F] Bushfires often spread slowly in a particular direction, especially under strong winds blowing in the same direction</td>
<td>13/</td>
</tr>
<tr>
<td>5 [F] Flying embers can travel, at most, only a few metres ahead of the bushfire front</td>
<td>4/</td>
</tr>
<tr>
<td>13 [F] A house can explode when it catches on bushfire</td>
<td>3</td>
</tr>
<tr>
<td>14 [F] The speed of a bushfire is best slowed by reducing the number of trees</td>
<td>4/7</td>
</tr>
<tr>
<td>15 [F] Leaves are the major source of embers</td>
<td></td>
</tr>
</tbody>
</table>

Note. Number of respondents who correctly changed their responses / number of respondents who incorrectly changed their responses for each knowledge fact and video pair, post-video. Significance is shown by: *p < 0.05, **p < 0.01, ***p < 0.001.
*Gave me a greater understanding of the different types of floods most of which I have only seen on the TV news*
*Don’t wait for a flood to learn what to do*
*I wasn’t fully aware of the impact of storm surges*
*Didn’t realise how many people die from floods*

For the bushfire videos, Videos 10 and 17 were associated with positive, significant changes in responses to hazard knowledge questions. While Video 10 offered primarily footage from an actual event, it was footage that showed spot fires burning in addition to post-fire damage to structures within a community. Video 17 conveyed several bushfire-related facts presented by an expert accompanied by infographics and actual event footage at specific points in time (Table 1). Participants also made several observations after watching the bushfire videos, including but not limited to:

* That bushfire spot was ignited by bushfire sparks.
* So hard to control
* The sporadic direction of the bushfire front across the paddocks
* Speed and ferocity of bushfires
* That people can die in their cars, leaving too late
* It is very dangerous to drive through bushfires, unpredictability of bushfires
* No surprise after last summer bushfires (Note: data was collected after 2019/20 bushfires)
* The danger of delayed action (bushfire)
* [Video showed] the reality of being a victim of a bushfire, [now] more aware of how to deal with them

Participants also discussed the style of the video, such that videos relying on simple facts were still effective at signaling how dangerous a flood could be and that the “the visual helped me digest a simple fact that would not otherwise be evident by itself”. A respondent also highlighted the unique benefit of visualisations: “I technically knew the 15 cm rule (though I’ve heard 10 cm too), but it is still hard to believe. Seeing it helps”. From the bushfire sample, participants noted the benefits of the videos as “very good in helping to understand the message especially for people who are visual learners”. However, some of the videos “could have been more engaging” or were “...a bit overwhelming” due to the larger amount of information provided over a 3-minute video, for instance.

### 4.2. Risk perceptions

While there was a significant, positive correlation between pre- and post-stimuli risk perceptions for all six flood videos (1: r = 0.43, p < 0.001; 2: r = 0.67, p < 0.001; 3: r = 0.56, p < 0.001; 4: r = 0.36, p < 0.001; 5: r = 0.58, p < 0.001; 6: r = 0.68, p < 0.001), there was no statistically significant increase in risk perceptions from pre-stimuli to post-stimuli across each of the flood videos. However, in comparison to the flood videos, six of the bushfire videos did trigger an increased coping appraisal perception (Table 5).

### 4.3. Coping appraisal

While there was a significant, positive correlation between pre- and post-stimuli coping appraisal perceptions for five of six flood videos (1: r = 0.37, p < 0.001; 2: r = 0.36, p < 0.001; 3: r = 0.16, ns; 4: r = 0.33, p < 0.001; 5: r = 0.35, p < 0.001; 6: r = 0.29, p < 0.01), there was no statistically significant increase in coping appraisal perceptions from pre-stimuli to post-stimuli across each of the flood videos. However, in comparison to the flood videos, six of the bushfire videos did trigger a significantly increased coping appraisal perception (Table 5).

### 4.4. Protective action

Across the flood and bushfire videos, participants reported an increase in the number of actions they would take in preparation and response, after watching the videos (Table 6a and Table 6b). Further, the count of participants indicating they would do ‘none of the above’ decreased across all the videos as well.

