NON-FATAL FIRE RELATED INJURIES:

THE LIVED EXPERIENCES OF THOSE WHO HAVE BEEN INVOLVED IN A HOUSE FIRE EVENT

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Non-Fatal Fire Related Injuries:

The lived experiences of those who have been involved in a house fire event.

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List of abbreviations used.

ACC – Accident Compensation Corporation

Fire and Emergency – Fire and Emergency New Zealand

NFFRI – Non-fatal fire-related injury

UDF – Unintentional dwelling fire

UK – United Kingdom

1. Executive Summary

This report presents the findings of a qualitative study utilising data from telephone and face-to-face interviews to provide insights into the experiences, motivations and actions among survivors of unintentional residential dwelling fires (UDF). Semi-structured interviews were conducted with 31 individuals who experienced a UDF, including 12 who were injured as a result of the fire and eight who did not contact Fire and Emergency New Zealand (hereafter referred to as Fire and Emergency).

There is little previous research to inform a detailed understanding of human behaviour in unintentional single/family occupant dwelling fires. This study provides a qualitative evidence base to support Fire and Emergency in the development and evaluation of national and local community fire safety strategies, education programmes and messaging to mitigate the risk of injury in UDF.

Preliminary findings indicate that despite a diverse range of fire experiences canvased during interviews, the experiences, motivations and actions of both the injured and uninjured survivors of an UDF are broadly similar.

A phased behaviour process was observed with a continuum of responses and actions occurring with common underlying motivations. Survivors balanced the risk of injury with quick actions to reduce a real, or perceived, risk of harm to self/other or to property.

All survivors interviewed undertook a rapid initial risk assessment which took into consideration the fire cues, particularly the size of the fire, and existing fire safety knowledge. There were distinct differences in what fire circumstances were viewed as dangerous by individuals during the initial risk assessment.

A situational decision and response were made. This was informed by fire safety knowledge and perceived risk of injury, and weighed against an urgent need, or strong desire to act quickly to minimise potential harm to self/other or to property. A divergence in actions and motivations was observed in terms of this situational decision-making process, falling into two broad areas of action: evacuating the dwelling; or attempting to extinguish the UDF. Each area was associated with a continuum of behaviours, with many initial decisions either reconsidered once initial attempts at extinguishing fires failed, or to meet immediate necessary needs prior to, or after, evacuation.

Injury occurred via one of two pathways on this continuum: 1) direct interaction with fire in combination with a reactive response; or 2) during re-entry to a UDF in the face of strong fire or smoke cues. Other behavioural pathways to non-fatal fire-related injury (NFFRI) may be possible but were not revealed in the current study.

There is clear evidence that many of the actions reported by survivors are contradictory to the prevailing fire safety advice administered by Fire and Emergency. Actions such as attempts to extinguish UDFs, movement through fire and smoke, re-entry into the UDF and risk taking despite strong fire and smoke cues overrode existing fire safety knowledge. These actions suggest that under-estimation of risks of NFFRI in UDF was common among those interviewed. Those who did adhere to fire safety advice, such as the “Get out Stay out” messaging, were strongly influenced by fire safety knowledge, experiences and training.

Fire and Emergency has a stated aim of “reducing the consequences from emergencies” through “reductions in harm from fire”. The following outlined strategies and recommendations, if implemented, will contribute to reductions in NFFRI and better organisational understanding of real

world experiences of survivors of UDF.

Recommendation 1: That Fire and Emergency continue to sponsor and develop fire safety campaigns and messaging which focuses on the primary prevention of fires in residential dwellings.

Recommendation 2: That in addition to the primary prevention measures above, Fire and Emergency consider reviewing and re-developing fire safety campaigns, messaging and strategies such that they reflect the lived experiences of survivors of UDF.

Recommendation 3: That Fire and Emergency continue and expand collaborative relationships with community groups and workplaces to provide fire safety training and knowledge, with a view to increasing overall levels of fire safety knowledge in the general public.

Recommendation 4: That Fire and Emergency, alongside other heath and emergency service agencies and services, provide public advice on the importance of timely and appropriate treatment of fire-related burns in order to minimise the severity of the NFFRI.

Recommendation 5: That Fire and Emergency, alongside other emergency agencies and services, consider how they can mitigate the disruptive aftermath of UDF on survivors' lives.

Recommendation 6: That Fire and Emergency purposely collect and analyse qualitative and quantitative data from Fire and Emergency attended UDF on survivor experiences, motivations and actions.

2. Purpose

This report was commissioned by Fire and Emergency New Zealand to understand opportunities to address non-fatal fire-related injuries in New Zealand. The findings expand a previous qualitative examination of unintentional domestic non-fatal fire-related injuries undertaken in Kent, United Kingdom, involving 10 injured survivors of dwelling fires.

The aim of this research was to accurately inform directions for unintentional non-fatal fire-related injury (NFFRI) prevention efforts by using data derived from personal interviews to identify the experiences, motivation and actions related to these injuries. This information will be used by Fire and Emergency to effectively prioritise and target preventive action to reduce NFFRI through community fire safety strategy and prevention programmes.

This research involved in-depth individual interviews with those who have lived experience of fire-related injury sustained in a household fire event to address the following research question:

Research Question: What are the lived experiences, motivations and actions of those sustaining a NFFRI during a household fire event and how do these differ from those not injured in similar household fire events?

3. Acknowledgements

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The study was considered and approved by the University of Otago Ethics Committee and the ACC Research Ethics Committee.

The research was funded by the Fire and Emergency New Zealand Research Fund.

4. Background

4.1 Introduction

This section describes existing scientific evidence regarding the experiences, motivations and actions of people during an unintentional residential dwelling fire (UDF).

Injuries sustained as a consequence of UDF are associated with considerable suffering for individuals and place a significant burden on the healthcare system. Recent New Zealand research on unintentional NFFRI sustained in residential settings found that for the 5-year period 2013-2017, NFFRI was responsible for 10,368 Accident Compensation Corporation (ACC) claims, 2,257 hospital discharges and 1,716 Fire and Emergency attendances (Lilley, Richardson & Davie, 2019). NFFRI was most frequent in males, and those of European ethnicity, while populations with high rates of NFFRI, and are therefore are over-represented, included males, individuals aged between 20-29 years of age, and among those who were of Māori ethnicity (Lilley, Richardson & Davie, 2019). Of people with NFFRI admitted to hospital, the average hospital stay was six nights, with a further one in five patients readmitted to hospital at least once in the following 12 months. At least 12% of admitted cases present with fire-related injuries that are a serious threat to life and require substantial ongoing treatment. Due to the quality of the data, it was not possible to determine the level of overlap in NFFRI information recorded by ACC, the Ministry of Health, and Fire and Emergency. Previous research also reported difficulties in establishing links between New Zealand Fire Service (later becoming Fire and Emergency New Zealand) and hospital admission data (Duncanson et al., 2002).

In the United Kingdom (UK), residential dwelling fires are the dominant setting of fire-related injury, both fatal and non-fatal (Hulse et al., 2020). A recent examination of UDFs occurring in the UK reported that while the incidence of UDFs is decreasing over time, once a UDF occurs the chance of it causing an injury has remained unaltered over time. While UDFs comprise 10-20% of all fires in the UK, they account for 66-71% of all fire-related deaths and 58-69% of all NFFRI. Similar figures are not available for New Zealand, however, 55% of fire incidents resulting in a hospital admission and 74% of fire-related medical treatment claims have previously been attributed to domestic fires (Lilley, Richardson & Davie, 2019; Duncanson et al., 2002).

Given the important contribution of fires in residential settings to the burden of fire-related injuries it is important to understand human behaviours within these settings in the event of a fire. Current paradigms of human behaviour in fires include human interactions with fires, either through inadvertent acts, omissions or carelessness in the ignition of the fire, or subsequently in interactions with the fire in attempts to contain the damage or extinguish the fire (Brennan & Thomas, 2001). New Zealand specific research has been limited to examining interactions with fires in the case of fire fatalities (Heimdall Consulting Ltd, 2005). A recent review of the literature on human behaviour in dwelling fires by Thompson et al., (2018) pointed to differences in the motivations and actions in those who sustain non-fatal injuries in fires compared with those who are fatally injured, with more research recommended to understand human fire behaviour in residential dwellings.

