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Exploring ‘wait and see’ responses in French and Australian WUI wildfire emergencies

Abstract

For Wildland-Urban Interface (WUI) residents, wildfire is a constant, growing risk. A timely response to wildfire is vital for human survival. Yet, upon receiving fire cues, previous studies show that instead of taking protective action, people often first wait and see how the situation unfolds. The circumstances under which ‘wait and see’ responses manifest have received research attention in Australia and North America. However, it is unclear whether the findings extend to European regions, given the scarcity of such research there. So, this study surveyed and systematically compared the responses of residents in French and Australian at-risk regions (N = 450). Those with recent wildfire experience described their actual responses; those lacking experience provided responses to a hypothetical fire. The results showed regional differences, with participants in France tending to choose to ‘wait and see’ more often than participants in Australia. There was less waiting when participants received environmental as compared to social cues, although the type of environmental/social cue appeared to moderate this behaviour. The cessation of waiting requires further study but early signs are that it may not always be followed by optimal action. Lacking preparedness and wildfire experience affected responses. Peri-event perceived risk also proved meaningful, unlike pre-event perceived risk.. These findings have implications for wildfire evacuation modelling (when developing simulation scenarios and evacuation triggers) as well as for wildfire management (when using evacuation models for planning or response, when designing interventions such as the education of residents).

KEYWORDS: *Evacuation; Decision-making; Human behaviour; Wait and see; Wildfire; Cross-cultural*

1. Introduction

The toll of wildfires (also commonly referred to as bushfires and forest fires) on wildland-urban interface (WUI) areas across the world is considerable. For example, the recent Australian bushfires (2019-2020) resulted in the loss of over 30 human and more than one billion animal lives, and some extremely hazardous changes in air quality levels (Readfearn, 2020; Richards, Brew, & Smith, 2020). Furthermore, according to reports these fires cost the Australian economy some A$100 billion (Read & Denniss, 2020). Moreover, as the wildfire 'season' comes to its end in one part of the world, another soon begins elsewhere. So, in global terms, the wildfire threat does not recede; it merely alternates between the southern and northern hemispheres.

Living in a WUI bears the risk of directly experiencing wildfire and, consequently, the risk of being injured or dying. Human activity and a major fuel source, vegetation, are in close proximity. Under hot and dry conditions, a fire can easily start and take hold. If wind is also present, the fire will move swiftly, at several kilometres per hour. It may even change direction suddenly as the meteorological conditions change (Country Fire Authority, 2020). Therefore, in the event of wildfire, a timely response upon the receipt of the first fire cues is vital to human survival in these areas. However, past wildfires have shown that residents often 'wait and see' how the situation unfolds before taking protective action (Strahan & Gilbert, 2021). Such delay can be to the detriment of residents as tragically demonstrated in the 'Black Saturday' bushfires of 2009 in Victoria, Australia (Handmer & O'Neill, 2016). Following that event, authorities within the state of Victoria have strongly advised against a 'wait and see' strategy (Emergency Management Victoria, 2016). Yet, media reports from as recent as Victoria's 2019-2020 bushfire season reveal that some people are still willing to 'wait and see', even after receiving an evacuation order, and could be tempted to do so even more as the COVID-19 pandemic has

seen many people self-isolate and be reluctant to leave (Chan & Middleton, 2019; Hollingsworth, 2021). Thus, investigation is required into the circumstances under which a 'wait and see' response may manifest during wildfires. Investigation is also required into the circumstances under which this response diminishes, or where it is unlikely to occur. Such knowledge would allow better planning of emergency response to wildfires, where the goals for human life safety may compete with residents' needs and risk perceptions (as illustrated in recent wildfires in Greece, see Smith, 2021). Emergency planning, supported by research, can utilise urban-scale evacuation modelling (Veeraswamy et al., 2018; Walhlqvist et al., 2021) as diverse scenarios could be simulated and behavioural responses beyond 'stay' or 'go' predicted.

1.1. Research background

Wildfire-related decision-making should not be conceptualised in binary terms, i.e. deciding to either 'stay' or 'go'. It involves preceding stages, including processes such as risk perception and information seeking, which are well acknowledged in research modelling human behaviour in building and urban-scale emergencies (Folk, Kuligowski, Gwynne, & Gales, 2019; Lovreglio et al., 2020; Reneke, 2013). According to the models, if these processes do not produce results that pass certain thresholds or are conclusive, then people defer making a decision about protective action. It could be said that people therefore decide to 'wait and see' until they receive further cues that provide information that is currently lacking (Lovreglio et al., 2019; McLennan & Elliott, 2013; Strahan, 2020). In other words, they will not commit to a course of action without receipt of something extra that leaves them feeling or knowing that they are in danger. This is similar to the concept of 'milling' (Wood et al., 2018), but that is centred in social cues and collective action, whereas individuals may wait and see alone and could take their cue from environmental conditions.

The Protective Action Decision Model or PADM (Lindell & Perry, 2012) is a more flexible theoretical framework, accommodating environmental as well as social factors plus individual characteristics. It highlights that not everyone will decide to take protective action immediately following the receipt of cues. For example, initial cues may tell the recipient that there is a risk of a wildfire starting, or that one has actually started, but not confirm whether it poses a personal or imminent threat to them. Consequently, people may require new information. They may actively seek it, or they may simply enter a more receptive state, should it arrive (Lovreglio et al., 2019). Alternatively, the uncertain situation may prompt negative emotions (e.g. anxiety) or stress, and some people may instead focus meanwhile on reducing that (Lindell & Perry, 2012). They may adopt coping strategies such as distraction, denial, or fatalism; so again, not actively seeking to resolve the situation. However, they could be forced into action if confronted with something compelling.

Pre- and post- 'Black Saturday' bushfire studies in Australia have shown that people may intend to 'wait and see' in advance of an incident, or may display this response upon receiving initial cues that there is a fire (McLennan & Elliott, 2013). Depending on which community the study was carried out in, the number of people intending to 'wait and see' ranged from a few percent of participants to just under a third, while around a quarter to almost three-fifths of participants have reported waiting during an incident (see summarised findings from literature in McLennan & Elliott, 2013). Wildfire studies in the USA also indicate that a considerable number of residents will 'wait and see': such intentions were reported by around 70% of Northwest Montana residents surveyed (Paveglio et al., 2014), and actual waiting was reported by between 54% and 85% of residents surveyed in South Carolina, Washington, and Texas (McCaffrey et al., 2018).

Further research involving Australian residents concluded that the main reason for a 'wait and see' response could be decision paralysis (McNeill et al., 2014). That is, residents might

recognise and understand the wildfire risks but have difficulty in seeing how the relative value of one type of protective action outweighs the other. However, that research investigated intentions to 'wait and see' and asked about the wildfire risks and value of protective action in abstract terms. If being asked about, or experiencing, a concrete, developing scenario, would it still be difficult to discern the value of evacuating relative to staying? It seems more logical that, once an incident begins, residents will not be mainly struggling with the types of protective action. Rather, as the aforementioned human behaviour models describe, residents will be engaged in evaluating threat-related information, when it becomes available, and in relation to their personal circumstances.

Some researchers have explored what may constitute warning triggers – i.e. environmental conditions that, when met, inform and prompt professionals in disaster management to issue warnings to target groups (those in the at-risk area) to take appropriate protective action (e.g. evacuate); it is assumed such triggers will end 'wait and see' responses, moving people into a more active state (Cova et al., 2016). This stance appears to presume that professionals will detect environmental cues before residents. Moreover, it presumes that the receipt of social cues will bring residents' decision-making about protective action to a conclusion. Studies of building emergencies have shown that people often wait for official instruction to evacuate, or for others to start evacuating (Brennan, 2000; Canter, 1996; Capote et al., 2012). A study of wildfires in the USA has also found that official social cues such as a mandatory evacuation order decrease the likelihood of a 'wait and see' response (McCaffrey et al., 2018). However, the Australian media reports mentioned earlier suggest social cues may not always stop this behaviour. Likewise, other Australian reports have shown that residents sometimes encounter environmental cues (e.g. smoke or embers) before, concurrent with, or in the complete absence of social cues, and take action consequently (2009 Victorian Bushfires Commission, 2010). Yet, wildfire research from the USA indicates that environmental cues increase the likelihood

of waiting (McCaffrey et al., 2018). Thus, while waiting and seeing may be contextualised as a response lasting until a resident feels threatened and begins to take purposeful action (including evacuating or staying and defending), less is known about the circumstances, for both social and environmental cues, under which the waiting ceases or when it is least likely to occur. Therefore, the (relative and combined) influence of environmental and social cues on wildfire decision-making deserves further research attention.

Policy makers and practitioners believe that a 'wait and see' response will be less likely when people are prepared for a wildfire. Thus, in order to avoid disaster, residents should be ready. Readiness includes a wide spectrum of actions, some of which are: clearing around one's property (NFPA, n.d.; Prevention Incendie Foret, 2018); putting a plan in place that determines the household's response to fire cues; and considering, in advance, the circumstances under which evacuation, staying to defend property, or staying to shelter indoors will be safe and appropriate (Emergency Management Victoria, 2016; Cal Fire, 2019; Gouvernement.fr, n.d.). Taking or thinking of such action prior to an incident should, theoretically, reduce the physical and psychological demands on residents during an incident, and therefore reduce delays in taking protective action. Some research supports this belief. For example, McCaffrey et al. (2018) found that individuals with a fire plan were less likely to 'wait and see'. They also found that those with a higher income were more likely to 'wait and see'. This could relate to possessing valuable items and therefore being hesitant to leave and potentially lose them. On the other hand, a higher income should provide the means to purchase insurance and therefore mitigate loss.

Demographic characteristics of residents (e.g. gender, age, medical impairments, etc.) could conceivably impact 'wait and see' responses. For example, older residents, especially those with sensory or mobility impairments, could be more reliant upon others in general to detect threats and provide protection (SFPE, 2019). Therefore, they could display more delayed

responses during wildfires. Having dependents as opposed to being dependent could produce the opposite result: for example, individuals with children have shown to be less likely to 'wait and see', although this was opposed to those with pets and livestock (McNeill et al., 2016). Additionally, females have frequently been shown to be more sensitive to risk than males in general (Hitchcock, 2001), as well as perceive risks in different terms to males due to their prevailing social roles (Gustafson, 1998). Thus, gender differences could occur in wildfire decision-making and could conclude decision-making more swiftly as a result, at least for females (Strahan & Gilbert, 2021). Alternatively, males and females could respond differently to the same or similar environmental and social circumstances (including when they are partners in the same household), i.e. both moved to take protective action but of a different kind. Whittaker et al. (2016) showed that, in the 'Black Saturday' bushfires, fewer women than men intended to 'wait and see'. However, it is not clear what the underlying reason was for this outcome. Moreover, in the USA, McCaffrey et al. (2018) found no gender differences for waiting during an incident.