### 5. Discussion

The purpose of this research was to understand how videos can help improve community (a) knowledge about a hazard, (b) perceptions of the hazard’s risk, and (c) protective action intentions across preparatory and response behaviour. The findings of an Australian nationwide survey suggest hazard knowledge is improved by videos that (i) visually demonstrate a fact an agency wants the community to know, (ii) include a small number of key facts about a hazard in any one video, and (iii) incorporate mixed-media or infographics to illustrate a point. Further, videos that contextualise the hazard information and focus on consequential facts, will observe greater hazard knowledge retention after viewing. Findings also identified that videos can impact risk perceptions, more so when the video content incorporates actual event footage.
of the hazard intensity and consequences. Finally, findings suggest videos can improve community protective preparatory and response behaviour intentions. The following bushfire videos triggered an increased risk perception: (i) video footage of the bushfire as it happens; (ii) photo montage with behaviour intentions.

**Table 6a**
Difference in frequency of preparatory and protective actions (counts).

<table>
<thead>
<tr>
<th>Video</th>
<th>Flood (Δ count)</th>
<th>Bushfire (Δ count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action</td>
<td>1 2 3 4 5 6</td>
<td>7 8 9 10 11 12 13 14 15 16 17</td>
</tr>
<tr>
<td>Developed/prepared an emergency kit</td>
<td>35 24 58 25 53 24</td>
<td>29 28 17 23 22 13 28 16 28 22 18</td>
</tr>
<tr>
<td>Created a household emergency plan</td>
<td>28 32 50 25 42 27</td>
<td>25 28 24 21 22 16 26 26 19 14 13</td>
</tr>
<tr>
<td>Signed up to receive emergency alerts/warnings</td>
<td>26 20 46 28 37 26</td>
<td>22 25 25 23 20 14 29 18 25 18 20</td>
</tr>
<tr>
<td>Downloaded agency app to stay informed</td>
<td>21 28 29 16 26 21</td>
<td>18 22 12 24 25 16 28 16 19 21 14</td>
</tr>
<tr>
<td>Had/prepared first aid box</td>
<td>18 15 41 23 36 9</td>
<td>9 16 15 17 10 7 22 10 12 13 12</td>
</tr>
<tr>
<td>Kept/prepared valuables, medication, pets and other significant belongings close by</td>
<td>21 22 36 34 41 25</td>
<td>29 34 24 24 18 17 32 18 25 11 14</td>
</tr>
</tbody>
</table>

| Followed emergency services instructions | 25 28 42 29 45 28 | 30 15 21 18 28 15 27 19 22 17 23 |
| Kept informed via agency website, social media, phone or radio | 22 21 35 19 28 20 | 24 19 13 11 20 12 24 15 16 14 16 |
| Started to evacuate my property and family if/when instructed to do so | 36 42 42 34 37 32 | 33 25 31 31 34 20 41 26 34 32 25 |
| Listened for more information from emergency services sources | 26 28 34 28 26 22 | 24 12 9 17 21 16 25 17 15 14 17 |
| I don’t know/ don’t remember | –1 –2 –3 0 –1 4 | –1 0 0 2 –1 0 –4 3 –2 3 –2 |
| Total number of participants (N) for each video | 104 113 122 111 111 120 | 91 81 76 82 81 72 87 76 77 82 77 |

Note: Δ denotes change in.

**Table 6b**
Comparison of change from pre- to post-stimuli protective action intentions.

<table>
<thead>
<tr>
<th>Video n</th>
<th>Pre: Actions (count)</th>
<th>Post: Actions (count)</th>
<th>Difference</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>104 1.59</td>
<td>4.07</td>
<td>2.48</td>
<td>–7.67**</td>
</tr>
<tr>
<td>2</td>
<td>113 1.65</td>
<td>3.96</td>
<td>2.31</td>
<td>–8.73**</td>
</tr>
<tr>
<td>3</td>
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* p < 0.001.

Heightened risk perceptions following consumption of the bushfire videos and higher reported coping appraisal suggests participants are more likely to end up taking their intended protective action rather than non-protective responses.