Little international or national research has investigated the experiences, motivations and actions of those involved in UDF to support professional fire services to develop their fire and rescue training, or community fire safety education activities. Instead, research has tended to focus on patterns of

behaviour among people exposed to fires outside a domestic setting in public, commercial, and industrial spaces (Galea et al., 2012; Zhao et al., 2009; Thompson et al., 2018). However, behaviours in these contexts are unlikely to be transferable to those enacted by people involved in UDF, where the circumstances and influences on behaviour greatly differ. Such influences may include social influences such as the presence of family members, friends, and pets; familial or household roles or responsibilities; ownership of the building and its contents; familiarity with the building and layout; as well as issues related to what is described as "a sense of shame and embarrassment" regarding the participants role in causing the fire or responses to the fire, or even a sense of "over-reaction" in calling in professional fire services (Wales & Thompson, 2013, Thompson & Wales, 2015).

4.2 Studies examining behavioural responses in dwelling fires

4.2.1 Theories based on commercial, industrial or other public fire settings

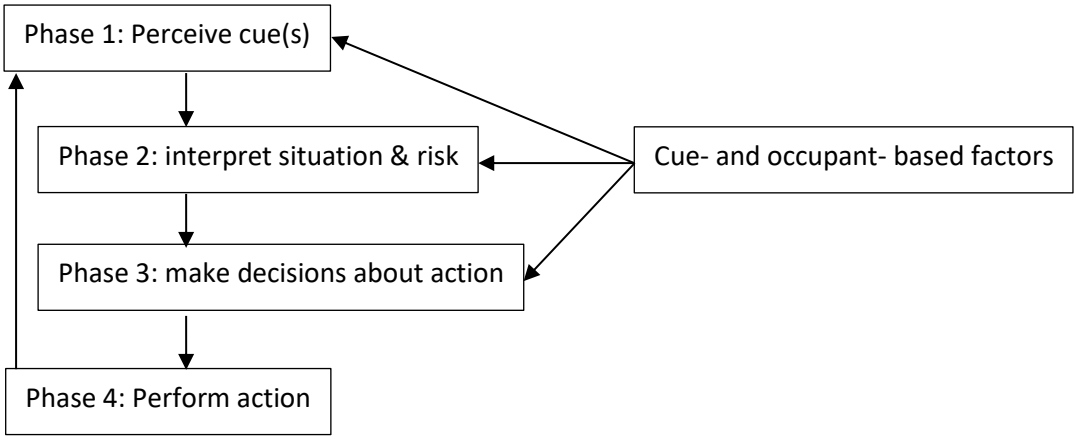
Early work conducted in the 1970s (Wood, 1972, Bryan, 1977) identified key aspects of human behaviour in fires, however, this research didn't differentiate between fire settings (Thompson et al., 2018). These studies found evidence of attempts to extinguish or contain fires, movement through smoke, and re-entry into burning dwellings. Gender based differences in these behaviours were observed, with males more likely to display fire-fighting behaviours and females more likely to warn others before exiting a building (Thompson et al., 2018). These differences have been observed in other fire settings and are likely to be driven by role and cultural expectations. (Bryan, 2002)

Much research following this period has examined human behaviours associated with fire ignition from inadvertent acts, carelessness or omissions, while the understanding of human behaviour in fire incidents is predominantly based on research from commercial, industrial or other public building settings (Thompson et al., 2018).

A recent model, established by Kuligowski, describes a phased behaviour process of an occupant's response to a building fire (Figure 1) (Kuligowski, 2009). Each action is considered specific to the occupants in the building, the building itself and the fire event, although the model identifies commonalities in this process. In the first perceptions phase of the process, building occupants perceive or receive environmental, physical (e.g. flames, smoke, heat, or debris) and social cues (e.g. hearing discussion, seeing others' inaction, or receiving phone calls from outside of the building). Occupants can additionally perceive more complex conditions and states, including perceived uncertainty, information overload, time pressure, and even their own thoughts or memories from a previous event. In the second interpretation phase, the occupant attempts to interpret the information provided by the cues perceived during the perception phase. During this phase, occupants interpret or define both the situation and the risk to themselves and/or to others. The third decision-making phase, involves occupants making decisions on what to do next based on their interpretations of the situations and risks. And, finally, in Phase Four of the behavioural process, occupants may perform the action that they decided upon in the decision-making phase.

Kuligowski's model, while able to describe a behavioural process of an occupant's response to a building fire, is unable to distinguish any distinction between behaviours that lead to occupants sustaining injury in a UDF (Kuligowski, 2009).

Figure 1: Model of behaviour process of occupant response in a building fire (Kuligowski, 2009)



4.2.2 Theories based on unintentional single/family occupant dwelling fires

A limited amount of research has occurred on the experiences, motivations and actions of those who survive UDF and how these may lead to fire-related injury. It is argued that due to the complexity of human motivations and responses that it is an over simplification to apply knowledge generated from non-residential settings to single/family occupant dwelling fires (Thompson et al., 2018).

Contemporary understanding of human behaviour in UDF comes predominantly from the UK LIFEBID research team. The first stage of this applied research involved a pilot study examining the individual experiences of UDF. Ten qualitative interviews were conducted with injured individuals surviving a single/family UDF in Kent, United Kingdom (Thompson and Wales, 2013). The key findings included:

- Several participants desired early action to tackle or mitigate the effects of a fire.
- The majority of participants entered, or attempted to enter, the room of fire origin to investigate, tackle or mitigate the effects of the fire. This group held strong beliefs in the validity or appropriateness of such actions.
- Deliberate actions were undertaken during the fire; actions were rarely undertaken irrationally/ in panic.
- Rapid response to fire cues occurred without conscious consideration of what those cues may indicate.
- The decision to enter the room of fire origin to tackle or mitigate fire depending on fire size was a rapid decision, balancing the perceived risk of fire with the perceived importance of early intervention.
- Participants expressed universal surprise at speed of fire and smoke development.
- Behaviours contradicted established fire safety advice (e.g. Get out, stay out, call the fire service out messaging) of the United Kingdom Fire Service.

While this study provides important insights into the experiences, motivations and actions of those injured in a UDF there are some limitations to this work. Namely the study findings have not been validated in other studies, or inform interpretation of findings, did not perform a formal qualitative

analysis, and the data is specific to the UK context. The degree to which the findings can be generalised to the New Zealand context is currently unclear. Similarly given the sample only examined injured survivors it is not understood how these experiences, motivations and actions may differ for those who do not sustain a NFFRI and for those who chose not to seek the help of professional fire services.

Further experimental evidence from this research team examined participant recall of the size of domestic kitchen fires presented in short videos and participants self-reported willingness to engage with the fire hazard (Hulse et al., 2020). A key finding of this experiment was that there was an observed reduction in the willingness to engage with a fire hazard with increasing size of the hazard such that large fire hazards are more likely to deter actions that would bring the occupant into closer proximity to the fire. Size of hazard, however, did not deter participants completely. Many reported that they would entertain the possibility of tackling the fire even when a large fire hazard was present. Prior fire experience and gender were reported to affect recollection and willingness, with males more often reporting a willingness to interact with hazard regardless of size. Such behaviours were concluded to contribute to or explain, in part, the likelihood of being injured in UDF (Hulse et al., 2020).

A subsequent quantitative study (LIFEBID) was conducted, informed by the data obtained in the qualitative semi-structured interviews. The LIFEBID study resulted in a database of survivors of UDF but to date this quantitative data has yet to be analysed in depth or published.

This body of evidence along with a recent literature review indicates that current fire safety advice strategies of what to do in the event of a residential dwelling fire are unlikely to be consistently followed by those who experience dwelling fires (Hulse et al., 2020). These findings support the need to look at human behaviour more closely to inform the evidence base for actions to minimise fire-related injuries and harm.