It has been argued that differences in risk perception should be examined in relation to culture and other contextual factors (Hitchcock, 2001). If such factors do indeed influence risk perception, then the prevalence of 'wait and see' responses should vary across cultures. However, contextual factors could impact on waiting in other ways. For instance, if a region's official wildfire policy shows a preference for one type of protective action, and this policy is supported by practice, then it is likely to shape how residents respond to wildfires (i.e. result in greater numbers of residents ultimately deciding to take the preferred action) (Hudson et al., 2019). However, if policy is not supported by practice, or by only allowing for a single response trigger such as a knock on the door from firefighters or the police, in such a way creating a dependency on professionals rather than fostering autonomous decision-making, then it could delay residents reaching their ultimate decision (AIDR, 2018; Fire and Rescue Service Officer,

SIS 2B, Personal communication, 12.04.2017). Following 'Black Saturday', the wildfire policy in Victoria, and other Australian states, has declared a preference for residents to evacuate early. However, it also overtly expects residents to prepare for other eventualities and tailor their plans according to their own circumstances (2009 Victorian Bushfires Commission, 2010). Thus, decision-making is left largely in the hands of residents and dependent on their circumstances. In the USA, policy has historically and more clearly favoured evacuation. However, this has not always been 'accepted practice' in some places, and the issuance of mandatory evacuation orders is a more common occurrence there (Paveglio et al., 2014; Ready, 2020). Greater conflict and less autonomy could, in part, account for the relatively higher percentage of 'wait and see' intentions and actual behaviour in the USA reported earlier.

Different wildfire policies exist elsewhere. For example, in the South of France, 'confinement' (more commonly known as shelter-in-place) is expressly preferred over evacuation. Moreover, residents are taught to rely upon instruction from authorities during an incident (Ministère de la Transition écologique, 2020). Therefore, it is possible that relatively more residents would wait there also. However, little research exists on the wildfire-related behaviours of European populations (Vaiciulyte et al., 2019), and no research has investigated 'wait and see' responses in Europe. This is despite the fact that – particularly in the South – Europe has experienced many fatal wildfires (Molina-Terrén et al., 2019). The European Commission has stated that "updated guidelines or procedures on how citizens should equip themselves for emergencies involving extreme fire events" are needed (Cardoso Castro Rego et al., 2018, p. 44). To meet these needs, researchers must first develop a better understanding of how contextual and other factors impact residents' decision-making and delays. Findings should be based on data from Europe as well as other parts of the world.

Thus, the aim of this study is to contribute to the planning for and response in wildfires. Planning should and can be supported by data to employ tools (i.e. evacuation models) to

predict the human response. At the same time, policy interventions could be supported by data to encourage appropriate decision-making among individuals living in at-risk areas, which could include establishing environmental triggers for evacuation. Such interventions would empower citizens to make an informed decision based on their circumstances, taking the form of a clear action plan that includes, when appropriate, waiting until an official evacuation order is given, unless certain environmental cues are perceived, in which case an alternative plan would be executed by the individuals at risk. Thus, it was envisaged that this research would help provide a more nuanced understanding regarding how many and who choose to wait and see, under what circumstances such a response occurs and ceases, and when it persists.

1.2. Research questions

The following research questions were formulated to inform the current gaps in the research area:

1. To what extent will a 'wait and see' response be observed under different fire cue (especially environmental) conditions?
2. What fire cue conditions will trigger the change from 'wait and see' to taking action?
3. Will those better prepared or with higher perceived risk be less likely to 'wait and see'?
4. What socio-demographic factors are related to 'wait and see' responses?
5. Will 'wait and see responses' in a European region (South of France) differ from those in an Australian region (Victoria) where there are different regional policies?

2. Methods

2.1 Study design and materials

A questionnaire survey was the means of collecting data from individuals residing in at-risk WUI areas in the French and Australian study regions. Two types of questionnaire – Hypothetical scenarios (H) and Actual Experience (AE) – were developed; the latter for residents who had directly experienced a relatively recent wildfire and the former for those lacking such experience. Previous disaster research, albeit on hurricanes, suggested that hypothetical and actual human behavioural responses may be consistent (Lindell et al., 2015). However, hypothetical-scenario studies are currently rare in wildfire evacuation research and, where some do exist, they are problematic to compare because of different variables, measures, and contextually unrelated samples. For this reason, the AE and H surveys were built around similar variables wherever possible and were aimed at the same population in each region. To create the survey questions and hypothetical scenarios, academic literature and media content on wildfires and evacuation were gathered for evaluation. A new framework was designed and used to structure this information gathering (Figure 1). The framework, entitled CIBER-t (Context, Information, Behaviour, Emotion, Risk and time), was developed following a review of work in the field of human behaviour in building fires and other disasters (Vaiciulyte, 2021).

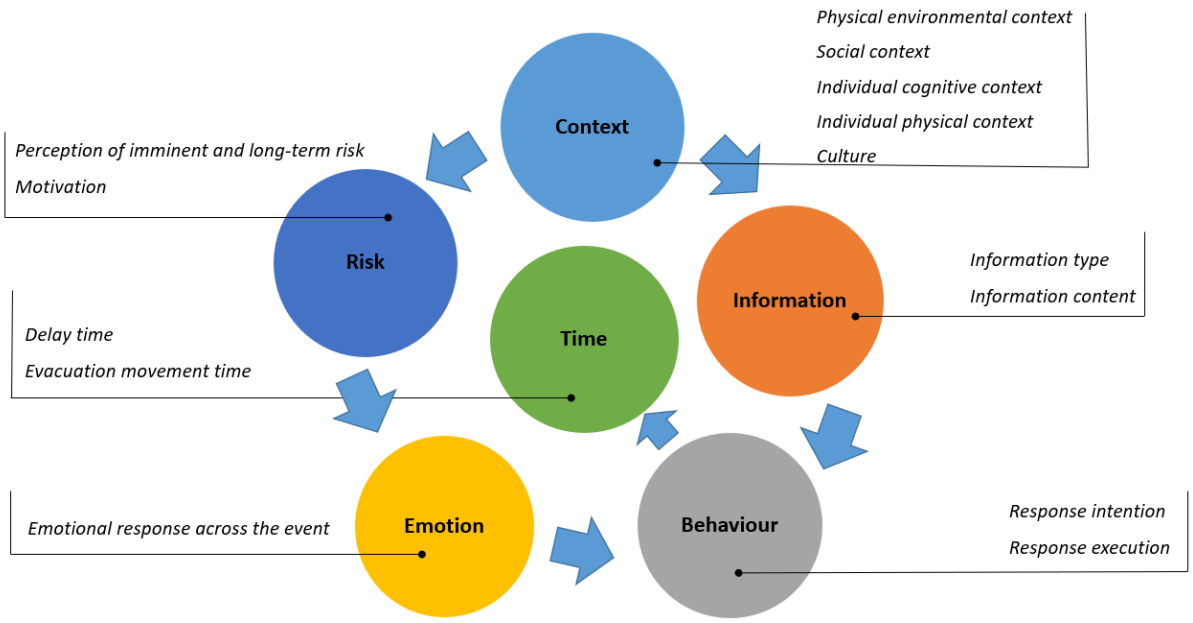


Figure 1. Examples of factors organised using CIBER-t during questionnaire development.

In the H survey, in addition to asking about preparedness and sociodemographic variables (see Table 1), the survey included a description of a hypothetical wildfire situation, with gradually escalating circumstances. Participants were randomly assigned to a group that faced one of three scenarios: where they received (1) social cues only (official, e.g. an evacuation order, and unofficial, e.g. sight of neighbours' action), (2) environmental cues only (e.g. smoke, flames), or (3) social + environmental cues (subset of cues presented to groups (1) and (2)) (Table 2). At each stage of escalation, participants were presented with choices of how they would respond to such a scenario (i.e. wait and see how the situation unfolds; seek more information; evacuate immediately; prepare to shelter indoors). The participants were required to provide a response for each stage, even if they indicated that they would have evacuated at any earlier stage. The scenarios were accompanied with visualisations to support the simulation of the event (see Figure 2 for an example). The use of visual tools have been found to heighten the perception of risk and could be expected to yield more realistic results compared to when no images are present (Xie et al., 2011).

Figure 2. Example of visualisation used for Scenario 1A, Australia (images: shutterstock).

In the AE survey, as well as questions about preparedness and sociodemographic variables (see Table 1), participants were asked about the initial fire cues they encountered ("How did you first become aware there was a wildfire occurring that could affect your town/village or residential area?") and what their immediate response to those initial social or environmental cues was (i.e. did nothing, waited to see how the situation would unfold; sought more information; started taking some protective action). It is important to note that ultimate responses were more complicated in the real-life scenarios, e.g. actions (evacuate or stay) sometimes changed due to external forces, which are beyond the scope of this study. Therefore, the important and comparable part is whether the AE participants initially chose to 'wait and see' or not.

Finally, the AE and H surveys both investigated risk perception. The text was slightly edited based on whether participants were being asked about their perceptions before and during the real wildfire in question (AE) or before and during seeing their hypothetical wildfire scenario (H). The pre-event perceived risk question was "To what extent [were]/[are] you concerned about a wildfire affecting you or this property?" The peri-event perceived risk question was "[After perceiving the first cues]/[After seeing the scenario escalate fully] to what extent [were you]/[would you now be] concerned that the following things might happen – I might get injured; my family/friends might get injured; my residence might be damaged?"

2.2 Recruitment and participants

There were two data collection periods, the first in summer 2017 for the South of France and the second in summer 2018 for Victoria – peak wildfire seasons for those regions. At-risk areas were identified via information provided within the latest risk documents, i.e. DDRM (2015), DICRIM (2016), and the Victorian Bushfire Handbook (Emergency Management Victoria, 2016). Recruitment occurred through a mixture of electronic and physical

advertisements placed in regional newspapers, non-profit organisations (i.e. universities, libraries) and their web pages, and targeted social media. Participation was voluntary, open to adults aged 18+ years old, and no financial incentives were offered for completion. When participants typed in or clicked on the survey link included in the advertisements, they arrived at the survey landing page, which instructed participants to complete the questionnaire most suited to their circumstances (and in their preferred language, French or English). A follow-up question within each survey confirmed that those selecting the AE survey had directly experienced a wildfire, usually within the last 3-4 years, while those selecting the H survey had typically never experienced a wildfire.

2.3 Data analysis

The variables presented in Table 1 were used in the data analysis. Descriptive data analysis, as well as inferential statistical analysis methods (such as Cohran's Q, McNemar, chi-square, Fisher's exact, Mann-Whitney U, and binary logistic regression tests), were used to better understand which factors contribute to 'wait and see' responses as opposed to taking any action. Measures of central tendency and dispersion, where these were appropriate to report, were the mean (M) and standard deviation (SD) or the median (Mdn) and interquartile range (IQR). An alpha level of 0.05 was used as the cut-off for statistical significance in all tests. IBM SPSS® software version 26 was used to analyse the data.

Table 1. Research variables.

Variable	Questionnaire	Code
Gender	AE and H	Male = 0 Female = 1
Age	AE and H	18-39 = 1 40-59 = 2 60+ = 3
Property type	AE and H	House = 1 Other = 0
Children or other dependents present	AE and H	Dependents = 1 None = 0

Variable	Questionnaire	Code
Medical impairments	AE and H	Impairments = 1 None = 0
Pets and livestock ownership	AE and H	Pets and / or livestock = 1 None = 0
Having a plan	AE and H	Plan = 1 None = 0
Insurance	AE and H	Insurance = 1 None = 0
Pre-event perceived risk	AE and H	High = 1 Low = 0
First warning type	AE	Social Unofficial Cues = 1 Social Official Cues = 2 Environmental Cues = 3
Peri-event perceived risk (injury, self)	AE and H	Not at all = 0 Very little = 1 Somewhat = 2 To a great extent = 3
Peri-event perceived risk (injury, others)	AE and H	Not at all = 0 Very little = 1 Somewhat = 2 To a great extent = 3
Peri-event perceived risk (property damage)	AE and H	Not at all = 0 Very little = 1 Somewhat = 2 To a great extent = 3
Planned evacuation destination	H	A nearby town = 1 Other = 0
Why did you choose to 'wait and see'?	H	I would not be sure how to respond = 0 I think I would have time to wait and see what happens = 1 Other reason = 2

Table 2. Hypothetical case survey scenarios presented to the participants and each of their escalating stages (A, B, etc.).