Cumulatively, the findings suggest the type of visual used during a natural hazard emergency can have a significant impact of the recipient’s ability to learn about the hazard, perceive risk, and perceive a need to take preparatory or response protective action. Specifically, consistent with past research, infographics were found to be useful in conveying large amounts of complex information about a hazard and desired protective action. Further, demonstrations of a hazard fact or threat level, consequence, or protective action were effective at conveying key messages. This finding is consistent with social learning theory such that efficacy beliefs are formed through vicarious experiences, modelling (e.g., seeing people doing the action) (Bandura, 1977).

Table 7 illustrates the content, style, outcome of each of the videos tested and proposes that videos 1–6 and 17 would be suited to preparatory stages of a natural hazard emergency as they saw improved hazard knowledge and saw an increase in intended preparatory and protective actions. These videos comprised a blend of concrete examples people’s experiences, expert opinion, and specific directives across infographics, people talking, and actual event footage (usually non-threatening). These videos were also mostly longer in duration than the others. Video 9 was effective at triggering risk perceptions and coping appraisal but saw a small negative change (0.51) in protective action intentions. As such, it is suggested to be used in the preparatory stage of a natural hazard emergency because it can be used to demonstrate the severity and impact of a bushfire at a time that doesn’t require community response. While videos, 7, 8, 10, 11–16 are proposed to be better suited to the response stage of a natural hazard emergency as they saw increased risk perceptions, increased coping appraisal, and saw an increase in intended preparatory and protective actions. These videos also comprised a blend of concrete examples people’s experiences, expert opinion, and specific directives, however, the styles were mostly actual event footage or people talking (or offering text over images about the hazard or action to take).

The research offers both theoretical and practical contributions. First, we expand on the existing research on the use of visuals to...
<table>
<thead>
<tr>
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<th>Specific Actions</th>
<th>Specific Direct Action</th>
<th>Expert Opinions</th>
<th>People-telling</th>
<th>Actual Event Footage</th>
<th>Stage of Event</th>
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Note: *x* denotes if that feature is present in the video; "text over image" suggests a change in information.

The research has some limitations to note. The findings are conducted in one specific geographic context, Australia. While most Western countries follow a similar escalation in warnings and supporting communication risk via statistical graphics, cartography, and symbols (cf. Bostrom et al., 2008; Saunders, 1994; Sutton and Fischer, 2021; Roth 2017; Lipkus and Hollands 1999), by considering the value and efficacy of videos to signal risk in warning and public information messaging. Our research provides empirical evidence on the content, style, length of videos that achieve different outcomes for knowledge building, risk perceptions, and protective action intentions across two specific natural hazard emergencies – flood and bushfire.

Certain videos were more successful than others at increasing respondent knowledge about a particular hazard type. This is particularly important as our study has confirmed widespread belief in disaster-related myths among our study population, especially regarding bushfires (Leonard and Kachel 2019). Videos released prior to a hazard’s season can be developed specifically to dispel these myths, which from history, have been linked to delayed or ineffective protective action decisions, resulting in harm to those most at risk (Kuligowski 2020; Klockow et al. 2014). Specific videos also performed well at visualising and thus triggering increased risk perceptions about the natural hazard events, suggesting videos are another tool alongside graphics, cartography, and symbols for visualising risk. Further, the different styles of videos triggering risk perceptions saw some incorporate text-over-images or captions compared to videos with no text, suggesting both designs can work together to visualise risk of a natural hazard emergency. The research thus addresses calls “to examine how textual and visual information may, or may not, interact on attitudinal and behavioural outcomes” (Hart and Feldman, 2016, p. 434).

Second, we extend the research investigating the use of visual media in safety (e.g., workplace health and safety (cf. Guo et al., 2017; Stege et al., 2022) and risk (e.g., Hicks et al., 2017) contexts by examining how videos are used in flood and bushfire natural hazard emergencies. The research thus answers the calls for a more user-centred approach to understand how visuals communicating risk are informing decision-making in the community (Richards, 2019). While Byerly Flint and colleagues (2022) found that negative visual imagery can increase risk perception at the cost of not promoting protective action, our research finds actual event footage, specifically, can trigger risk perceptions, but when paired with content (e.g., text, showing crews fighting fires or moving safely through an affected area) that triggers coping appraisal, then protective action intentions are more likely to increase. This finding is consistent with Tannenbaum et al. (2015) in their review of fear arousing communications.