4.3 Summary

To date, while theories of human behaviour have been built using findings predominantly from commercial, and industrial only one qualitative study has specifically examined the lived experience of individuals who sustained a physical injury because of an UDF in single/family occupant dwellings (Wales & Thompson, 2013). Semi-structured interviews with 10 injured survivors in the UK demonstrated that most people attempted to tackle or mitigate the effects of the fire, and that they strongly believed these actions were valid and appropriate. While this study provides important insights into the experiences, motivations and actions of those injured in a UDF, there are some limitations to this work. The degree to which the findings can be generalised to the NZ population is currently unclear. Similarly, it is not understood how these experiences, motivations and actions may differ for those who do not sustain a NFFRI and for those who choose not to seek the help of professional fire services.

5. Methodology

5.1 Study design

A combination of face-to-face and telephone semi-structured individual interviews were conducted with survivors of an UDF to examine their experiences, motivations and actions in response to the fire.

5.2 Ethical considerations

Ethical approval was obtained from the: University of Otago Human Research Ethics Committee (Ref # 20/013), and ACC Research Ethics Committee for recruitment of an injured sample. Key considerations for this study was maintaining participant privacy and confidentiality of which all transcripts have assigned a study number and copies of interview audio materials shared with transcription services have been deleted once interview transcription was completed. This report has endeavoured to maintain the privacy of participants by using participant numbers and has obtained individual participant's consent to use their comments.

5.3 Data collection methodology

5.3.1 Inclusion/Exclusion criteria

People who had experienced a domestic dwelling fire event in the last 5 years were included in the study. A diverse range of participants whose fire experiences differed with respect to contacting Fire and Emergency and their experience of injury sustained in a UDF were sought.

Inclusion criteria

- People aged 18 years and over who have experienced an UDF event in the previous 5 years (exposed to smoke, fire or flame), with no upper age limit.
- For those experiencing an injury as a result of this fire event, injury will be defined as unintentional injury due to exposure to smoke, fire or flame. Therefore, an injury will be identified based on whether the person, at the time of the injury incident, was exposed to smoke, fire or flame and if the fire-event was unintentional.
- People with a range of injury types, including injuries that did not involve hospitalisation, were included.
- People who did not contact Fire and Emergency were also included.

Exclusion criteria

- People who had experienced unintentional fire events involving a fatality;
- Injuries due to intentional injury, such as assault, self-harm; and
- Injuries due to other external causes, such as road crashes or falls.

5.3.2 Identification of participants

Purposive sampling was used to ensure a broad representation of ages, genders, fire types, households, and geographical areas across participants.

Multiple recruitment avenues were utilised, including advertising in:

- community papers;
- social and health practices;
- community centres (e.g. libraries); and
- social media outlets.

Additionally, specifically to aid the recruitment of an injured sample, a letter of invitation was sent from the research team via ACC to a sample of 400 persons with a fire-related burn claim in the last 12 months.

Target areas were broadly national with community papers used in the Southland, Central Otago, Dunedin, Christchurch, Northland and Auckland areas.

5.3.3 Interview

Prior to the interview being conducted, written informed consent was collected from each participant, including permission to audio-record the interview (Appendix B). Recruitment continued until data saturation was reached (i.e. no new major themes emerging from interviews), with 31 participants recruited and interviewed. A minimum of 5 participants per group of interest (ie. injured and non-injured, attended and non-attended fires).

Data was collected between April and December 2020. Interviews ranged in length from 30 to 60 minutes. A $30 koha was provided to reimburse participants for their time. Interviews were digitally recorded and transcribed by an independent company with all material destroyed by the transcription service after returning completed transcripts.

Questions in the interviews were broad and open-ended to allow the participants to talk about aspects of their experiences of the fire event that were most important to them using a structured interview guide to ensure key topics of interest were fully explored with all participants. The interview guide (Appendix A) was developed following a review of the literature to identify key theories of human behaviour in response to residential fires (Kuligowski, 2009) and previous qualitative research (Wales & Thompson, 2013). Questions explored: how participants became aware of the fire, the actions they undertook and associated reasons, evacuation from and re-entry into the dwelling, opinions of their actions, and whether with hindsight they would do anything differently.

5.4 Data analysis

A grounded theory approach was utilised to generate an abstract theoretical explanation of a social process and to capture interconnected experiences, motivations and actions (Charmaz, 2014). The use of a grounded theory approach involves the development of hypothesis about a social behaviour so allows for the identification of potential points of intervention useful to inform strategic injury prevention directions. Inductive coding was used to inform a constructivist grounded theory focused on understanding how people construct meaning from UDF.

An inductive approach to analysis was taken whereby understanding and descriptions of phenomenon are generated from the data (Charmaz, 2014) (in contrast to deductive approaches that aim to provide support for existing theories). This approach was employed due to the limited research that has previously been conducted in this area, with no available work in the NZ context.

Furthermore, the only previous qualitative study examining human behaviour in response to dwelling fires among 10 individuals in the UK did not identify key themes from the data collected (Wales & Thompson, 2013).

Coding and analysing of qualitative data was additionally informed by the following questions:

- How do people respond and what are the motivations for these responses?
- What did people learn and what does this tell us about what people need to know to respond safely to fires?
- What aspects of the situation affected their behaviour? (e.g., size, potential danger)
- What aspects of knowledge impacted behaviour?

In line with grounded theory methodology data analysis began alongside continued data collection (Charmaz, 2014). The initial step of analysis involved reading over the initial 20 interview transcripts to become familiar with all the content. During the familiarisation process notes were made about the content of transcripts in relation to the research questions. Following this, sections of the interviews relevant to the research questions were coded using NVIVO 12. Nvivo is a qualitative analysis software that is used to organise and easily access particular codes. The initial coding focused on labelling portions of transcripts with code (short descriptions about the content of the text). An overview of these initial codes is included (see Appendix C). Following initial coding all sections of transcripts within each of the initial codes was collated and read over. The focus of this step was understanding the content of each code and the similarities and differences of the content within it alongside the similarities and differences of it from other codes. Following grounded theory methodology as more interviews were completed they were coded, and constant comparisons made to understand the content of this data and how it related to the other data. This included developing summaries of the different fire experiences and making notes and diagrams about how these cases were similar and different. Within these comparisons there was a specific focus on differences between those who were injured and those who were not. The constant comparative method led to the development of a theory about how people respond to house fires. Once this initial theory was developed codes and transcripts were re-read and the theory was refined to best explain all the data collected. The final iteration of this theory and analysis explaining it is presented below.

Quotes have been lightly edited to improve readability and interview numbers have been used to protect interviewee privacy.

6. Results

6.1 Participants

Thirty-one interviews were conducted between April and December 2020 and March and April 2021. Interviewing was disrupted by national and regional COVID-19 pandemic lockdowns between March and August 2020. Interviews from 31 participants from 28 individual UDFs were used in the following analysis, with the remaining interviews not fully meeting the inclusion criteria. The majority of interviews were conducted over the telephone or video calling and a smaller number (n=3) were conducted in person.

The sample characteristics, while not intended as representative, were broad: the majority of participants were female, of working age, identified as European, had adequate financial security and came from the Auckland and Northland region (Table 1).

Of the 31 participants interviewed eleven participants reported sustaining a NFFRI and eight reported non-attendance by Fire and Emergency. Injuries ranged from superficial burns requiring a visit to a General Practitioner or Emergency Department for healthcare, through to hospital admissions for smoke inhalation and/or burns treatment.