Scenario		A	B	C	D	E	F
Group 1. Social Cues Only	*You cannot see any environmental cues of the wildfires*	You learn from the TV, radio, Internet or similar that there is a forest fire in your area that is heading towards your town/ village.	It is estimated to reach your town/ village in 3 hours	You can see that your neighbours are evacuating.	Your family members are concerned about your (and theirs, if you live together) safety and they urge you to evacuate.	Residents are being ordered to evacuate	Now you hear a knock on the door – it is a firefighter who urges you to evacuate immediately.
Group 2. Environmental Cues Only	*You have not received any advance warning about a forest fire in your area.*	You look through the window and see smoke plumes over the top of the trees.	You look through the window and see embers flying and landing on nearby structures.	You look through the window and see that the vegetation around your residence is catching fire.	You look through the window and can see signs that there is a forest fire nearby, e.g. smoke, embers and flames. Your throat and eyes start to feel irritated and you feel unwell due to the smell and smoke in the air.	-	-
Group 3. Social + Environmental Cues	*You learn from the TV, radio, Internet or similar that there is a forest fire in your area that is heading towards your town/ village.*	You look through the window and see smoke plumes over the top of the trees.	You look through the window and see embers flying and landing on nearby structures.	You look through the window and see that the vegetation around your residence is catching fire.	Your throat and eyes start to feel irritated and you feel unwell due to the smell and smoke in the air.	Residents are being ordered to evacuate.	-

2.4 Ethical considerations

Participants' vulnerability when answering questions relating to a disaster was taken into account. For this reason, the rules of ethical conduct for surveys, as approved by the University Research Ethics Committee, were followed meticulously. Participants were provided with a participant information webpage and advised that if they had any concerns about revisiting their experiences then they should speak with their GP or a counsellor. Participants were also informed from the outset of their right to withdraw from the survey at any time without giving reasons. No personal information identifying individuals was collected in the survey.

3. Results

The results are presented for the H and AE samples from Victoria (AUS) and the South of France (SoFR). A total of 177 completed AE surveys and 273 completed H surveys were included in the analysis reported in this paper. Participant ages ranged from 18 to 78 years in AUS, and from 18 to 75 years in SoFR. Further detail about the profile of participants is shown in Table 3.

Table 3. Profile of participants.

	SoFR		**AUS**	
Variable	**AE (n = 81)**	**H (n = 151)**	**AE (n = 96)**	**H (n = 122)**
Gender	Female 58% Male 42%	Female 52% Male 48%	Female 65% Male 35%	Female 71% Male 29%
Age – M	43.81 years	43.38 years	49.22 years	44.41 years
SD	15.15	13.79	13.85	12.59
18-39	40%	40%	22%	44%
40-59	44%	50%	54%	40%
60+	16%	10%	24%	17%
Property type	House 79% Other 21%	House 55% Other 45%	House 92% Other 8%	House 84% Other 16%
Children or other dependents present	Dependents 48% None 52%	Dependents 36% None 64%	Dependents 43% None 57%	Dependents 37% None 63%

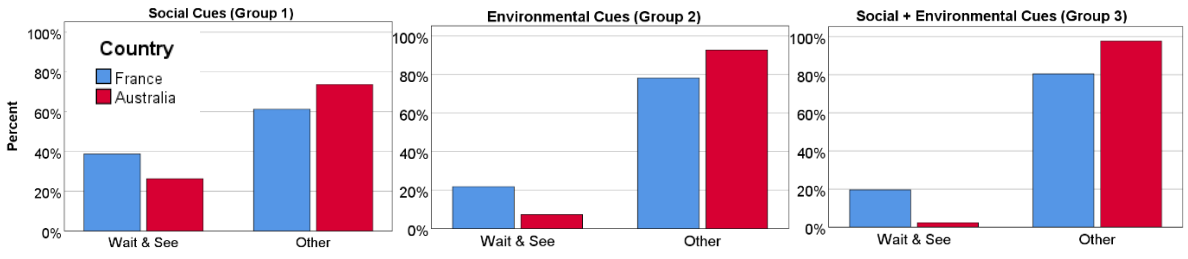
Variable	SoFR		AUS	
	AE (n = 81)	**H (n = 151)**	**AE (n = 96)**	**H (n = 122)**
Medical impairments	Impairments 12% None 88%	Impairments 5% None 95%	Impairments 15% None 85%	Impairments 14% None 86%
Pets and livestock ownership	Pets/livestock 56% No animals 44%	Pets/livestock 45% No animals 55%	Pets/livestock 84% No animals 16%	Pets/livestock 66% No animals 34%
Having a plan	Plan 20% No plan 80%	Plan 15% No plan 85%	Plan 82% No plan 18%	Plan 53% No plan 47%
Insurance	Yes 42% No 58%	Yes 68% No 32%	Yes 87% No 13%	Yes 46% No 54%
Pre-event perceived risk	Low 31% High 69%	Low 58% High 42%	Low 6% High 94%	Low 71% High 29%
First warning type	Social Unofficial Cues 13% Social Official Cues 9% Environmental Cues 79%	n/a	Social Unofficial Cues 24% Social Official Cues 52% Environmental Cues 24%	n/a
Peri-event perceived risk (injury, self)	Not at all 51% Very Little 27% Somewhat 16% To a great extent 6%	Not at all 9% Very Little 38% Somewhat 32% To a great extent 21%	Not at all 50% Very Little 30% Somewhat 18% To a great extent 2%	Not at all 7% Very Little 14% Somewhat 45% To a great extent 34%
Peri-event perceived risk (injury, others)	Not at all 27% Very Little 19% Somewhat 35% To a great extent 20%	Not at all 3% Very Little 5% Somewhat 30% To a great extent 62%	Not at all 21% Very Little 27% Somewhat 30% To a great extent 22%	Not at all 0% Very Little 9% Somewhat 27% To a great extent 64%
Peri-event perceived risk (property damage)	Not at all 21% Very Little 31% Somewhat 22% To a great extent 26%	Not at all 4% Very Little 14% Somewhat 36% To a great extent 46%	Not at all 16% Very Little 25% Somewhat 35% To a great extent 24%	Not at all 4% Very Little 7% Somewhat 24% To a great extent 65%
Planned evacuation destination	n/a	A nearby town 40% Other: Another residence 3% Another building 15% Open area 30% I don't know 13%	n/a	A nearby town 53% Other: Another residence 3% Another building 2% Open area 31% I don't know 11%
Why did you choose to 'wait and see'?	n/a	Not sure how to respond 34% Would have time to wait and see 49% Other 17%	n/a	Not sure how to respond 14% Would have time to wait and see 36% Other 50%

3.1. To what extent will a 'wait and see' response be observed under different fire cue (especially environmental) conditions?

3.1.1. Influence of social and environmental cues

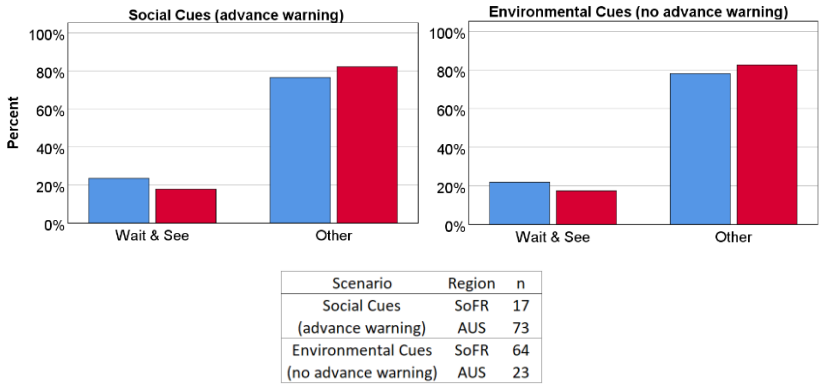
First, the proportions of H and AE participants who chose to 'wait and see' as opposed to take any action were explored (Figure 3). For this part of the analysis, responses across the H scenario stages were collapsed, meaning H participants either chose to 'wait and see' at some point or never did so. The H and AE responses showed similar trends, i.e. those who chose to 'wait and see' were in the minority. However, it was usually not a small minority, with the proportions ranging from around one-fifth through to almost two-fifths; the exceptions were AUS-H Groups 2 and 3, who chose to 'wait and see' far less. Both scenario groups were presented with environmental cues, either in isolation or in combination with social cues, unlike Group 1 who were only presented with social cues. Indeed, the presence of environmental cues were associated with less waiting among H participants overall; this was also the case for AE participants, although the impact there was minimal. Across both surveys and all fire cue conditions, SoFR participants chose to 'wait and see' more often than AUS participants.

Hypothetical Scenarios



Scenario	Region	n
Social Cues (Group 1)	SoFR	49
	AUS	39
Environmental Cues (Group 2)	SoFR	55
	AUS	41
Social + Environmental Cues (Group 3)	SoFR	46
	AUS	43

Actual Experience



Scenario	Region	n
Social Cues (advance warning)	SoFR	17
	AUS	73
Environmental Cues (no advance warning)	SoFR	64
	AUS	23

Figure 3. Influence of different cues on 'wait and see' responses. *For H, Other = 'Seek more information', 'Evacuate immediately', 'Prepare to shelter indoors'; for AE, Other = 'Sought more information', 'Started taking some protective action'. Note, two additional 'Other' options were offered for H scenarios 2C and 3C – 'Try to put out the fire myself' and 'Call the fire service' – due to anticipating such behaviour might appear more logical for some participants at this stage.*

3.1.2. Influence of environmental cues only

Second, H and AE participants were compared by their responses to different types of environmental cue. In this instance, responses across the H scenario stages were not collapsed. Instead, the data for Group 2 were examined; these participants were introduced to smoke, embers, and flames in stages A, B, and C, respectively. As Figure 4 shows, there were some differences between the AE and H participants. For AE, seeing smoke resulted in almost one-quarter of participants in both study regions waiting and seeing, whereas – apart from one exception – no-one or close to no-one in either study region waited following the sight of embers and flames; the exception was the AUS-AE response to embers, which was more conflicted. On the other hand, H participants – particularly those in AUS – showed less indecisiveness when seeing smoke and a similar pattern was observed for embers. Waiting was non-existent among all H participants when seeing flames.