Third, we offer practical insights for emergency management design of videos based on the primary goal of the risk communication at a particular stage of a flood or bushfire natural hazard emergency. Specifically, the findings have practical implications for emergency management in the design and timing of videos for warning and public information messaging. Education-based content aimed at improving knowledge about a hazard is better provided during the preparation stage rather than the response phase of a natural hazard emergency as that stage is more focused on instructional communication, warning of the risk, and prompting specific actions. Further, shorter, focused messages (provided via multiple media in one video) performed better at improving knowledge than longer, multi-fact videos, which are useful for rapidly implementing learnings about a hazard to improve comprehension and subsequent protective action in the early stages of an event (either preparation or early response). Actual event footage (especially those that show hazard intensity and consequences), such as footage of a raging bushfire, triggers risk perceptions about the event, which is useful in the response of an event, assuming it is also able to promote coping appraisal so the public feel confident in how to respond.

6. Limitations

The research has some limitations to note. The findings are conducted in one specific geographic context, Australia. While most Western countries follow a similar escalation in warnings and supporting
public information communication content (e.g., UK, US), there is an opportunity for future research to examine the extent to which the findings are replicable in other countries. The cross-sectional nature of the study has a clear limitation to only capturing knowledge change at one point in time. Without a follow up survey with the same participants, it is hard to know if this knowledge was retained or used in preparation for, or in response to, an event. However, this trend is found in almost all studies of hazard awareness interventions (see review in Lindell et al. (2021) for an example), with the exception of Mullis and Lippa (1990). Future research on the efficacy of visuals to educate the public would benefit from longitudinal research to assess knowledge attainment over time. Another limitation arose in the measurement of perceived risk and coping appraisal. Pre-stimuli, the risk and the coping appraisal measurements were more general, (risk: relating the location the participant was in; coping: protecting life and property generally). The post-stimuli risk measure could have been influenced by the location of the video, while the post-stimuli coping appraisal measure was a more specific assessment of self-efficacy, response efficacy, and response cost for the protective actions respondents reported they would do. Future research would overcome this limitation by surveying participants in the area relevant to the video. Finally, protective action intentions rather than actual behaviour were measured. Future research could potentially combat this by using virtual reality lab experiments, which are proving useful in understanding non-compliant or deviant decision-making in other contexts (e.g., Knateder, Müller, Jost, Mühlenberger and Pauli, 2014) as the virtual reality scenarios can be perceived as more realistic by study participants in certain scenarios (Feng et al., 2018).

7. Conclusion

Visual media are critical to translating complex hazardous events into easy to comprehend situations. When designing visual media, especially videos, for natural hazard emergencies, the goal of the risk communication for a specific stage of an event should dictate what type of visual is incorporated with text-based warnings and public information content. When trying to educate the public, prior to an event or in the early stages of an event, videos focused on showing what the hazard will do are helpful. When the goal of the risk communication is to trigger risk perceptions in the community, triggering a personalisation of the threat, actual event footage showing intensity and impact of the hazard is helpful. To encourage protective action, videos incorporating footage of what actions to take is helpful.

CRediT authorship contribution statement

Paula Dootson: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. Erica Kuligowski: Writing – review & editing, Writing – original draft, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. Scott Murray: Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of Competing Interest

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

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Appendix A. Deidentified video descriptions

Video 1: Understanding flood classifications

The video is being presented by a hydrologist. The presenter is initially shown on screen which then transitions into clips of flooding in Australia, and then dynamic infographics on flood classification, going back and forth between clips of flood, infographics and the presenter. The infographics present an isometric view of a coastal town/city with a river and hill. In the isometric diagram, rain is shown in multiple levels to visualize the classification of flooding. The classifications talked about are Minor Flooding, Moderate Flooding and Major Flooding which is used by the government to classify types of floods and associated warnings. References to [agency] are included in the video via flood warnings and weather forecasts; as well as an outro referencing [agency website]. The [agency] logo is shown on the video the entire time.