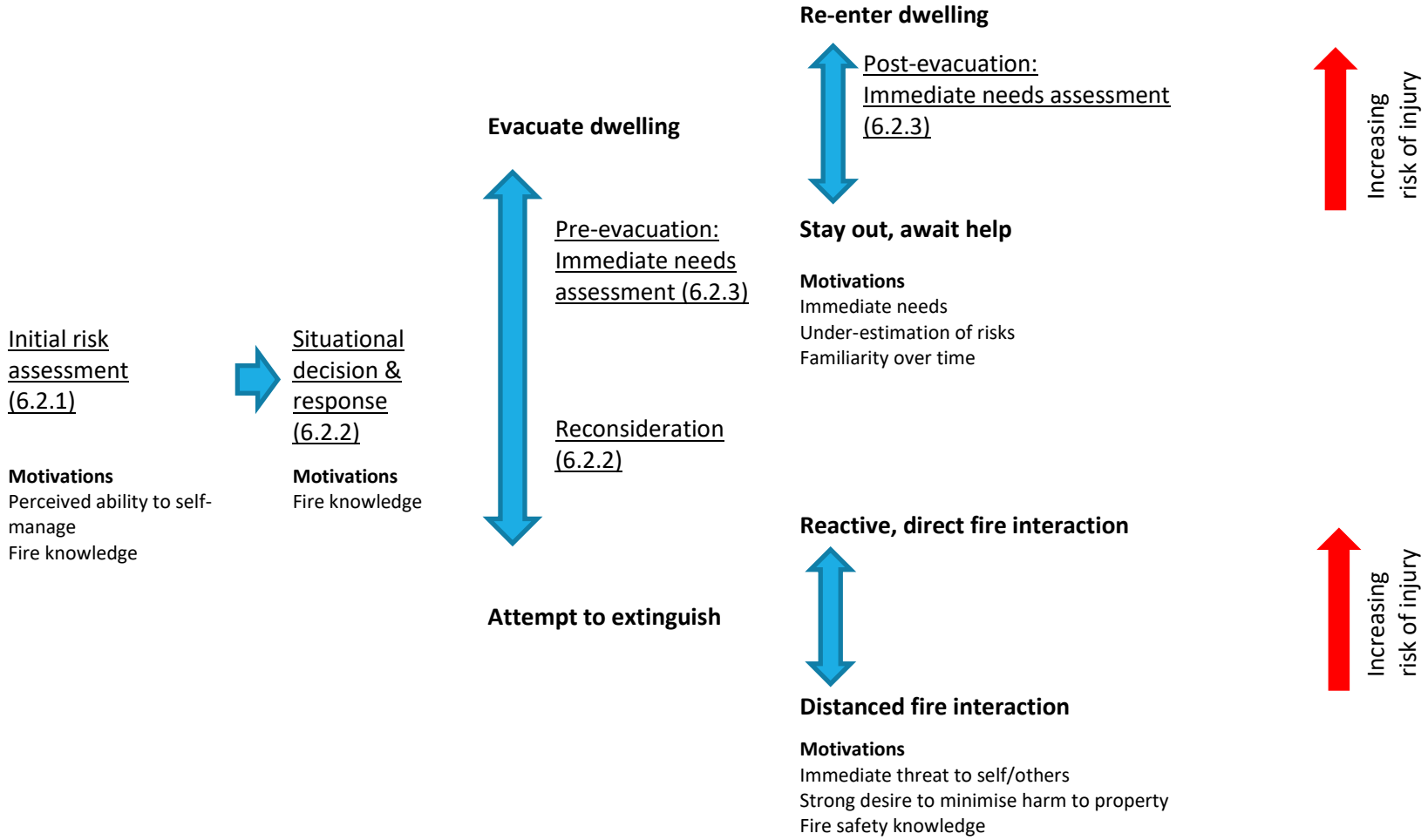
Table 1. Characteristics of participants in qualitative interviews

Characteristics	n (%)
Gender	
Male	11
Female	20
Age (years)	
<30	3
30-39	4
40-49	4
50-59	7
60-69	7
≥70	6
Ethnicity	
Other ethnicities	3
European	28
Financial security	
Not/just enough	6
Enough/more than enough	24
Region	
Otago & Southland	9
Canterbury	5
Other North Island	3
Auckland & Northland	14

6.2 Situational map

The interviews highlighted that despite the diverse range of fire circumstances, there were many experiences, motivations and actions in common following the discovery of fire or smoke cues in a UDF. Figure 2 outlines the preliminary situational map generated by grounded theory analysis. The following sections describe the experiences, motivations and actions associated with each element of this map.

Figure 2: Situational map: Understanding the common experiences, motivations and actions of injured and uninjured survivors of UDF.



6.2.1 Initial risk assessment

Summary. In response to discovering fire or smoke cues in a dwelling all participants made an initial risk assessment. Universally these initial risk assessments were made very rapidly and directly informed the next phase of the behaviour process. While the interview data clearly distinguished between an initial risk assessment and a later situation decision and response where a decision on an action is reached (see section 6.2.2), interviewee accounts indicated that these processes often happened in quick succession.

Factors that influenced participants initial risk assessments included:

- their existing level of knowledge about fires and fire safety;
- what they knew of their particular situation from the fire and smoke cues present; and
- the characteristics of the fire they faced, including any uncertainties with regard to fire knowledge and fire cues.

Specific factors that influence these initial risk assessments included the size and location of the fire. Smaller fires that had yet to spread from the initial seat of the fire (point of fire origin) or those fires where there was direct, or perceived, immediate threat to another person's safety, were often assessed as something that needed or could be managed immediately. Larger fires, well spread fires or fires with ambiguous smoke or fire cues, were assessed as situations beyond self- management, requiring Fire and Emergency to attend and manage.

These initial lay assessments led to one of two conclusions made by the interviewee that the fire was able or unable to be self-managed. In both cases the risk of injury to self/others played a role in this assessment.

Key findings

Rapid assessment of risk

Upon discovering fire or smoke cues all participants made a rapid assessment (with little pause for thought) about the risks the current situation posed of injury and their own ability to self-manage the fire based on those cues present. This assessment directly informed the interviewee's response to the fire. The main consideration raised in a participants risk assessment was their own perceptions of relative size of the fire, including size of the fire/flames or the level of smoke and the degree of spread of the fire, and their perceived ability to self-manage these circumstances. In cases where a person was on fire, the need to minimise harm to this person was paramount, over-riding other aspects of risk assessment. Other less common cues included noises, water from ceilings, neighbour contact and explosions which all elicited an investigation and rapid assessment of risk which was more confused that directly sighting fire or smoke.

Small fires were more likely to be assessed as situations to be self-managed

Participants were more likely to perceive they could manage the situation if the fire, flames or smoke cues were judged to be small or were contained to a small space or item. This group clearly balanced the risk of injury against an urgent need, or a strong desire, to act quickly to contain the fire while they felt they could.

I thought "OK, I can sort of try and clear this out now. It's not, like, a huge issue that I need to put out the fire". And then, after opening the oven, I can risk assess that I could deal with it myself. Um, sort of internal risk assessment, or sub-conscious risk assessment. (P23: uninjured, unattended fire)

Like it was small enough to […] you have to analyse everyone, every fire 'cause it would be terrible to walk away from a fire and the whole thing, then you could've put it out without too much trouble or danger to yourself or anyone else. I mean obviously people come first. (P5: uninjured, attended fire)

Nobody was hurt so I wasn't worried about that, and I could see that actually it was containable so we could sort it, once I'd checked out that it was wasn't, you know, roaring through the basement or something. (P5: uninjured, attended fire)

The key motivation for self-managing fires was predominantly a perceived need to reduce the immediate threat of injury to self/others, or to limit the potential spread of damage within the dwelling while it was still considered to be a manageable size.

*The first thing I did was put the fire out even before I woke up my wife or anything. I just made sure the fire was out properly before anything else and so yeah, I was only, we probably should have evacuated even though the fire was out until the fire people came or whatever but it's just, in that instance, it was a small fire. (*P4: uninjured, attended fire)

*Like I said if [the fire] was bigger I wouldn't have been able but it was not that big one. I want to help in a quick action so it was not too late. (*P25: injured, attended fire)

To me I could see the house, like the entire house burning. And as small as it was I was still thought yeah this thing's gonna reach all the parts and it's gonna go everywhere in the house. But was still time to just get rid of it. So I thought yeah, it's true, it's still small and I'll get rid of it before it touches everything else […] to protect the house protect everything we had in there. That was not my house. I was renting. (P28: injured, unattended fire)

Large fires were more likely to be assessed as presenting higher risk

Those participants that discovered large or more ominous fire cues, such as fires characterised by large volumes of smoke and large flames, rapidly assessed that self-management of the fire situation posed a personally unacceptable risk of injury to self/others. Subsequently, this was the prime motivation to evacuate the dwelling and seek the attendance of Fire and Emergency. In these circumstances participants were able to self-assess the risks knowing when a fire situation was beyond their level of knowledge, ability or willingness to engage with the fire.