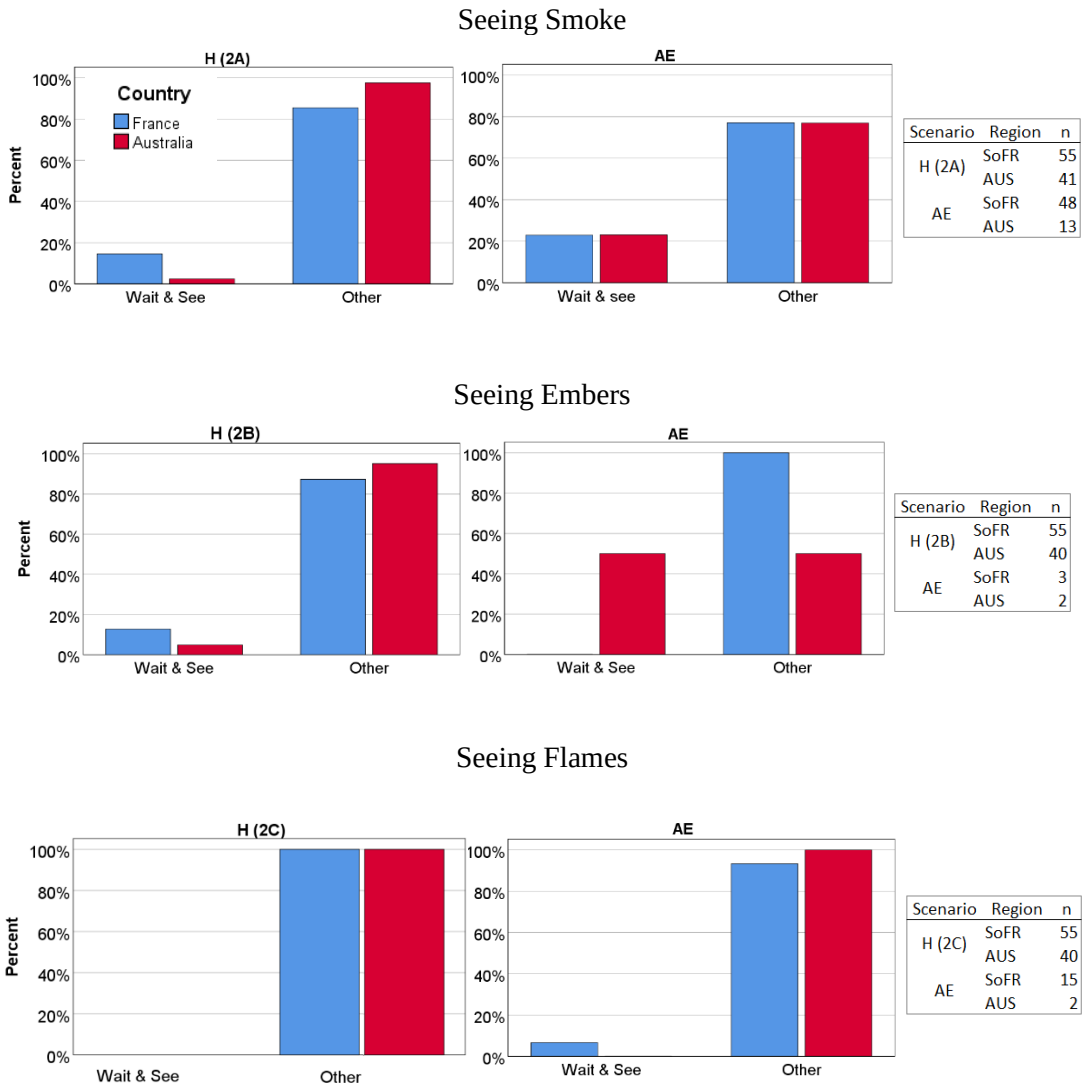


Figure 4. Influence of different environmental cues on wait and see responses

3.2. What fire cue conditions will trigger the change from wait and see to taking action?

Table 4 presents data from H participants only but includes all three groups. As mentioned in section 2.1, H participants were shown all stages of their escalating scenario and were asked about their responses at each stage, even if they chose to evacuate early on in the scenario. This was to attempt to collect data on and thus be able to gauge the likely frequency of waiting in circumstances where it was less obvious that the threat was a personally significant or imminent

one, as well as the likely frequency in circumstances where the need for taking action seemed clear. The results show that 'wait and see' responses were most prominent across the Group 1 stages. However, the decision to 'wait and see' fluctuated among the SoFR sample; 'wait and see' responses reduced more than fourfold (from 26% to 6%) when participants were not only notified of an approaching wildfire but also presented with an estimated time of fire arrival (1B), but then doubled and rose even further (from 6% to 12 to17%) when participants received social cues, i.e. saw their neighbours evacuating (1C) and were urged to leave by their family (1D), before reducing again – almost threefold (from 17% to 6%) this time – when an order to evacuate was given (1E), and reduced somewhat further (from 6% to 4%) when directly faced with a firefighter issuing an evacuation order (1F). In contrast, the AUS Group 1 seemed unaffected by the additional time information, but their waiting halved at stage 1C (from 16% to 8%) and continued to reduce gradually until no participants were waiting by the final stage. Across the rest of the scenario groups, for both SoFR and AUS, 'wait and see' responses were lower to begin with and tended to diminish quite quickly (i.e. by stage B or C when embers and then flames were noticed), without bouncing back. The slight exception was AUS Group 2, whose waiting first increased at stage B but ended completely thereafter. Nonetheless, across almost all scenarios and stages, AUS participants were less likely to wait and see than SoFR participants.

Table 4. The proportion of wait and see responses across different scenario stages.

	Social Cues (Group 1)		**Environmental Cues (Group 2)**		**Social + Environmental Cues (Group 3)**	
Stage	SoFR (n = 49)	AUS (n = 39)	SoFR (n = 55)	AUS (n = 41)	SoFR (n = 46)	AUS (n = 43)
A	26%	16%	15%	2%	20%	2%
B	6%	16%	13%	5%	2%	0%
C	12%	8%	0%	0%	0%	0%
D	17%	5%	0%	0%	0%	0%
E	6%	3%	-	-	0%	0%
F	4%	0%	-	-	-	-

Of interest next was what actions followed the cessation of waiting. Table 5 shows the pattern of responding from H participants who first chose to 'wait and see'. When viewing these results, in should be remembered that this was a smaller subset of H participants and thus the percentages for the subsequent choices similarly reflect a smaller number. With this caveat in mind, it can be seen that 'seek more information' and 'evacuate immediately' were the two main actions that followed 'wait and see'. 'Call the fire service' and 'try to put out the fire myself' were the top subsequent actions chosen by the SoFR and AUS Group 2 participants respectively at stage C; this was when nearby vegetation was said to catch fire. At this particular stage, not only did the subsequent action differ between the two countries, the final response that followed also differed, with the AUS participant choosing to shelter and SoFR participants choosing to evacuate. While evacuation without first receiving an official order is not a common practice in SoFR, the participants in France chose this option a number of times, pushing 'prepare to shelter indoors' (the policy-preferred response) into second place, if it placed at all.

Table 5. The dynamic change in subsequent choices for those who first chose to 'wait and see'.

		Social Cues (Group 1)		**Environmental Cues (Group 2)**		**Social + Environmental Cues (Group 3)**	
		SoFR (n = 49)	AUS (n = 39)	SoFR (n = 55)	AUS (n = 41)	SoFR (n = 46)	AUS (n = 43)
First choice	A	Wait and see (26%, n = 12)	Wait and see (16%, n = 6)	Wait and see (15%, n = 8)	Wait and see (2%, n = 1)	Wait and see (20%, n = 9)	Wait and see (2%, n = 1)
Subsequent choices	B	1.Seek info (50%) 2.Evacuate (33%) 3.Wait and see (17%)	1.Evacuate (50%) 1.Wait and see (50%)	1.Evacuate (37%) 1.Wait and see (37%) 2.Shelter (25%)	1.Seek info (100%)	1.Evacuate (56%) 2.Shelter (33%) 3.Wait and see (11%)	1.Seek info (100%)
	C	1.Seek info (50%) 2.Evacuate (25%) 2.Wait and see (25%)	1.Seek info (33%) 1.Evacuate (33%) 1.Wait and see (33%)	1.Call fire service (37%) 2.Try put out fire (25%) 2.Shelter (25%) 3.Evacuate (12%)	1.Try put out fire (100%)	1.Evacuate (44%) 2.Shelter (22%) 2.Call fire service (22%) 3.Try put out fire (11%)	1.Evacuate (100%)
	D	1.Seek info (33%) 1.Evacuate (33%)	1.Seek info (40%) 1.Evacuate (40%)	1.Evacuate (71%) 2.Shelter (29%)	1.Shelter (100%)	1.Evacuate (44%) 1.Shelter (44%)	1.Evacuate (100%)

	1.Wait and see (33%)	2.Wait and see (20%)			2.Seek info (11%)	
E	1.Evacuate (83%) 2.Wait and see (17%)	1.Evacuate (100%)	-	-	1.Evacuate (78%) 2.Shelter (11%) 2.Seek info (11%)	1.Evacuate (100%)
F	1.Evacuate (92%) 2.Wait and see (8%)	1.Evacuate (100%)	-	-	-	-

3.3. Will those better prepared or with higher perceived risk be less likely to 'wait and see'?

Risk perception has been noted as an important factor in the literature on decision-making and could therefore influence 'wait and see' choices in wildfires. Preparedness – in the form of having a plan for the household, or insurance, or even having thought of where to go during a wildfire – could also influence individuals with respect to 'wait and see' responses. Thus, both were examined next. For H participants, only scenario stage A choices were analysed with the pre-event perceived risk data (Table 6) because subsequent responses could be confounded by different risk perceived during the dynamic event (peri-event perceived risk) plus fewer people tended to 'wait and see' as the scenarios escalated. The results showed that there was no relationship between the initial response and the pre-event level of concern over wildfires for either H or AE participants.

Table 6. Pre-event risk perception and 'wait and see' responses in the H and AE samples.

		SoFR-H			AUS-H		
		Pre-event perceived risk					
Scenario	Response	Low	High	Test result	Low	High	Test result
1A	Other	43%	57%	p = .509 V = .09	69%	31%	p = 1.00 V = .02
	Wait and see	54%	46%		67%	33%	
2A	Other	62%	38%	p = 1.00 V = .01	67%	33%	p = 1.00 V = .11
	Wait and see	63%	37%		100%	0%	
3A	Other	62%	38%	p = .378 V = .13	74%	26%	p = 1.00 V = .09
	Wait and see	78%	22%		100%	0%	

		SoFR-AE			AUS-AE		
Scenario	Response	Low	High	Test result	Low	High	Test result
n/a	Other	23%	77%	p = .060	6%	94%	p = .656
	Wait and see	44%	56%	V = .22	8%	92%	V = .04

Note: V = Cramer's V (effect size).