Video 2: Understanding floods

The video is being presented by a hydrologist. The presenter is initially shown on screen which then transitions into clips of actual flooding in Australia, and then dynamic infographics on how flooding occurs, going back and forth between clips of flood, infographics and the presenter. The infographics is an isometric view of a coastal town/city with a river and hill. The infographics shows riverine flooding, whereby the rain in the graphic is shown to saturate the soil and thus cause flooding. The information conveyed in this video is on how floods occur and the effects of topography and geography on floods. The video offers a concrete example of a flood. The video pertains to the entirety of Australia. References to [agency] are included in the video via flood warnings and weather forecasts; as well as an outro referencing [agency website]. The [agency] logo is shown on the video the entire time.

Video 3: Flood safety

The video is being presented by an unknown female voice. The presenter is not shown on the screen and she narrates the information regarding flood safety, which is supported by dynamic infographics that show numbers, statistics, and information. The dynamic infographics are animated scenes such as raining, flooding, what to pack, leaving early, and make a flood plan (e.g., shown by a car traveling a particular route; community with roads and houses is shown via birds-eye view). The information included are specific directives on what to do in the case of a flood, such as emergency planning, leaving early and staying informed. The video is pertaining to general floods but is from [agency]. The video is made by the [agency] and the outro provides further information on the [agency] website. The video is also uploaded by [agency] Facebook page. Logo is shown only at the end.

Video 4: Storm surge

The video is being voiced by an unknown male voice. The presenter is not shown on screen and he narrates the information regarding (tropical) storm surges, which is supported by dynamic infographics that explain how a storm surge occurs and its effects (graphics show a coastal area with a house inland, moving water due to tides, and then moving...
water due to storm surge; the waves eventually reach the house and locations further inland. The information included is how storm surges occur, their effects/danger and the possible conditions that can occur in. The video is pertaining to coastal areas. The video is made by the by the [agency1] and is shared by the [agency2] on their Facebook page. The only time that [agency1] is mentioned is at the beginning of the video (no logo – just the text).

**Video 5: Protect what you love**

The video is voiced by an off-screen female voice. The speaker is not shown on screen, but there are multiple people (of all ages) with who are being interviewed. The people shown on screen are supporting the narrative of the video which is to “protect what you love” – or take only what is important/necessary during a flood situation. Each interviewee tells the audience what three things they would take with them during a flood - the video pans over these things – e.g., my dog, my family members, my mountain bike, my handbag, my laptop, my photos, phone, etc. When an interviewee is not on the screen, actual event footage video shows flooding, people performing recovery actions, and areas (not flooded) but that are located nearby water sources and could be at risk. The information inside the video is both people’s experiences and a directive. The video mentions high risk areas which are more prone to the effects of flooding. The video is made by [agency] and a logo is shown at the end of the video.

**Video 6: Flood impact description video**

The video is presented by a male (scientist, who is in a white lab-coat), who is shown on screen giving a demonstration that is only takes 15 cm for a vehicle to float. He is standing in a warehouse in a flooded section with about 15 cm (depth) of water next to a small blue hatchback. He then pushes the car with a pen, which he also used to represent what 15 cm of water looks like (15 cm is the length of this pen, etc.). When he pushes the car with the pen, it floats away from him (out of camera view). The information inside the video is a directive as it provides information and tells the audience not to drive on flooded roads. The video is based off UNSW research and is endorsed by [agency 1, agency 2, agency 3] with a link to (website for campaign) at the end (logos to these orgs are also included at the end).

**Video 7: Crews working on the bushfire**

The video is not being presented by anyone. It is a video of the bushfire service fighting a specific bushfire. There is no narrative or information being conveyed aside from the visual information of what a bushfire looks like. The video is taken from the side of the road showing the bushfire from a distance with the smoke from the bushfire obstructing much of the view. A fire truck drives by (toward the viewer) and the video also shows a bushfire service vehicle parked in between the camera and the bushfire (it is not clear the agency to which the trucks belong). The only sound is wind (every so often) against the mic and the sound of the fire truck driving by. The video is a concrete example of what a bushfire can look like and how much danger it poses. The video pertains to [state withheld]. The video is uploaded by [agency], although it is not mentioned within the video.