They were too big a flame that I was like "oh my God I don't know what to do" so I just quickly rang 111. (P1: uninjured, attended fire)

I mean we had to get out there was nothing else that we could've done. It was hot and smoky and you know, there wasn't any really any alternative… it was too well started to do anything about it. (P10: uninjured, attended fire)

Cause there was smoke coming through the whole house by then, and I thought "no this is not a good idea", you know you need to get out. (P18: uninjured, attended fire)

It was too well started to do anything about it. (P3: uninjured, attended fire)

It wasn't like just a bit of smoke or flame and you go "oh shit, we need to find the fire extinguisher". It was like "we just need to get out of here". (P2: uninjured, attended fire)

Past knowledge, experiences and training informs assessment

In many fire situations canvased in this study an interviewee's past knowledge, experiences or training also influenced the assessment of risk. That knowledge can come from many sources alongside professional fire services, including early training from youth organisations, like Girl Guides, and from workplaces.

I think the rationale behind that is again, it looks like such a small fire, you can manage, you know, you can put it out but once my head clicked into thinking about the video that I'd seen which you've probably seen it, with the fire that starts on the couch is actually, A) it's rubber, it's really hard to put out; B) this is gonna escalate really quickly. (P7: uninjured, attended fire)

When I went to look into the basement, I didn't step into it, I got down on my hands and knees, and looked in. As I say, really fortunately the fire drill was fresh in my mind from the week before, so, I didn't actually go into the area where the smoke was. (P19: injured, attended fire)

[…] *at that stage which they're [workplace] not doing now, they did a really extensive orientation process which included a whole afternoon of fire stuff and a lot of it was managing a fire if there was a fire in the wards or within the hospital but a bit of it was actually about fires at home and I think because of that training that I had had, we had completely different outcomes than what we may have had and it's stuck with me my whole life.* (P7: uninjured, attended fire)

Some participants mentioned recalling common fire safety messages while making an initial assessment of the situation and in deciding whether to attempt to extinguish the fire. Interestingly one individual mulled over the relevancy of the fire safety message to the situation and was conflicted in adhering to that advice to the extent that they regretted not attempting to extinguish the fire themselves.

You just need to get out. And that's the message that we do get, you know, from the fire service. But I guess, you think, like you said "it's not going to happen to me" and "it's not that bad" – this is the thing that I was saying to myself [...] I, if I had, I don't know how fast the fire is but I wish I probably tried, like I wish I could've tried to put it out but I didn't know how bad it was […] I kind of regret not trying. (P14: uninjured, attended fire)

One participant recollected re-entering a UDF at least three times, during the last attempt recalling how thick smoke severely impaired their vision and orientation in the house, and reported some very minor smoke inhalation effects. This case illustrates that some experience with fire might lead to over-confidence in situations involving fire, increasing the risk of injury.

[My previous experience] may have helped me a wee bit, or it could've hindered me, that, being a rural area, we do a lot of burn-offs of shrubbery and that sort of thing, and I've done a lot of renovations and landscaping around our property, and I got rid of a lot of trees over the last, probably, 10 to 20 years. So, I've had a lot of bonfires. So, yeah, you sort of get appreciation of how to start a fire, and what fire can involve, and the heat involved in it too.

So, that could be positive, but it also could be a negative, I suppose, because you don't respect it as much. (P3: uninjured, attended fire)

Shock and distress affects assessment

A further factor reported by some participants was that the act of discovering fire or smoke cues induces a heightened state of shock, frozen responses and/or distress. The overwhelming nature of the situation impacts upon the initial assessment of risk for these participants.

Yeah, you're in shock. You don't know what to do, you're standing there like oh my God, oh my God what do I do? Oh crap. I was like, it's terrifying. (P1: uninjured, attended fire)

Because it's just sort of, everything goes out of your head, you know […] I'm quite the type of person who's very organised but I was disarrayed that night. (P24: uninjured, attended fire)

Some of it is really hard because you're not thinking rationally at the time. (P2: uninjured, attended fire)

6.2.2 Situational decision and response: Evacuate property or attempt to extinguish

Summary. Following the initial risk assessment participants used this information to make decisions that informed one of two broad courses of action.

Fires that were initially assessed as needing urgent self-management, or as able to be self-managed, lead to the decision to attempt to extinguish the fire. Fires that were assessed as unable to be self-managed, lead to the decision to evacuate the dwelling, and subsequently to contact Fire and Emergency, who were seen to be best placed to manage the situation. The key motivations of those who decided to attempt to extinguish a fire are the perceived urgency of the situation with regard to safety of self/others, a strong desire to act quickly to reduce property damage and/or their knowledge about effective ways to put out a fire. For those who decide to evacuate a dwelling the key motivation is to avoid injury or to seek professional help.

Some participants who made an initial risk assessment that led them to decide that they could extinguish, or control, the fire went through a stage of reconsideration where they realised they were not sure how to use a fire extinguisher, or that it would not be effective given the size or location of the fire. Once these participants reconsidered their ability to manage the situation they followed the actions of those who made this assessment earlier by evacuating the dwelling and calling Fire and Emergency.

Prior fire safety knowledge, experiences, training and preparation informed this phase. This was particularly evident with regard to safe, orderly evacuation of UDFs involving family groups.

Key findings

Decision to extinguish

Decisions to attempt to extinguish a fire involved two sets of circumstances, both with different motivations. The first involved circumstances where a person was on fire and so the fire posed an immediate danger to self/others. This response even though it wasn't well thought out at the time was considered a rational reaction by the person to concern for others safety and after the event it

was justified to minimise harm to self/others.

> *I know what to do when there is an emergency, because I did the whole course, like a short term course and I know what to do. But at that stage my wife is burning so I, [thought] nothing whatsoever, other than get the fire out.* (P25: injured, unattended fire)

The second involved the perceived ability of the interviewee to control the situation in order to minimise fire damage in situations where the fire was assessed to be manageable. In this situation participants justified their decision and response with a concern for the fire spreading within the dwelling and causing further damage.

> *What I tried to do is because I thought that the fire was going to come up with the ceiling.* (P28: injured, unattended fire)

> *I just, without thinking, I was like oh I need to put that [rug fire] out before it burns my [sleeping] wife and so I put it out with just my bare hand without thinking about it. (*P4: uninjured, unattended fire)

Reconsideration

Some participants, after initially assessing the circumstances of the current fire to be self-manageable, discovered that they did not have the skills or knowledge to successfully fight the fire. A lack of knowledge regarding how to safely use fire-fighting equipment, like a fire extinguisher, or how to safely access awkward locations were the most commonly raised motivations for participants to reconsider attempts to extinguish the fire. At this stage participants revoked their original decision and safely evacuated the dwelling.

> *Yeah my wife grabbed the fire extinguisher and then she looked at the fire and thought it [the extinguisher] wasn't gonna do anything.* (P21: uninjured, attended fire)

> *So I went to the kitchen because we had a small fire extinguisher, and I went to get the extinguisher, and I was struggling to use it. I couldn't quite figure out how to put it on. I wasn't panicking, I was thinking, I might need to squirt a little bit of stuff on it.* (P20: uninjured, attended fire)

> *Ran to get the fire extinguisher which we had and then got back to the bathroom and thought actually how do you put this out when it's, you know like I couldn't actually reach the ceiling or anything and then I remember having thoughts of oh do I get the ladder, the manhole's right there […] Well all I could think of is if I'm spraying above my head, it's gonna end up all over me and because it was going up and I could only see through the cracks of the heater, I didn't think any would end up all over the, you know, the light but it actually wouldn't end up on top of the fire unless I could get into the roof space which would've been really dumb probably. It did cross my mind though.* (P7: uninjured, attended fire)

Decision to evacuate house

Those who assess that they cannot manage the fire made the decision to evacuate the dwelling. Typically, these are fires that were assessed by the interviewee to be large, well spread or ambiguous in cause or origin. Subsequently a decision is made to contact Fire and Emergency, who were seen to be best placed to manage the situation. The key motivations for those who decide to evacuate the dwelling is to avoid injury or to seek professional help.

And we came running out of the house and I mean it was too well started to do anything about it so basically we ran out of the house. (P3: uninjured, attended fire)

Knowledge informs response

Aspects of fire knowledge and preparation played a distinct role in deciding the course of action at this phase. Participants mentioned how practicing fire drills contributed to a straight forward decision making process and a safe evacuation in fire circumstances, especially in those situations involving family groups.