In contrast, relationships were observed between 'wait and see' responses and the peri-event level of concern. Test results showed that the SoFR-AE participants who waited perceived a significantly lower risk of injury to themselves, risk of injury to others, and risk of property damage, than the participants who responded differently (Injury, self: 'wait and see' Mdn = 0.00, IQR = 0.00-1.00 versus 'other' Mdn = 1.00, IQR = 0.00-2.00; U = 399.50, p = .039; Injury, others: 'wait and see' Mdn = 0.00, IQR = 0.00-2.00 versus 'other' Mdn = 2.00, IQR = 1.00-2.00; U = 313.50, p = .003; Property damage; 'wait and see' Mdn = 1.00, IQR = 0.00-2.00 versus 'other' Mdn = 2.00, IQR = 1.00-3.00; U = 388.00, p = .035). For the AUS-AE participants who waited as opposed to responded differently, only the perceived risk of property damage was significantly lower (Injury self: 'wait and see' Mdn = 0.00, IQR = 0.00-1.00 versus 'other' Mdn = 1.00, IQR = 0.00-1.00; U = 517.50, p = .107; Injury, others: 'wait and see' Mdn = 1.00, IQR = 0.50-2.00 versus 'other' Mdn = 2.00, IQR = 1.00-2.00; U = 564.50, p = .288; Property damage: 'wait and see' Mdn = 1.00, IQR = 0.00-2.00 versus 'other' Mdn = 2.00, IQR = 1.00-3.00; U = 428.50, p = .015). For the H participants, responses across the scenario stages were collapsed. SoFR-H participants' peri-event perceived risk was not significantly different between those who chose to wait at any time and those who chose other responses (Injury, self: 'wait and see' Mdn = 1.00, IQR = 1.00-2.00 versus 'other' Mdn = 2.00, IQR = 1.00-2.00; U = 1884.50, p = .157; Injury, others: 'wait and see' Mdn = 3.00, IQR = 2.00-3.00 versus 'other' Mdn = 3.00, IQR = 2.00-3.00; U = 2105.50, p = .639; Property damage: 'wait and see' Mdn = 2.00, IQR = 1.00-3.00 versus 'other' Mdn = 2.00, IQR = 2.00-3.00; U = 2000.50, p = .359). However, AUS-H participants' peri-event perceived risk did differ

significantly across all measures, with those choosing to wait at any time displaying lower levels of concern (Injury, self: 'wait and see' Mdn = 2.00, IQR = 1.00-2.00 versus 'other' Mdn = 2.00, IQR = 2.00-3.00; U = 444.50, p = .007; Injury, others: 'wait and see' Mdn = 2.00, IQR = 1.00-3.00 versus 'other' Mdn = 3.00, IQR = 2.00-3.00; U = 476.50, p = .008; Property damage: 'wait and see' Mdn = 2.00, IQR = 1.00-3.00 versus 'other' Mdn = 3.00, IQR = 2.00-3.00; U = 469.00, p = .006).

For the analysis involving the preparedness variables, the H survey data were collapsed across scenario stages again. It was revealed that having a plan was not significantly related to either choosing to 'wait and see' or taking action, but having insurance showed a significant relationship with taking action (91%) compared to waiting (9%) in the SoFR-AE sample (Table 7). Additionally, having thought about one's evacuation destination was significant in the AUS-H sample, with more participants planning to go to a nearby town (83%) rather than closer locations (17%), such as a nearby residence, another building like a hall or church, or an open area like a beach or sports field, when their decision was to 'wait and see'. However, this relationship was only evident when the data from all three H scenario groups were merged, rather than when looking at it for each scenario separately.

Table 7. Results for preparedness and 'wait and see' responses.

SoFR	**Test result**				
Variable	AE	H 1	H 2	H 3	H Merged
Having a plan	p = .444 V = .11	p = 1.00 V = .04	p = .670 V = .09	p = .488 V = .09	p = 1.00 V = .03
Insurance	p = .010* V = .27	p = .802 V = .04	p = .730 V = .05	p = .127 V = .24	p = .211 V = .10
Planned evacuation destination	n/a	p = .254 V = .17	p = .150 V = .22	p = 1.00 V = .06	p = .872 V = .01
AUS					
Having a plan	p = .065 V = .19	p = .690 V = .12	p = 1.00 V = .06	p = 1.00 V = .14	p = .130 V = .13
Insurance	p = .648 V = .09	p = .278 V = .21	p = 1.00 V = .07	p = 1.00 V = .13	p = .370 V = .08
Planned evacuation destination	n/a	p = .257 V = .21	p = .232 V = .27	p = 1.00 V = .15	p = .020* V = .21

*Note: * p < .050; V = Cramer's V (effect size).*

3.4. What socio-demographic factors are related to 'wait and see' responses?

A similar analysis of the 'wait and see' responses was then performed with the socio-demographic variables. The results (Table 8) show that, for SoFR-AE, those who had pets/livestock were significantly more likely to take action (89%) than 'wait and see' (11%), while there were fewer participants without animals who decided to take action (64%) as opposed to wait (36%). For SoFR-H Group 1, participants who had dependents were significantly more likely to take action (82%) than choose to 'wait and see' (18%), as compared to those who did not have any dependents, who were equally as likely to wait as they were to take action (50%). This was also the case for the merged SoFR-H data, where 87% of those who had dependents chose to take action rather than wait, compared to 66% of those who did not have any dependents.

In AUS, participants in H Group 2 were significantly more likely to choose to take action (60%) than 'wait and see' (40%) if they were between 40 and 59 years of age, but no such difference was found for the other age groups and their corresponding choices. The same can be said about the merged H data, where those between the ages of 40 and 59 chose to take action in 70% of cases and choosing to 'wait and see' dropped to 30%.

No other socio-demographic characteristic was significantly related to responses in either survey sample or study region.

Table 8. Results for socio-demographic characteristics and wait and see responses.

SoFR	**Test result**				
Variable	AE	H 1	H 2	H 3	H Merged
Gender	p = .063 V = .21	p = .551 V = .09	p = .742 V = .08	p = .276 V = .19	p = .588 V = .04
Age	p = .521 V = .13	p = .169 V = .27	p = .599 V = .17	p = .456 V = .17	p = .125 V = .17
Property type	p = .513 V = .089	p = .704 V = .05	p = 1.00 V = .002	p = .718 V = .08	p = .743 V = .03

Children or other dependents	p = .721 V = .04	p = .022* V = .32	p = .183 V = .20	p = .448 V = .17	p = .003* V = .23
Medical impairments	p = .107 V = .20	p = .137 V = .25	p = .218 V = .26	p = 1.00 V = .13	p = .683 V = .08
Pets and livestock ownership	p = .007* V = .30	p = .612 V = .07	p = .213 V = .17	p = .716 V = .08	p = .489 V = .06
AUS					
Gender	p = .272 V = .11	p = .719 V = .09	p = .092 V = .33	p = .214 V = .30	p = .112 V = .17
Age	p = .428 V = .14	p = .169 V = .34	p = .035* V = .48	p = 1.00 V = .19	p = .037* V = .26
Property type	p = 1.00 V = .04	p = 1.00 V = .02	p = .439 V = .12	p = 1.00 V = .06	p = .700 V = .05
Children or other dependents	p = .492 V = .07	p = .441 V = .18	p = 1.00 V = .04	p = .488 V = .16	p = .486 V = .06
Medical impairments	p = 1.00 V = .04	p = .279 V = .18	p = 1.00 V = .15	p = 1.00 V = .05	p = 1.00 V = .004
Pets and livestock ownership	p = 1.00 V = .05	p = 1.00 V = .06	p = 1.00 V = .06	p = .349 V = .21	p = .554 V = .06

*Note: * p < .050; V = Cramer's V (effect size).*

3.5. Will 'wait and see' responses in a European region (South of France) differ from those in an Australian region (Victoria) where there are different regional policies?

Regional differences have already been noted in relation to research questions #1-4. This research question sought to investigate the potential influence of the regional policy on participants' responses overall. Data for H participants were merged, as were data for AE participants (Table 9). The results indicated that there were significant differences between the two regions' 'wait and see' responses for the H participants but not the AE participants. In other words, the intention to wait (but not actual waiting) was significantly more likely when in SoFR than when in AUS.

Table 9. Influence of region on wait and see responses.

	Hypothetical Scenarios			Actual Experience		
	Groups 1-3 Merged			**Social and environmental cues Merged**		
	SoFR	AUS	Test results	SoFR	AUS	Test results
Wait and see	27%	11%	*p = .001, V = .19*	22%	18%	*p = .453, V = .06*
Other	73%	89%		78%	82%	

Note: V = Cramer's V (effect size).

In the H survey, participants were asked directly why they chose to 'wait and see' in any of the scenario stages. They were offered two answer options related to the regions' respective policies (i.e. passive confinement and therefore potential reliance on authorities in SoFR => not being sure how to respond; early evacuation and therefore potential advance warning in AUS => thinking there is time to 'wait and see'), plus a further 'other' option. Figure 5 shows that while around a third of participants in each study region answered in the way expected given their regional policies, the majority of SoFR participants in fact believed that they would have time to 'wait and see', while the majority of AUS participants chose an 'other' reason.

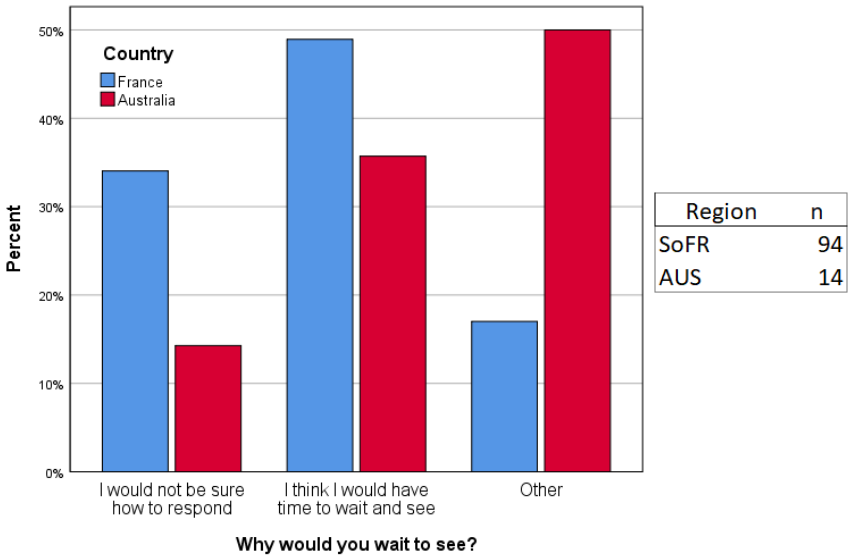


Figure 5. Reasons to wait and see by H participants.

Lastly, the SoFR and AUS data were modelled and compared using logistic regression. For both models, the outcome was whether a 'wait and see' response was chosen as opposed to other responses. The predictor variables included all those independent variables examined earlier in this Results section if they were measured in both the AE and H surveys. A dichotomous 'wildfire experience' (AE, H) variable was added to the list of predictors. So too were two further dichotomous variables: 'social cues' (Yes, No) and 'environmental cues' (Yes, No). AE participants who initially encountered social cues were coded as 'social cues' (Yes) and 'environmental cues' (No), while those who initially encountered environmental

cues were coded in the opposite way. H Group 1 participants were coded as 'social cues' (Yes) and 'environmental cues' (No), H Group 2 participants were coded as 'social cues' (No) and 'environmental cues' (Yes), while H Group 3 participants were coded as 'social cues' (Yes) and 'environmental cues' (Yes). The regression results are shown in Table 10; significant predictors are displayed in bold.

Table 10. Logistic regression results predicting 'wait and see' responses by region.