**Video 8: Bushfire update – Watch and Act**

The video is a 14 s video of an update on a local bushfire with time and date mentioned in the title (on Facebook). There is no narrative or information being conveyed aside from the visual information and the Facebook title saying the bushfire is at a Watch and Act level. The video is taking place at night with the bushfire contrasting the darkness. Most of the screen is covered in bushfire. (no real sound other than the sound of wind against the camera mic every once in a while). The video continues to pan the scene – where the viewer can see a boat, a truck, and a van in the foreground, with intense bushfire in the background engulfing bush/trees (with firefighters nearby). The sky is dark with smoke and has an orange glow. The video is more of a concrete example of what a bushfire can look like and how much danger it poses. The video is uploaded by [agency], although it is not mentioned within the video.

**Video 9: Bushfire claims luxury resort**

The video is not being presented by anyone and there is no audio. It is a video of an overhead view of a resort post bushfire. There is no narrative in the video or information being conveyed aside from the video information of what the bushfire had done to the resort. The clip is a silent clip of the resort from a helicopter, going over the destroyed property. The video is a concrete example, showing the devastation of a bushfire. The video is specific to [location]. The video is uploaded to [news site] and supports their news article but does not have any links to [news organisation] inside the video.

**Video 10: Actual event footage of a bushfire**

The video is not being voiced by anyone and is a series of actual event footage of a specific bushfire event. Initially the footage starts off showing the aftermath of the bushfire and the structures destroyed. Everything shown in the video is completely burnt — fencing, houses, sheds, cars — so much so that it’s difficult to make out what was originally there. Thirty seconds into the video shows a car driving on a road that seems to be obscured slightly by smoke. The video then goes back to showing the impacts of the bushfire (wood from trees, perhaps, or fencing still smoking).

The video then transitions into footage of the bushfire during the night where a house is completely on bushfire as well as vegetation nearby. The video is a concrete example, showing the devastation of a bushfire. The video is specific to [location]. The video is uploaded by [agency1] and during the video there is credit on the footage of during the bushfire to the [agency2].

**Video 11: Strike teams**

The video is not being presented by anyone and is a video of a bushfire in [location] taken from inside a car (perhaps a fire truck). There is no narrative or information being conveyed aside from the visual information of the ongoing bushfire and its severity. The video is of a grassy and forested land on bushfire with heavy wind conditions moving the bushfire and smoke. The viewer can see trees that are fully engulfed in flames; large flames. The smoke from the bushfire is obstructing much of the view. The video is a concrete example, showing the devastation of a bushfire. The video is specific to [location]. The video is uploaded by the [agency]. There is no links or logos during the video to show where the video is from.

**Video 12: Bushfire photos in a video slideshow**

The video presents a series of still photos (shown sequentially) as footage of the bushfire that occurred in [location]. The video begins with shots of a helicopter over the grasslands bushfire – suppressing it. Next, footage from the helicopter shows how close the bushfire is to the adjacent community (houses, etc.). In some shots, the bushfire is shown as a grasslands bushfire that has spread toward the bush and in other shots, the bushfire is shown completely engulfing large trees. Heavy smoke is shown coming from the bushfire in most pictures. There is no presenter, but the video does have a background music throughout the footage. The narrative of the video is in the description as it is not voiced by anyone. In the video’s description, the bushfire location is mentioned as well as some context such as the evacuation of [location]. The video is
a concrete example, showing the devastation of a bushfire. The video is specific to [location]. The video is uploaded by [agency], although there is no information during the video of who made the video and where the bushfire is.

Video 13: Elevated bushfire risk

The video is a series of still photographs with captions informing the audience of the elevated bushfire risk between specific dates in a specific state. The caption tells the audience to be more aware, follow the advice of emergency services and monitor the situation. The video is a series of stills of bushfires burning. Large bushfires are shown, as well as smaller bushfires (burning ground cover) and photos of thick smoke only (over a large area of the bush). A helicopter is also shown suppressing a large bushfire at the beginning of the video. Also shown is the aftermath of bushfires in forests (large trees completely burnt). The video is directive as it is providing the audience advice and information about a situation. The video is specific to the entirety of [state]. The video is uploaded by [agency].