Before the fire and then we did the same week of the fire, we did our fire drill, right so that ok, beep beep beep beep, fire alarm's going, how are you gonna get out of the house and you know, they scrambled out the windows and went down to the mail box. So we practiced that. (P7: uninjured, unattended fire)

And, so, my boy came home and said, "look, Dad, we have to do this, we have to have an escape plan for our house." And, so, unfortunately, that day (my wife) was at work, but I said, "OK, we'll do it with the rest of the family." So, we all, basically practised, I think it was about, maybe 2 or 3 times, we practised escaping different routes from the house. I think that had helped because the kids, (my wife) and I have talked about it quite a few times, that we're amazed how calm and collected the kids were. If anything, they were a lot calmer than us at the time. (P3: uninjured, unattended fire)

6.2.3 Immediate needs assessment

Summary. This phase focuses on interviewee's assessment of their immediate needs and if they have what is required to meet these. The assessment of immediate needs occurs either while in the process of evacuating (pre-evacuation) and/or after evacuation (post-evacuation). This response ranges from delaying evacuation from a UDF to re-entering the UDF, both with the purpose of retrieving necessary items. Common items considered worthy of this response, include: pets, cell phones (to call for assistance); clothes (to keep warm); and wallets and keys.

There are two main motivations to delay evacuation, or for re-entering a UDF: the first is an immediate need for something inside the dwelling which overrides the potential danger of the situation; while the second is a justification based on aspects of having gained a greater understanding of the extent of the fire from outside the dwelling and a reconsideration of the potential risks it poses.

Pre-evacuation assessment of immediate needs leads to delays in exiting the dwelling as important items are gathered from areas generally viewed by participants as unaffected by fire. Items may be specifically retrieved while the interviewee considers there is a window of opportunity to do so without any perceived increase in risk of injury or increased perceptions of safety in the knowledge of where the fire is currently situated. As this group has dealt with their immediate needs before exiting the house they do not tend to attempt re-entry. Other actions undertaken before evacuation may include actions to reduce the spread of fire to reduce property damage.

Post-evacuation assessment of immediate needs lead to re-entry into the UDF to retrieve necessary items, sometimes contained within parts of the dwelling with active fire involvement. Some participants reported being able to gain a better idea of the location of the actual fire once they

exited the house, subsequently feeling safe enough to re-enter the dwelling. Re-entry attempts can be thwarted by fast advancing smoke, fire and flames. Many participants who attempted re-entry expressed surprise at the speed of the development of the fire, putting themselves a higher risk of sustaining an injury. At this stage, some participants appear to genuinely put their lives at risk, ignoring strong smoke and fire cues, in attempts to rescue pets or to retrieve necessary items demonstrating many underestimated the risks posed by re-entry.

Key findings

Pre-evacuation

Following a decision to evacuate an UDF many participants undertook additional actions prior to evacuation. These were invariably considered essential tasks by the interviewee and can often mean that the likelihood of re-entry following evacuation is reduced.

While clearly focused on evacuating the dwelling many participants assessed that they had a window of opportunity. They were aware of the current location of the fire and perceived an opportunity to grab essential, or valued, items that were typically close by, or elsewhere in the dwelling, as they evacuated the UDF. Most commonly these retrieved items included items such as handbags, shoes, clothes, car keys and laptops.

> *I had to come outside to ring them [Fire and Emergency] so I just grabbed my handbag as I was passing and I just put on the shoes that I could, quickest to put on my feet.* (P8: uninjured, attended fire)

> *Oh I had picked my phone up on the way past it. We didn't have time to get dressed.* (P13: uninjured, attended fire)

> *Came out the back, and, thankfully, I had been kind of set up for going to work, so I had my handbag and my car keys. My cell phone was beside the bed. I think I ran back into the bedroom and got the duvet and my phone, for the kids to wrap around themselves [...] I didn't actually really go back in. I guess I went from the hallway, probably, to my bedroom, which was just off it by a couple of metres.* (P2: uninjured, attended fire)

At least two participants undertook other deliberate actions prior to evacuation, based on existing fire knowledge, to minimise fire damage to their property once they made the initial decision to evacuate.

> *Before I left the house, because again it was, like I told the kids to get out, I did shut all the doors and turn of the gas bottle which the fireman said contained it and there was the potential, the gas bottle could've exploded [...] but it was actually only one room and again, the fireman said God if you hadn't shut all the doors, it would've been, you know, had a lot more air so it would've burnt a lot faster and it would've been a bit different scenario.* (P7: uninjured, attended fire)

> *The first thing I do 'cause I was in Brownies and at Guides in the UK, emergency situation, any smoke, first thing you do is turn off the electric. The electric, the fuse box was in that room […] it's amazing what you're taught when you're little and luckily it was just two steps. It was in the room where I was, where the fire started and I just went click to all the switches. I just didn't think, it just clicked.* (P8: uninjured, attended fire)

Some participants did not take the opportunity to grab anything while in the process of evacuating the dwelling, considered their safe exit as the highest priority in the circumstances. This group was potentially influenced by previous training and fire knowledge which stopped them from re-entering.

> *I had time to grab some stuff and I never grabbed anything [...] there was no smoke, it was all contained in the bathroom and I walked past photo albums and hard drives and you know, and it does amaze me that I never grabbed anything.* (P7: uninjured, attended fire)

> *Low priority wasn't it? [saving belongings] […] Getting out was [higher priority].* (P3: uninjured, attended fire)

> *Well it wasn't on my mind [saving belongings], getting out was.* (P3: uninjured, attended fire)

Post-evacuation

Following a successful evacuation from a UDF many participants (n=12) reported re-entering this dwelling. The main motivation of participants re-entering a UDF was a self-assessment of not having necessary items to meet immediate needs.

> *Yeah. "I was just kind of, I wasn't thinking about what I needed to do next. I just thought, "OK, well, if this is happening, what do I need right now?" And I thought, "I'd probably need, you know, I need my car keys," so I grabbed those, and the laptop was just sitting on the dining room table, so I grabbed that.* (P18: uninjured, attended fire)

> *I realised, um, I hadn't, didn't have my wallet or my phone. I thought, "OK, I got out OK, let me go back in." I raced back in, and by that time, the, it was about, minutes after we got out, I suppose, um, and going in the back door, there was smoke going through the kitchen, got into the bedroom. Yeah, there was, visibility was getting low, so I got down low to the ground, got back out, and then, it was raining, decided to, it was quite cold, um, middle of winter basically, so, I thought, the kids have only got their clothes on their backs, same as my wife, so I raced back in to get some more clothes. Lucky there were some clothes on the back porch, and then I remembered, the other 2 cats hadn't come out because my kids were yelling at me that there were still 2 missing.* (P3: uninjured, unattended fire)

> *We went back in once to get our cell phone off the table because, but you know, that was down the other end of the house [from fire].* (P7: uninjured, unattended fire)

> *I thought, I have to get hold of my husband. I've got to tell him. And, um, so I ran back down the passage, under the burning roof, to my bedroom to grab my cell phone, which was charging.* (P20: uninjured, attended fire)

Participants also take into account the potential danger of re-entering the house by making a secondary risk assessment based on updated information about the fire. Re-entry can be informed by new information on the fire location or size, as viewed from outside the dwelling. Some participants believed they were less at risk than they initially thought because of visuals of where the fire was and what rooms or surfaces were affected. In some of these situations, participants justified re-entering the house as essential to be able to manage the situation, such as re-entering the burning property to retrieve a phone in order to call Fire and Emergency.

I got outside and then I could see the flames coming up the roof and then I was like ok, I know that I'm the only neighbour home out of the whole block of flats so I ran back inside and got my phone. (P14: uninjured, attended fire)

He's told me off so many times, and he's not letting me forget it, you know. He says to me, you know, "that was the most stupid thing you could've done." I said, "yep, it probably was." But, um, you know, at the time, I was thinking, "I have to have some way of contacting him and my friend," because I thought, "well, I'm on my own, standing out here in my night dress and my dressing gown. (P20: uninjured, attended fire)

Some re-entered the UDF motivated by a strong desire to ascertain where the source of the fire was or to limit the harm.