	SoFR (N = 223)				AUS (N = 211)			
Variable	**Beta coefficient**	**S.E.**	**Wald**	**p-value**	**Beta coefficient**	**S.E.**	**Wald**	**p-value**
(Intercept)	-1.03	1.20	0.74	0.389	-3.18	1.75	3.29	0.070
Wildfire experience	**1.40**	**0.61**	**5.31**	**0.021**	0.98	0.72	1.84	0.175
Pre-event perceived risk	-0.11	0.39	0.08	0.780	-0.27	0.71	0.14	0.704
Having a plan	0.30	0.66	0.21	0.650	**1.40**	**0.55**	**6.52**	**0.011**
Insurance	**0.93**	**0.42**	**4.95**	**0.026**	-0.99	0.68	2.08	0.149
Gender	0.08	0.37	0.05	0.821	-0.14	0.50	0.08	0.779
Age:			3.37	0.185			1.05	0.592
- *40-59*	-0.24	0.44	0.31	0.580	-0.02	0.60	0.00	0.978
- *60+*	0.80	0.57	1.93	0.165	0.58	0.69	0.72	0.397
Property type	0.12	0.41	0.09	0.769	0.37	0.82	0.20	0.654
Children or other dependents	**0.80**	**0.39**	**4.15**	**0.042**	0.12	0.52	0.05	0.820
Medical impairments	-1.30	1.10	1.41	0.235	0.01	0.70	0.00	0.988
Pets and livestock ownership	0.16	0.41	0.16	0.688	-0.37	0.65	0.32	0.572
Social cues	0.00	0.54	0.00	0.997	2.01	1.25	2.58	0.108
Environmental cues	0.46	0.56	0.69	0.405	2.02	1.21	2.79	0.095
Peri-event perceived risk (injury, self):			3.47	0.324			2.35	0.502
- *Very little*	0.89	0.61	2.14	0.144	-0.39	0.60	0.42	0.519
- *Somewhat*	0.11	0.64	0.03	0.862	-0.26	0.72	0.13	0.714
- *To a great extent*	0.22	0.75	0.09	0.767	-1.87	1.29	2.09	0.148
Peri-event perceived risk (injury, others):			**11.97**	**0.007**			3.55	0.315
- *Very little*	**-2.35**	**0.89**	**6.94**	**0.008**	1.20	0.99	1.47	0.226
- *Somewhat*	**-2.13**	**0.69**	**9.49**	**0.002**	0.08	0.98	0.01	0.938
- *To a great extent*	**-2.33**	**0.73**	**10.09**	**0.001**	0.50	1.03	0.23	0.629
Peri-event perceived risk (property damage):			5.63	0.131			7.18	0.067
- *Very little*	-0.76	0.67	1.30	0.254	-1.19	0.84	1.99	0.158
- *Somewhat*	-1.51	0.66	5.16	0.023	-1.62	0.81	3.95	0.047
- *To a great extent*	-0.88	0.68	1.66	0.198	-2.37	0.91	6.84	0.009

Note: S.E. = standard error. Reference categories for each variable were: Wildfire experience = AE; Pre-event perceived risk = High; Having a plan = Plan; Insurance = Insurance; Gender = Female; Age = 18-39; Property type = Other; Children or other dependents = Dependents; Medical impairments = None; Pets and livestock ownership = None; Social cues = Yes; Environmental cues = Yes; Peri-event perceived risk (injury,

self) = Not at all; Peri-event perceived risk (injury, others) = Not at all; and Peri-event perceived risk (property damage) = Not at all.

Both the SoFR and the AUS logistic regression models were statistically significant ($X^2(22) = 45.72$, $p = .002$, and $X^2(22) = 37.36$, $p = .022$, respectively). The SoFR model explained 28% (Nagelkerke R^2) of the variance in 'wait and see' responses and correctly classified 78% of cases, while the AUS model explained 29% (Nagelkerke R^2) of the variance in 'wait and see' responses and correctly classified 86% of cases. However, as Table 10 shows, the variables that significantly predicted waiting in France were not the same as those that significantly predicted waiting in Australia. SoFR participants were significantly more likely to 'wait and see' if they lacked wildfire experience, did not have insurance, or did not have dependents such as children. Additionally, SoFR participants were significantly less likely to 'wait and see' if they perceived a greater risk of injury to others during the actual/hypothetical wildfire. In contrast, only one variable significantly predicted responses in AUS: participants were significantly more likely to 'wait and see' if they did not have a plan for responding to a fire. Please note, certain levels of concern about property damage were significant for both SoFR and AUS; however, overall, the variable 'peri-event perceived risk (property damage)' was not a significant predictor of waiting in either region.

4. Discussion

This study found support for the assertion that some people's response to a wildfire will be to 'wait and see'. As displayed in Figure 3, the proportion of AUS-H participants intending to wait was somewhat similar to that reported previously for Australian communities (3% to 32% – see summarised findings from literature in McLennan & Elliott, 2013). The proportion of AUS-AE participants who actually waited during their incident was closer to (i.e. a bit below) the lower end of the range previously reported (approximately 25% to 58% – see

McLennan & Elliott, 2013). The proportion of SoFR participants intending to wait or actually waiting was higher than that reported in Australia, but far lower than that reported previously for American communities (intending = approximately 71%, actually waiting = between 54% and approximately 85%) (McCaffrey et al., 2018; Paveglio et al., 2014). These differences show that while past research from outside Europe has been important in highlighting a global problem, those findings cannot be wholly generalised to other parts of the world.

The receipt of just social cues was not found to have a decisive effect on all participants' decision-making. Certainly, with regards to intentions to wait, it would appear that cues in the form of a wildfire notification via the media may be deemed insufficient to end those intentions, and unofficial cues such as seeing neighbours' reactions could potentially be detrimental (i.e. encourage further waiting, which could lead to death or toxic smoke inhalation and injury) in some regions. However, official cues in the form of a direct order to evacuate did appear to reduce waiting, as has been noted elsewhere (e.g. McCaffrey et al., 2018).

When the influence of environmental cues on 'wait and see' responses was assessed, it was clear that such cues were more effective in reducing intentions to wait, both when presented alone and when presented in combination with social cues such as a wildfire notification via the media. Actual waiting was only marginally less frequent when participants received environmental as opposed to social cues. However, closer inspection showed the influence of environmental cues was nuanced. The results suggested that, in both the hypothetical and real-life situations, participants were not entirely sure what to do in response to seeing smoke, while more decisiveness was usually displayed in response to seeing embers and certainly in response to seeing flames. On the one hand, smoke is a cue that is often expected to prompt action instead of waiting, according to first responders (Executive manager in learning and development, CFA, personal communication, July 16, 2018). So, practitioners should be made aware that their expectations are not necessarily reflected in the manner in

which the public is likely to respond. On the other hand, embers and flames are indicators of a fire being in very close proximity, meaning a potential danger to life and property and very little time to act. Thus, residents also need to be made aware that their expectations (i.e. of being able to evacuate safely at this point) may differ from the reality. Unfortunately, if the public wait until they see embers or flames, it may be too late to commence a safe evacuation.

Further unravelling of the circumstances under which H participants believed it would be appropriate for them to 'wait and see' showed that, of the smaller subset who chose to wait at the initial stage of the wildfire scenario presented to them, most moved into an active state upon receipt of a second fire cue. However, while for some, this active state meant starting to take protective action, for others it meant actively seeking further information. Thus, although their passive waiting ceased, they still did not feel ready to commit to leaving or staying. So, it will be important in future research to ascertain what it is that residents need to know in such moments, similarly to McCaffrey et al. (2013) study but for more diverse geographies.

Of those who ceased waiting and commenced taking protective action, that action was usually to evacuate immediately. It is interesting that, for Group 3, leaving remained the response for the AUS participant and for several of the SoFR participants at stage D when the fire was now in the area, affecting their breathing and vision and making them feel unwell. Choosing to evacuate under such detrimental conditions would be risky behaviour. This illustrates that missing a chance to react to earlier wildfire information, e.g. seeing smoke, could lead to subsequent actions that endanger life. Thus, it would seem beneficial to take steps to improve risk awareness among residents, to help emphasise the necessity to take rapid decisive actions sufficiently early during the evolving incident.

While risk perception is thought to play a strong role in decision-making, it was not entirely the case in this study. On the one hand, perceiving higher risk prior to fire onset did not help

push H or AE participants' decision-making processes over the threshold that results in taking protective action, rather than waiting, upon receipt of initial fire cues. On the other hand, peri-event perceived risk did appear to play a role in decision-making, with a lower level of concern about injury to one's self, injury to others, and damage to property being associated with choosing to 'wait and see'. However, this was not uniform across the two study regions or the two survey samples, as SoFR-AE participants who waited perceived a lower risk across all three measures while AUS-AE participants who waited perceived only a lower risk of property damage. In contrast, SoFR-H participants' waiting appeared unrelated to peri-event perceived risk, while AUS-H participants' waiting was significantly associated with all measures. According to the theoretical framework provide by the PADM, peri-event risk perception is the product of multiple inputs, including those related to the fire, to the official emergency response, and to the resident's personal and contextual characteristics. Thus, it is perhaps unsurprising that its effects were not uniform.

Preparedness variables also did not show a uniform effect on participants' responses. In the initial analysis broken down by region and survey (section 3.3), no significant effect of having a plan was found. Having insurance was significantly associated with taking action rather than waiting, but only for the SoFR-AE sample. It could be that these participants in the French region who had insurance were more safety-minded individuals in general, i.e. ones who tended to be risk aware, who had thought about the consequences of hazardous events, and while perhaps not having formulated a fire plan, were nonetheless mentally prepared to be confronted with an emergency and thus reacted quickly. Alternatively, having appropriate insurance cover means that the financial cost of losing property is covered. As such, people's priorities could be less conflicted during a fire, and attention could be immediately turned to acting to protect self and family from harm. Therefore, insurance policies could have a part to

play in reducing the element of hesitancy in at-risk areas when residents find themselves under threat.

Still on preparedness, having thought ahead about one's evacuation destination was significantly associated with less waiting, but only in the AUS-H sample overall. There, more participants planned to go to a nearby town during evacuation rather than escape to closer locations such as a public hall in their own town. This result calls into question the rationale behind such a decision. Going to a place further away does require commencing evacuation quickly since it will entail being on the road for longer, which could come with risks. So, on the face of it, the association with less waiting seems comforting. However, the greater number choosing to evacuate to another town could also be due to a lack of knowledge of places within one's own community (e.g. a beach, a nearby lake or an approved fire-safe building), that would offer some degree of safety from the type of large fires seen historically in the country. Thus, this finding could also indicate a lack of community-wide education. Alternatively, the response could be based on a logical assumption that, in an event where one's own home is threatened, any other known closer location (such as a sports ground or local buildings even if made from robust materials) may also be more at risk, motivating the residents to choose a nearby town instead. Finally, it could perhaps be due to some participants preferring to shelter at their relatives' and friends' homes located further afield – a decision to a degree independent from the fire conditions and possibly more related to their personal circumstances.

When it comes to socio-demographic factors, there was no overlap between the two study regions or between the AE and H samples in terms of whether or how their responses related to these factors. The results may suggest that there could be both regional differences and other not-yet-known-but-important ways in which wildfire experiences shape diverse populations' responses. For example, for AUS-AE, none of the socio-demographic variables were related to 'wait and see' responses, while being middle-aged was relevant for AUS-H participants,

particularly Group 2 who encountered environmental cues only. This outcome could potentially indicate that there are segments of Australian communities, i.e. younger and older adults, who have not yet experienced a wildfire and who might be prone to reacting slowly, perhaps because they feel less able to make a critical decision or take action for themselves in a situation without any sign of support or involvement from authority figures. Therefore, interventions targeting different age groups could be formed more intentionally. For SoFR-AE, on the other hand, having pets/livestock was significantly associated with choosing to take action, as was having dependents, indicating the importance of livestock and dependents on evacuation decision-making (also reported in Kuligowski et al., 2020, McNeill et al., 2016), suggesting that those without animals or dependents may lack an obvious incentive to err on the side of caution and, consequently, take risks by delaying rather than leaving quickly. Interestingly, such an effect was not found in Australia, although it was reported by a study on the Australian population by Strahan et al. (2019). This potentially indicates that there are segments of the French population who will need stronger evidence to give them more certainty that protective actions such as evacuation are appropriate and beneficial.