Video 14: Bushfires forcing people out

The video is a series of interviews of those affected by a bushfire. The interviewer asks the interviewees what they are doing/where they are going. One set of interviewees respond with what information they were told about the bushfire and what they are doing (e.g., fuelling up at a petrol station). These interviewees also provide an update on the status of the bushfire (number of homes burnt, people died) and also that one of the interviewees actually lost their home. Other interviewees say where they are evacuating to. The interviewer (male) asks some of the interviewees if they are following advice and they respond that they are heeding the warnings and leaving. The video is a series of people’s experiences and involves them telling the viewer what they are doing and briefly about the effect the NSW bushfires have had on them. The video is specific to a town in [state]. The video is uploaded by a news outlet, although there are no credits or information to who took and owns the video.

Video 15: Bushfire threatening suburbs

The video starts off with a news anchor asking a field reporter about the local situation in [city]. The reporter mentions where he is in relation to the bushfire (and the viewer can see some of the bushfire behind the reporter – i.e., smoke and a faint orange sky). The viewer can also see what looks like a family standing there behind the field reporter, who are looking at the bushfire (they don’t seem to be leaving or in any hurry). Phil goes on to explain the situation such as the direction of the bushfire, the location, the warning level, and government advice on the bushfire. The bushfire is 7000 ha. The reporter eventually acknowledges that there are people standing behind him, noting that there is no panic there but people in [town] are aware of the risk because of previous bushfire experience.

The anchor asks the reporter some questions, e.g., how did the bushfire start, etc. And the field reporter response. The anchor also mentions that [local radio station] is a good source of information about the bushfire and its ongoing situation. The video is an expert’s opinion video whereby they discuss the situation. The video is specific to [city]. The video is uploaded by a news outlet and it is mentioned multiple times throughout the video with links to [local radio station] for information about the bushfire.

Video 16: Travelling in summer

The video is a series of infographics with a male narrator. The video pertains to awareness of bushfires as well as advice. The narrator mentions three simple points: (1) check the bushfire danger rating, (2) think about the area you are going to and an escape path, (3) know what to do when you get caught in a bushfire area. The infographics are 2D animations. First, showing an overhead view of a community on bushfire and a car traveling on roads as a bushfire spreads in the direction that the car is moving. The graphics then show what the bushfire danger rating scale looks like and the different technology that can be used to access the rating for that day. The video also instructs people (with associated graphics of a car driving through an area with multiple routes from an overhead view) to plan out their route and have multiple routes as options. Finally, the graphics show the dangers of driving through a bushfire using colourful graphics of a car on a road with bushfires burning on either side, producing embers that fly into the path of travel. The video then shows how to drive to a clear area and what to do next. The graphics support the narration and the instructive text that is shown throughout the video. The video is a specific directive giving advice to follow and raising awareness of the dangers of bushfire. The video is not specific to any region of Australia, although it is uploaded by [state agency]. At the end of the video it mentions more information at [agency website]. The middle of the video also shows this website on a laptop, as if someone was searching their website, specifically to find the bushfire ‘safer places’ within their area (as a last resort).

Video 17: Understanding bushfire weather

The video is presented by a senior meteorologist and begins with actual event footage of a large bushfire (completely engulfing trees). The meteorologist, shown on the screen at this point, then continues to talk about information pertaining to bushfire such as the factors which influence the size, intensity, speed and predictability of the bushfire. They continue to mention the usual time bushfires occur within a year, but then mentions other factors such as humidity, density of vegetation and temperature, which can lead to bushfires, in or out of season. A cold change is also mentioned to show how the direction of a bushfire can change and how bushfires can be caused by thunderstorms or can cause a thunderstorm. The video switches between the meteorologist and a series of dynamic infographics used to visualize the information, including a map of Australia to illustrate the bushfire danger seasons across the country, an isometric view of the bush (trees/forest) which, at some point, contains a bushfire that produces smoke (also showing how fast bushfire can spread with high winds and that they can produce embers). Actual event footage of large areas on bushfire (heavy smoke shown, grasslands fire, and larger bushfires) is also shown. Actual event footage is also provided of pyro cumulonimbus clouds that are linked to intense bushfire behaviour. Bushfire danger rating is also mentioned, showing a graphic of the half circle with the pointer, and shown how it is used by [agencies] to keep the public informed of bushfire risk on any given day. Actual event footage of bushfires are shown again. Finally, advice is given on what to do during and before a bushfire such as having a plan, staying informed, and being prepared. The video is both specific directive and expert opinion. The presenter provides advice and information regarding bushfires. The video is specific to the entirety of Australia. The video is uploaded by [agency] and the [agency] is mentioned multiple times in the video (with the website shown at the end of the video and the logo visible throughout).