And in the meantime I was running downstairs to check downstairs in the basement because the house is on a slope and I thought oh my goodness maybe there's a fire underneath the house and I just wanted to find the source, you see. (P5: uninjured, attended fire)

Re-entry despite strong smoke and fire cues

Some participants appeared to under-estimate the risks associated with smoke and the speed of the fire. These participants were highly likely to have sustained smoke inhalation injuries to a certain degree even though they did not report sustaining any injuries. This situation certainly presents a strong possibility for these types of injuries.

And it's like the fireman grilled me aye and it was like you never run back in but like the smoke, the fire hadn't got into the lounge so yeah. I did crawl, like my dad was a fireman so I did crawl on my hands and knees 'cause the smoke was starting to get pretty bad at this point […] I could see it and I knew that, like the room wasn't on fire. There was a lot of smoke coming through the door but the door was closed so I did get on my hands and knees 'cause I was worried about the smoke 'cause the room was really filling by then. (P14: uninjured, attended fire)

So, that last time I went in, I tried to get back, up the front, to where the cats were, were probably going to be, in the bedrooms. Unfortunately, visibility was […] it's funny, it's, well, not funny, but you see, you see these movies, action movies, I suppose, and you see the hero running into the fire and, you know, there's still visibility. Um, you see them coughing a bit, but, you know, you think, "yeah, I can do that." So, adrenaline's pumping, I'm back in there, and of course the power's out, so, absolutely not light at all. And there is, um, no oxygen, so I dropped to the ground and, ah, by that time, I knew if I went any further, I wouldn't be getting out. (P3: uninjured, unattended fire)

Smoke inhalation type injuries were sustained upon returning to the fire to retrieve essential items or to rescue pets, where the situation justified the risk to the participant.

I remembered my Australian Terrier dogs were in their sleeping cage in the living room, broke free of the person holding me and went back in to get them, against advice of 111 operator. (P32: injured, attended fire)

I rescued some birds but I had to leave some behind [..] and then we lost the dog […] There was no smoke in the front of the house at all […] I know I probably wasn't supposed to go back in but I thought it was safe enough because there was no smoke coming that way. (P36:

injured, attended fire)

Knowledge informed immediate needs assessment

Training and knowledge might stop people re-entering the house even if their immediate needs assessment makes them feel like they need something from inside. Some participants were conflicted with regard to re-entry and in these situations safety knowledge had a strong influence on their decision to stay out of the UDF or in the manner in which they attempted to re-enter the house.

> *And the other thing is getting out and staying out. I think schools are very good at that, at teaching kids from an early age, to have a meeting place and an evacuation. I think that's really, really important because, as I say, I was really tempted. I wanted to, 'cause both our vehicles were there, and it would've been very easy to back them out […] but, ironically, I had just conducted a fire drill on the Friday, at work, for my company that I work for, and the biggest thing they always tell you is, "don't be tempted to go back in.* (P19: injured, attended fire)

> *I probably would've been saying, "no, don't go in, don't," because that's what been trained into me. They always say, "don't go in," it just doesn't really matter; your life's more important.* (P22: uninjured, attended fire)

> *I did get, I was going to go to the door but I'd forgotten I closed the door. So I thought oh if I open that door, it's going to let air in, that's not going to be good 'cause that's from the Guides with that badge thing.* (P8: uninjured, attended fire)

Those participants that stayed out of a UDF discounted the possibility of re-entry due to pre-existing knowledge of explosive potential or other significant fire cues.

> *Well, we actually had in the same area a diesel furnace for central heating, so we had to stand well back because we were a bit afraid that we would have an explosion. Fortunately diesel was very hard to ignite, and, it didn't go, it didn't ignite. But that was the most terrifying part was the fact that we, every time we heard a crack or a bang, we were worried that the whole house was going to go.* (P19: injured, attended fire)

Seeking outside help pre or during evacuation

Often calls to Fire and Emergency are made while still in the dwelling as part of the evacuation process, especially in cases where the fire had not spread extensively within the dwelling.

While most commonly participants reported seeking the help of Fire and Emergency in close proximity to the decision to evacuate the dwelling, other sources of help were also sought, such as close neighbours or family.

> *I quickly rang 111 and then 'cause we live in (a small community), there's like a local fire station which is like five minutes down the road, so they were here within five minutes. And then I quickly rang my mum. And my granddad lives up the hill and he ran down the road and he went in and he obviously got buckets of water and put it out as fast as he could.* (P1: uninjured, attended fire)

Surprise at speed of UDF development

Interviewee's indication of surprise at how fast fire and smoke spread means that the information participants have to make the assessment to re-enter a UDF is unlikely to be correct.

> *Then went to go back inside to get my phone which I left by the bed, the house was full of black smoke and I couldn't go near it, sort of five/ten minutes at the most [...] Hit the smoke, came back and I thought well do I get down on my hands and knees and go in and I thought nah, I thought better of it.* (P12: uninjured, attended fire)

> *But it was just so scary 'cause like within like three minutes the whole lounge went completely black, you couldn't see anything.* (P1: uninjured, attended fire)

6.2.4 Fire-fighting attempts pre-empt injury

Summary. It was not until a person had decided that they were going to attempt to extinguish a UDF that differences in the experiences, motivations and actions were observed between those who sustained a fire-related injured and those who did not. At this point it was the type of action taken to extinguish the fire, the level of deliberation of what that action should be and the proximity to the fire and flames during this action that distinguished between those who sustained an injury or not. Those who responded to the fire reactively, or in a highly disorganised state, and as a result directly interacted with the fire sustained a NFFRI. These people often assessed that they urgently needed to put the fire out generally acting in a manner that put them at increased risk of sustaining injury. Reactive actions occurred in direct contradiction to their own concerns about their own safety or consideration of the suitability of their chosen means of extinguishing the fire. The motivation behind these reactive responses tended to be fear of injury for self/others, or a strong overriding desire to reduce damage to property.

Comparison of outcomes. A comparison of similar cases of small cooking fires with the same initial risk assessment that the fire could be managed led to a different outcome based on the type of response taken to extinguish the fire. For example, one participant who had a cooking fire and assessed they could manage it responded by smothering the fire with a pot lid and extinguished the fire with no injury. In contrast, two other participants also had a cooking fires but tried to move the hot pot that had a metal handle from the stove, dropped the pot catching the carpet on fire and was burnt by the fire and the hot oil in the process.

Key findings

Reflexive actions led to direct fire interactions

In situations where participants initial risk assessment indicated that the fire posed an immediate threat of injury to self/others, the actions that followed were often reflexive and involved rushed thought processes. Responses that resulted in reflexive responses led to direct interactions with the fire and flame, such as using the interviewee's hands to extinguish flames or attempting to move an item while on fire. All participants that responded reflexively sustained a NFFRI in this action.

> *Yeah it just happened so quick. I don't know why I done it I just didn't think. I would stand back and think just to get out […] I turned off the range to begin with. And then stupidly I picked up the fry pan to take it outside. And then from that I got burnt.* (P31: injured,

attended fire)

That's right I put out the flame, that's a great thing I did even though I got burned 'coz I don't know that's the only thing I could do […] mind was not working at that time, the action, I never thought of anything else […] there was no time to think, it was just a reflex. (P25: injured, unattended fire)

Injured participants often expressed that these reflexive responses were contradictory to their own existing knowledge of fires but the immediate threat of injury or damage to the dwelling in the situation justified the quick reactive response. There were differences observed in the motivations and rationale of this type of action depending on the type of fire and level of immediate threat to life, or to injury, to self/others. For those reacting to a person whose clothing was on fire, a reactive action was considered justified and rational by participants with any delays having a high likelihood of more severe and life-threatening outcomes for the victim of the fire.

Just like that knee jerk reaction where you're like, "Oops there's a fire, put it out" but you know I probably shouldn't have done that. (P4: injured, unattended fire)

Looking back it was a major danger. Probably, I shouldn't have attempted anything, but yeah, I'm actually glad that I did, because all went well [fire extinguished]. But yeah it could have changed, it could have been completely different. I was concerned, because the flames were all around him [husband], but he was about to catch fire, so maybe in the background I was also thinking of preserving him when I first threw the first blanket [over the fire]. (P35: injured, unattended fire)

Those reacting to the discovery of other fires, such as a cooking pan fire, were motivated by a desire to move the item on fire and minimise the damage likely to be caused to the dwelling.