Overall, regional differences were observed; as mentioned, SoFR participants chose to 'wait and see' more often than AUS participants. The latter participants' more decisive behaviour was likely influenced in part by an awareness of the tragic 2009 Black Saturday bushfires – an event of a magnitude that France has not experienced this century, and so the SoFR population would likely have less media exposure to information regarding the negative effects of 'wait and see' responses. Nonetheless, it is also likely that future research may find differences between countries in Europe, for example between countries that have experienced recent wildfire events resulting in large loss of life and property (e.g. Greece) and those that have not (e.g. Germany). It was also hypothesised that regional differences would be due to wildfire policies, with a communicated preference against waiting and for early evacuation in

Australia versus a clear preference for passive sheltering in France with not much guidance publicly available about evacuation other than to be vigilant for instruction from the authorities. However, further differences were detected between AE and H participants, showing that deeper disparities in responses exist between the two regions. Moreover, the reasons for waiting provided by the H participants in SoFR and AUS were not as in line with the policy hypothesis as expected. That is, while a substantial proportion of SoFR-H participants confirmed that they would not know what to do (indicating reliance on the authorities' instruction), more thought they would have time to wait before making a decision. Conversely, while a substantial proportion of AUS-H participants confirmed that they thought they would have time to wait (indicating a belief that they would receive early warning of a fire), more reported that they had another, unspecified reason for waiting (see e.g. McLennan & Elliott, 2013). It is not known to what extent policy influences 'wait and see' decision, as it may be largely due to individual subjective interpretation. Thus, future studies should explore this relationship.

The final part of this paper's analysis, logistic regression modelling, also found regional differences. That is, while a model containing the same variables was a significant fit for both regions' data, explained a similar amount of variance, and each time classified cases to a good degree of accuracy overall, it produced different significant predictors for SoFR and AUS. For the French region, when all variables were considered together, peri-event perceived risk of injury to others had the greatest influence on waiting. The other three significant predictors related to experience, dependents, and preparedness. A different preparedness variable was the sole significant predictor of waiting in the Autralian region when all variables were considered together.This further supports the argument that findings from wildfire research conducted in one part of the world cannot be wholly generalised to other parts. Nonetheless, it would appear that the general elements of the PADM can be used to build a model for 'wait and see'

responses as well as for other responses during a wildfire (see Kuligowski et al., 2022, for a similar logistic regression model predicting the decision to evacuate).

The findings of this study have implications for practitioners and policy makers. They call for their attention when designing effective communication during wildfire emergencies, highlighting a need to ensure instructions are clear about action to be taken, authoritative, and incentivising. They also call for attention when designing preparedness initiatives for wildfire events, especially in at-risk areas where populations may be largely inexperienced. Preparedness should focus on assisting residents to swiftly and correctly interpret environmental cues such as smoke, or identify physiological symptoms and their implications for the ability to carry out protective action safely. Residents should also be helped to identify safe refuges within their locality and alternate routes to reach the safe locations, which can be factored into fire plans. Additionally, more consideration should be given as to how to reach out to residents in their homes – not just residents deemed vulnerable, such as those living with young children or the elderly, but also those without dependents. Educational safety campaigns may be effective but need to capture interest and are likely to be conducted for a limited time. Thus, policy makers should seek to identify and collaborate with alternative information sources such as insurance companies – their marketing campaigns and policies are likely to be viewed by more people and more frequently when policies need renewing, and these could contain reminders about the benefits of wildfire preparedness.

The observed effects of environmental and social cues on ‘wait and see’ responses also have implications for urban-scale evacuation modelling, for several reasons. Firstly, the differences in the extent of waiting seen in France compared to Australia (and the USA) mean caution should be exercised when applying research findings to simulation models across geographies, even when the models are capable of simulating such environmental and social effects. Secondly, there is a potential for over-reliance on the effects of social cues in initiating

a protective action response, as it seems that some people will 'wait and see' under certain official and unofficial social cues. Thus, developers of evacuation models should consider the integration of hazard data within their models, to enable scenarios where evacuation is triggered by different progressing environmental cues in addition to social cues. Finally, for evacuation simulations to more accurately reflect reality, it is important to consider that response behaviour of individuals with experience of wildfires and those without may be different.

5. Limitations

Despite the proposed novel approach to understanding 'wait and see' responses in different world regions, and in populations with different levels of wildfire experience, some limitations need to be acknowledged.

Participant numbers, while overall sufficient for exploring behavioural responses to environmental and social cues, were lacking in size to be able to perform some further, inferential statistical analyses (e.g. whether AE participants' responses differed significantly when exposed to smoke versus embers versus flames, or statistically modelling the dynamics of H participants' responses during the fire's escalation). Moreover, since 'wait and see' was a free choice, not a response imposed on participants, it meant that certain parts of the analysis naturally had to deal with smaller or decreasing numbers of participants, and this must be borne in mind.

We also acknowledge the limitations that the proposed experimental design offers when using various scenarios in questionnaires. Only some cues combinations can be selected and explored, while in reality there would be more permutations that could influence decision-making. Thus, future studies with larger samples might investigate combinations involving different unofficial social cues with different environmental cues. Similarly, when

investigating actual experiences, although it was possible to capture some situational details, we were not able to access information about other aspects that could have influenced participants' behaviour (e.g. if participants lived in a topography that provided a view meaning smoke or fire was more visible earlier).

Finally, while peri-event perceived risk was found to be associated with participants' responses, one point must be noted: in contrast to the outcome, 'wait and see', which in the H survey was chosen across different scenario stages, the measurement of this risk perception in the H survey only occurred once, at the end of each scenario (i.e., only after the final stage). It was believed that the addition of further measures of perceived risk, after every stage, would have lengthened the H survey to the point where it might have become unwieldy for participants. Thus, future work should address the challenge of examining dynamic and multi-faceted risk perception in a way that does not threaten survey completion.

6. Conclusions

This study is the first to look at 'wait and see' responses in wildfire evacuation situations beyond North American and Australian contexts. It presented evidence that whilst waiting before evacuating is likely in a European region also, current regional differences in 'wait and see' responses exist. In SoFR, participants chose to 'wait and see' more often, confirming the urgent need to conduct further human behaviour research in European contexts. So, policy makers should commission and use local research. This will support evidence-based planning, which in turn should help authorities direct resources to where they may have the greatest effect in minimising waiting (e.g., improving their communications, improving residents' preparedness, etc.). While responses to social and environmental cues did not diverge substantially between experienced and inexperienced individuals, with those choosing to wait always in the minority, there were some experience-related differences that require further

attention. For example, waiting in response to seeing smoke was more prevalent among those who had actually experienced a recent wildfire. Logistic regression results also found a lack of experience to be a significant predictor of waiting for SoFR. Thus, it can be concluded that residents' as well as practitioners' assumption-led expectations of the effect of fire cues on behaviour need to be modified to reflect reality. Additionally, this points to the need for authorities to keep their population and fire incidence records up to date. These records should be analysed periodically to determine the current likely level of inexperience among the population. Educational safety campaigns and alternative outreach can be tailored and implemented accordingly, as discussed here. Furthermore, urban-scale evacuation modelling and simulation tools may be used to help policy makers and pracitioners with wildfire planning. This is a promising, growing area and thus this study's findings provide some direction for tool development. They also provide direction for end users, i.e. with the recommendation to use local and up-to-date data to populate the models, thereby facilitating simulation of more realistic scenarios.

The study also investigated triggers for ending 'wait and see' responses, which is an important aspect for disaster management. The participant numbers available for this part of the analysis do not allow a final judgement to be made about triggers. However, the findings did raise the possibility that environmental cues may compel more people to end waiting and enter an active state. Yet, they also suggested that the interpretation of environmental cues might not translate into choosing appropriate action. If replicated with larger samples, these findings could have multiple ramifications, including an increased need for medical support due to smoke exposure, an increased need for fire and rescue services to enter hazardous areas to assist evacuation, and consequently an increased demand on emergency service resources, the availability of which may be over-estimated by residents. This is one of the reasons why conducting research with people at risk of experiencing wildfires is so essential.

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Declaration of interest

Authors have no competing interests to declare.

References

2009 Victorian Bushfires Commission (2010). Final Report.

AIDR, 2018. Public Information and Warnings, Handbook 16.

Brennan, P. (2000). Modelling cue recognition and pre-evacuation response. *Fire Safety Science*, 6, pp. 1029–1040. https://doi.org/10.3801/IAFSS.FSS.6-1029

Cal Fire (2019). Prepare for wildfire [online]. Available at: https://www.readyforwildfire.org/prepare-for-wildfire/get-set/wildfire-action-plan/ [Accessed 08 March 2020].

Canter, D., V. (1996). An overview of behaviour in fires. In: Psychology in Action. Dartmouth benchmark series. Dartmouth publishing company, Hantshire, UK, pp. 159-188. ISBN 1855213656

Capote, J. A., Alvear, D., Abreu, O., Cuesta, A., & Hernando, J. (2012). Children evacuation: empirical data and egress modelling. In Fifth International Symposium on Human Behaviour in Fire.

Cardoso Castro Rego, F. M., Moreno Rodriguez, J. M., Vallejo Calzada, V. R., & Xanthopoulos, G. (2018). Sparking firesmart policies in the EU. https://doi.org/10.2777/248004

Chan, B., Middleton, J. (2019). More than 30,000 tourists in Australia who defied orders to leave area east of Melbourne amid raging bushfires are 'trapped' as roads are cut off, after; locals warned staying would be 'suicide'. *Daily Mail Australia, Mailonline, and AFP* [online]. Available at https://www.dailymail.co.uk/news/article-7835431/Tourists-REFUSE-evacuate-Australian-wine-region-bushfires-cut-road-out.html [Accessed 01 June 2020].

Country Fire Authority (2020). How fire behaves [online]. Available at: https://www.cfa.vic.gov.au/plan-prepare/how-fire-behaves [Accessed 01 June 2020].

Cova, T.J., Dennison, P.E., Li, D., Drews, F.A., Siebeneck, L.K. and Lindell, M.K. (2016). Warning triggers in environmental hazards: who should be warned to do what and when? *Risk Analysis*, 37, pp. 601-611. doi:10.1111/risa.12651

Day, R.C., Hulse, L.M., Galea E.R., (2013). Response phase behaviours and response time predictors of the 9/11 World Trade Center evacuation, *Fire Technology*, *49*, pp. 657–678. http://dx.doi.org/10.1007/s10694-012-0282-9

DDRM (2015). Le dossier départemental sur les risques majeurs [online]. Available at:

http://www.haute-corse.gouv.fr/dossier-departemental-des-risques-majeursa1536.html [Accessed 01 June 2020].

DICRIM (2017). Le document d'information communal sur les risques majeurs [online]. Available at: http://www.corse.developpement-durable.gouv.fr/le-document-dinformation-communalsur- les-risques-a320.html [Accessed 01 June 2020].

Emergency Management Victoria (2016). Victorian Bushfire Handbook.

Folk, L. H., Kuligowski, E. D., Gwynne, S. M. V, & Gales, J. A. (2019). A provisional conceptual model of human behavior in response to wildland-urban interface fires. *Fire Technology*, *55*, pp. 1619–1647. https://doi.org/10.1007/s10694-019-00821-z

Galea, E., Deere, S., Sharp, G., Filippidis, L., & Hulse, L. (2010). Investigating the impact of culture on evacuation behaviour. In Proceedings of the 12th International Fire Science & Engineering Conference, Interflam 2010, 1, pp. 879–892. Retrieved from http://gala.gre.ac.uk/3994/

Gouvernement.fr (n.d.). R!Sques, prévention des risques majeurs [online]. Available at: https://www.gouvernement.fr/risques/feux-de-forets [Accessed 01 June 2020].