Appendix B. Knowledge facts for bushfire and flood

To test knowledge about bushfires, participants were presented with a series of statements (some true, some false) and asked to nominate each statement as either ‘characteristic of a bushfire’ or ‘not characteristic of a bushfire’. The bushfire statements (bolded where the false statements are made positive by the text in parentheses) included:

1. [F] Bushfires often spread slowly in a particular direction, especially under strong winds blowing in the same direction (can spread quickly from one area to another)
2. [T] Bushfires create embers that can ignite spot bushfires ahead of the bushfire front.
3. [T] Fires produce heavy smoke that can make it difficult to see the road ahead.
4. [T] Large bushfires can create their own weather with high winds.
5. [F] Flying embers can travel, at most, only a few metres ahead of the bushfire front (many kilometres ahead).
6. [T] Bushfires can burn grasses, trees and other vegetation, homes, sheds, cars, and many other items on the landscape.
7. [T] Ways to stay safe in bushfires include all of the following: follow advice of emergency services, download agency apps to stay informed, be prepared, and constantly monitor conditions.
8. [F] Fires do not pose a significant danger to lives and property (Fires are a significant danger).
9. [F] The higher the bushfire danger rating, the less dangerous the bushfire conditions will be (the more dangerous).
10. [T] It is important to plan ahead for bushfires – including making a household plan and creating an emergency kit.
11. [F] It is safe to drive through a bushfire when evacuating (it is dangerous to drive through a bushfire).
12. [T] Fires can be ignited by lightning during thunderstorms.
13. [F] A house can explode when it catches bushfire.
14. [F] The speed of a bushfire is best slowed by reducing the number of trees (Fire fronts move faster in thinned forest and open grasslands).
15. [F] Leaves are the major source of embers (bark on tree trunks).

To test knowledge about floods, participants were presented with a series of statements (some true, some false) and asked to nominate each statement as either ‘characteristic of a flood’ or ‘not characteristic of a flood’. The flood statements (bolded where the false statements are made positive by the text in parentheses) included:

1. [F] 1 m or more of water is necessary to float a car (15 cm).
2. [T] Short bursts of heavy rainfall can lead to rapid onset flooding (also called flash flooding).
3. [T] There are three types of riverine flooding: minor, moderate, and major. Evacuation may be required in major flooding events, but never in minor or moderate flooding events (major and moderate flooding events).
4. [F] Authorities advise people that it is ok to drive through floodwaters (to never drive through floodwaters).
5. [F] Flash flood occur within minutes of heavy rainfall (within 6 h).
6. [T] Flash floods occur when there is too much water to be absorbed by the land.
7. [F] Dam flooding is the most common type of flooding in Australia (Riverine).
8. [T] Riverine flooding is driven by two factors: 1) heavy rainfall, 2) the capacity of the land to absorb water.
9. [F] Floods can occur in different areas in Australia – flat inland areas, coastal areas, and mountainous areas.
10. [F] Fires are the second most deadly natural hazard in Australia (Floods).
11. [F] In the last 10 years, 10% of Australian deaths due to floods were in cars (50%).
12. [T] Storm surges can destroy buildings, wash away roads, and pose threat to life.
13. [T] People who live close to a creek, river, major stormwater drain or in a low-lying area may be at risk from floods.
14. [F] Flooding is not an issue in times of drought.
15. [T] It is important to plan ahead for floods – including making a household plan and creating an emergency kit.

References