Gustafson, P. E. (1998). Gender differences in risk perception: theoretical and methodological perspectives. Risk Analysis : An Official Publication of the Society for Risk Analysis, 18(6), 805–811. https://doi.org/10.1111/j.1539-6924.1998.tb01123.x

Handmer, J., & O'Neill, S. (2016). Examining bushfire policy in action: Preparedness and behaviour in the 2009 Black Saturday fires. *Environmental Science and Policy*, 63, pp. 55-62. https://doi.org/10.1016/j.envsci.2016.05.011

Hitchcock, J., L. (2001). Gender Differences in Risk Perception: Broadening the Contexts. *Risk: Health and Safety Environment, 12*(3), pp. 179-204.

Hollingsworth, J. (2021). First came Covid lockdown. Now a bushfire is forcing these Australians to evacuate. *CNN* [online]. Available at: https://edition.cnn.com/2021/02/03/australia/perth-evacuation-fires-intl-hnk/index.html [Accessed 30.08.2021].

Hudson, B., Hunter, D., Peckham, S. (2019) Policy failure and the policy-implementation gap: can policy support programs help?, Policy Design and Practice, 2:1, 1-14, DOI: 10.1080/25741292.2018.1540378

Johnson, P. F., Johnson, C. E., & Sutherland, C. (2012). Stay or Go? Human behavior and decision making in bushfires and other emergencies. *Fire Technology*, 48(1), pp. 137–153. https://doi.org/10.1007/s10694-011-0213-1

Kinateder, M. T., Kuligowski, E. D., Reneke, P. a, & Peacock, R. D. (2015). Risk perception in fire evacuation behavior revisited: definitions, related concepts, and empirical evidence. *Fire Science Reviews*, 4(1). https://doi.org/10.1186/s40038-014-0005-z

Knuth, D., Kehl, D., Galea, E., Hulse, L., Sans, J., Vallès, L., … Schmidt, S. (2014). BeSeCu-S – a self-report instrument for emergency survivors. *Journal of Risk Research*, 17(5), pp. 601–620. https://doi.org/10.1080/13669877.2013.815649

Kuligowski, E. (2020). Evacuation decision-making and behavior in wildfires: Past research, current challenges and a future research agenda. *Fire Safety Journal*, 120, 103129, https://doi.org/10.1016/j.firesaf.2020.103129

Kuligowski, E.D., Zhao, X., Lovreglio, R., Xu, N., Yang, K., Westbury, A., Nilsson, D., & Brown, N. (2022). Modeling evacuation decisions in the 2019 Kincade fire in California. *Safety Science*, 146, 105541. https://doi.org/10.1016/j.ssci.2021.105541

Lindell, M. K., & Perry, R. W. (2012). The Protective Action Decision Model: Theoretical Modifications and Additional Evidence. *Risk Analysis*, 32(4), pp. 616–632. https://doi.org/10.1111/j.1539-6924.2011.01647.x

Lindell, M. K., Prater, C. S., Gregg, C. E., Apatu, E. J. I., Huang, S. K., & Wu, H. C. (2015). Households' immediate Responses to the 2009 American Samoa Earthquake and Tsunami. *International Journal of Disaster Risk Reduction*, 12, pp. 328–340. https://doi.org/10.1016/j.ijdrr.2015.03.003

Lovreglio, R., Kuligowski, E., Gwynne, S., & Strahan, K. (2019). A modelling framework for householder decision-making for wildfire emergencies. *International Journal of Disaster Risk Reduction*, 41, 101274. https://doi.org/10.1016/j.ijdrr.2019.101274

Lovreglio, R., Kuligowski, E., Walpole, E., Link, E., & Gwynne, S. (2020). Calibrating the Wildfire Decision Model using hybrid choice modelling. *International Journal of Disaster Risk Reduction*, 50, 101770. https://doi.org/10.1016/j.ijdrr.2020.101770

McCaffrey, S. M., Wilson, R., & Konar, A. (2018). Should I stay or should I go now? Or should I wait and see? Influences on wildfire evacuation decisions. *Risk Analysis*, 38(7), pp. 1390–1404. https://doi.org/10.1111/risa.12944

McCaffrey, S. M., Velez Knox, A., Briefel, J. A. (2013). Differences in Information Needs for Wildfire Evacuees and Non-Evacuees. *International Journal of Mass Emergencies and Disasters*, March 2013, Vol. 31, No. 1, pp. 4–24.

McLennan, J., & Elliott, G. (2013). “Wait and See”: The Elephant in the Community Bushfire Safety Room? Proceedings of Bushfire CRC & AFAC 2012 Conference Research Forum, (August 2012), 1–184. Retrieved from http://www.bushfirecrc.com/sites/default/files/managed/resource/2012_research_forum_proceedings_final_0.pdf#page=135

McNeill, I., Dunlop, P., Skinner, T., & Morrison, D. (2014). Information processing under stress: community reactions. Final project report. Bushfire CRC.

McNeill, I. M., Dunlop, P. D., Skinner, T. C., & Morrison, D. L. (2016). A value- and expectancy-based approach to understanding residents’ intended response to a wildfire threat. *International Journal of Wildland Fire*, 25(4), pp. 378–389. https://doi.org/10.1071/WF15051

Ministère de la Transition écologique (2020). Feux de forêt : préservons la végétation face aux incendies [online]. Available at: https://www.ecologie.gouv.fr/campagne-feux-forets

Molina-Terrén, D. M., Xanthopoulos, G., Diakakis, M., Ribeiro, L., Caballero, D., Delogu, G. M., Viegas, D. X., Silva, C. A., Cardil, A. (2019). Analysis of forest fire fatalities in Southern Europe: Spain, Portugal, Greece and Sardinia (Italy). *International Journal of Wildland Fire,* 28(2), 85. https://doi.org/10.1071/wf18004

Mozumder, P., Raheem, N., Talberth, J., & Berrens, R. P. (2008). Investigating intended evacuation from wildfires in the wildland-urban interface: Application of a bivariate probit model. *Forest Policy and Economics*, 10(6), pp. 415–423. https://doi.org/10.1016/j.forpol.2008.02.002

NFPA (n.d.). National Fire Protection Association. Preparing homes for wildfire [online]. Available at: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire [Accessed 08 March 2020].

Paveglio, T., Prato, T., Dalenberg, D., & Venn, T. (2014). Understanding evacuation preferences and wildfire mitigations among Northwest Montana residents. *International Journal of Wildland Fire*, 23(3), pp. 435–444. https://doi.org/10.1071/WF13057

Petrolia, D. R., & Bhattacharjee, S. (2010). Why don't coastal residents choose to evacuate for hurricanes? *Coastal Management*, 38(2), pp. 97–112. https://doi.org/10.1080/08920751003605365

Prevention Incendie Foret (2018). Débroussaillement — Le Guide Complet : conseils et règlementation [online]. Available at: http://www.prevention-incendie-foret.com/connaitre-les-regles/debroussaillement [Accessed 08 March 2020].

Ready (2020). Wildfires [online]. Available at: ready.gov/wildfires

Reneke, P. (2013). Evacuation Decision Model. NIST, NISTIR 7914. https://doi.org/10.6028/NIST.IR.7914

Read, P., Dennis, R. (2020). With costs approaching $100 billion, the fires are Australia's costliest natural disaster. *The Conversation* [online]. Available at: https://theconversation.com/with-costs-approaching-100-billion-the-fires-are-australias-costliest-natural-disaster-129433 [Accessed 08 March 2020].

Redfearn, G. (2020). Canberra experiences worst air quality on record as bushfire smoke from south coast sets in.

https://www.theguardian.com/environment/2020/jan/01/canberra-experiences-worst-air-quality-on-record-as-south-coast-bushfires-rage

Richards, Brew, Smith, (2020). 2019–20 Australian bushfires—frequently asked questions: a quick guide https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1920/Quick_Guides/AustralianBushfires

Salzman, C. D., & Fusi, S. (2010). Emotion, cognition, and mental state representation in Amygdala and Prefrontal Cortex. *Annual Review of Neuroscience*, 33, pp. 173–202. https://doi.org/10.1146/annurev.neuro.051508.135256.Emotion

SFPE (2019). SFPE Guide to Human Behavior in Fire.

Smith, H. (2021). Firefighters battling wildfires to save homes on Greek island of Evia. *The Guardian* [online]. Available at: https://www.theguardian.com/world/2021/aug/10/firefighters-battling-wildfires-to-save-homes-on-greek-island-of-evia?fbclid=IwAR3SOT4mR4LcGkTw_S51QaQilWJZt6Sci8CF96ih60uA0n5q3hKmNtAQ9ME [Accessed: 16 November 2021].

Strahan, K. (2020). An archetypal perspective on householders who 'wait and see' during a bushfire. *Progress in Disaster Science*, *x*(x), pp. 2590-0617. http://dx.doi.org/10.1016/j.pdisas.2020.100107

Strahan, K. W., Whittaker, J., Handmer, J. (2019). Predicting self-evacuation in Australian bushfire. *Environmental Hazards*, Volume 18, 2, pp. 146-172.

Vaiciulyte, S., Galea, E. R., Veeraswamy, A., & Hulse, L. M. (2019). Island vulnerability and resilience to wildfires: A case study of Corsica. *International Journal of Disaster Risk Reduction*, 40. https://doi.org/10.1016/j.ijdrr.2019.101272

Vaiciulyte, S. (2021). When disaster strikes: Human responses to wildfires and evacuation in the South of France and Australia. Doctoral Dissertation, University of Greenwich, London, UK.

Veeraswamy, A., Galea, E.R., Filippidis, L., Lawrence, P.J., Haasanen, S., Gazzard, R.J., Smith, T.E.L., 2018. The simulation of urban-scale evacuation scenarios with application to the Swinley forest fire. Safe. Sci. 102 (July 201*7), 178–193. https:// doi.org/10.1016/j.ssci.2017.07.015.

Vidgen, B., Yasser, T (2016). P-Values: Misunderstood and Misused, Frontiers in Physics, 04 March 2016, https://doi.org/10.3389/fphy.2016.00006

Wahlqvist, J., Ronchi, E., Gwynne, S. M. V., Kinateder, M., Rein, G., Mitchell, H., Bénichou, N., Ma, C., Kimball, A., Kuligowski, E. (2021). The simulation of wildland-urban interface fire evacuation: The WUI-NITY platform, Safety Science, Volume 136, 105145, ISSN 0925-7535, https://doi.org/10.1016/j.ssci.2020.105145.

Whittaker, J., Eriksen, C., & Haynes, K. (2016). Gendered responses to the 2009 Black Saturday bushfires in Victoria, Australia. *Geographical Research*, 54(2), pp. 203–215. https://doi.org/10.1111/1745-5871.12162

Wood, M.M., Mileti, D.S., Bean, H., Liu, B.F., Sutton, J., & Madden, S. (2018). Milling and public warnings. *Environment and Behavior*, 50(5), pp. 535-566. https://doi.org/10.1177/0013916517709561

Xie, X., Wang, M., Zhang, R., Li, J., & Yu, Q. (2011). The role of emotions in risk communication. *Risk Analysis*, 31(3), pp. 450–465. https://doi.org/10.1111/j.1539-6924.2010.01530.x