I grabbed the pot with my hand and that's where, that's a massive mistake and obviously, at the time, like I know that I shouldn't have done that […] what I tried to do is because I thought that the fire was going to come up with the ceiling. (P28: injured, unattended fire)

Response based on prior fire-fighting knowledge

Participants who reported thinking through how they were going to safely extinguish the fire typically did not report sustaining an injury. This group of participants appeared to make risk assessments informed by prior fire safety knowledge and in the main reacted calmly enough to maintain sufficient distance from the fire and, subsequently, to not injure themselves in the process. Two participants successfully extinguished the fire, or contained it until help arrived, without incurring an injury.

I was going to try and suffocate it, but I was like, I don't really know how to do that too well, so I'll just get some water or something. So, then, I just, splashed it a bit. (P23: uninjured, unattended fire)

Well I got a big lid, and I put it over the top of the fire. And that stopped the air getting to the flame. (P21: uninjured, attended fire)

6.2.5 Incidental observations

Treatment of injury to minimise harm

Many of the injured participants were in situations where they, or someone they knew, had knowledge about how to treat burns. These participants received immediate care for their burns through methods like being put under a cold shower or bath. In contrast, some participants did not know how to treat a burn. The most effective primary first aid is to interrupt the continued process of burning of human tissue with cooling fluids, such as water. These participants received incorrect home treatment (such as applying oil or butter) and did not get professional burn treatment until a period of time after the burn was sustained. Knowledge about the appropriate immediate response to burns and swift application of this knowledge could help to minimise injury as burns continue to cause tissue damage without the correct treatment. Those participants who had access to this initial treatment did so as a result of neighbours, partners or parents who were medical professionals or had done first aid training courses.

> *So my neighbour is a trained nurse. And she took me over to her house and then put me into a bath and poured water all over my burn, and she kept dousing my face with a facecloth.* (P31: injured, attended fire)

There was some uncertainty regarding how exactly to treat burn injuries and the potential to minimise the severity of the burn through rapid treatment.

> *In our normal knowledge, I know that some people used to say you can put honey on the burn or some cream kind of burning cream or something you can put and some people say butter […] with that information, we put all those things without applying any medicine, what I understand to the hospital, I need to keep my hand in cold water. So that [is] information I got after the incident that I never knew*. (P25: injured, unattended fire)

> *I didn't know that (how to correctly treat burns). I didn't know that at all, because I've burned myself a few times with just fire. Well, I knew with fire just to put to put water,[…] put water on but not as long as he (my partner) did, because I've burned myself with a hair straightener just umm on my hands. And I just would pass it under the water tap onto the tap and then that's it. But then I still would get a blister and the fact that that's because you've got to leave it so long. Like they said it's at least 10 minutes under, constantly under the water constantly.* (P28: injured, unattended fire)

Aftermath of incident

The impact of the UDF on participant's lives was substantial in the short medium and long term. Many struggled to recover from the disruption to their living situation many months after the incident. While grateful and appreciative of the services of Fire and Emergency during the fire, a number expressed frustrations at the lack of support from Fire and Emergency in the immediate aftermath of the incident. Participants noted an expectation that Fire and Emergency would be able to provide some assistance for people in need in the immediate aftermath of a fire. They also noted confusion about who was responsible for practical aspects of recovery such as securing a dwelling following a fire, when the property could be accessed again, and who could help survivors with their immediate needs. While often beyond the control of Fire and Emergency, substantial frustrations

were also expressed regarding the role of insurance processes in delaying a return to normality following a UDF.

> *My understanding is that it's the fire service's responsibility that the house is secure until they hand it over to the insurance company […] but I am not sure about that.* (P18: uninjured, attended fire – burgled in aftermath of fire)

> *I was already at my limit [at Work and Income] and I couldn't [get further advances], and that's what made the struggle harder is that I tried my hardest. I mean I had a report, I had a thing from the fire brigade saying that I had a house fire and lost everything, I still didn't get any help from them [Work and Income]. I actually got no help from anyone. The people that helped me were the community.* (P06: uninjured, attended fire)

These findings add further support to those found by Skylight and Allan & Clarke (2018) in examining after fire impact on community in New Zealand.

7. Discussion

7.1 Principal findings

This study aimed to inform directions for non-fatal fire-related injury (NFFRI) prevention efforts by using semi-structured qualitative interviews to examine the experiences, motivations and actions related to UDF. This information can be used to effectively prioritise and target preventive action to reduce NFFRI through fire safety strategy and prevention programmes focused on mitigating the impact of fire-related injury.

This study focuses on the experiences, motivations and actions of people in the event of discovering a UDF to inform secondary prevention activities, rather than primary prevention activities to prevent a fire from occurring. Primary prevention actions, focused on preventing the initiation of residential dwelling fires, will have the biggest impact in reducing the burden of NFFRI. Reports describing fatal and non-fatal fire-related injuries and recommendations to Fire and Emergency for primary prevention efforts are available elsewhere (Lilley, Richardson & Davie, 2019; Lilley, McNoe & Duncanson, 2018).

Secondary prevention activities that occur in the event of a fire contribute to reducing the burden of NFFRI by minimising the likelihood and severity of fire-related injuries sustained during a fire event, thereby reducing the experiences of personal devastation associated with these injuries, as well as the burden to emergency response services and the health system.

This qualitative interview study sought to understand people's lived experiences, including their motivations and actions, during fires occurring in a residential setting, and how these may differ for those that are injured or un-injured in such events.

7.1.1 What are the lived experiences, motivations and actions of survivors of UDF?

This study identified a diverse range of lived experiences of survivors of UDF for Fire and Emergency to consider in the review and design of community fire safety strategies, programmes and messaging.

Universally all survivors made a rapid risk assessment of the fire and smoke cues to ascertain if the

fire was able to be self-managed. Fire cues, including the size of the fire, plus pre-existing fire safety knowledge were identified as being key considerations in this assessment.

There were distinct differences in what fire circumstances were construed as dangerous during the initial risk assessment. Small fires, or fires perceived as being contained or on a movable item, were considered manageable. Larger, well spread fires, or fires with an ambiguous origin or source, were assessed by people as posing too greater a risk of injury to self-manage, and therefore required the attendance of Fire and Emergency to manage the situation.

The situation dependent decisions and responses made by participants aimed to minimise the risk of injury to people and of destruction of property, but knowledge of potential risks and aspects of each situation influenced behaviour after the initial risk assessment. Fire safety knowledge and previous fire experiences also resulted in increased caution in assessing risks and in the situation dependent decision and response.

The ability to use knowledge about fires was impacted by the heightened stress, anxiety or an overwhelming sense of the situation. Where a fire situation was clearly overwhelming, decisions and responses tended be reactive, leading to direct interactions with the fire and inevitably resulting in a NFFRI.

Knowledge, or knowing what to do, is of secondary importance if someone is in immediate danger. This might cause someone to act reactively, disregarding the potential of injury when the safety of self/others is the priority. Equally, despite pre-existing knowledge, many chose to fight fires perceived to be small, contained or movable, motivated by an overriding desire to minimise property damage by directly interacting with the fire.

Reactions undertaken while experiencing heightened emotions or distress do not necessarily lead to injury. People who decide they are unable to put out the fire might still have heightened or distressed reactions to the overwhelming nature of the situation. In initially deciding to evacuate the dwelling they put themselves in a position of decreased risk of injury as they call Fire and Emergency to manage the fire and stay out of the UDF.

An evaluation of a person's immediate needs occurs at some point prior to, or following, evacuation from a UDF. Strong motivations to rescue pets or to retrieve essential items are weighed up against what they know about the fire location to assess if there is a window of opportunity to re-enter the dwelling. The expression of surprise at the speed of fire and of smoke expressed by those who re-entered suggests that many are underestimating the risks posed by re-entering a UDF, or that they are willing to take this risk to ensure they meet their immediate necessary needs.

Knowledge about fire safety and fire phases affects behaviour at many points across the behavioural process and can reduce the risk of injury. Fire safety training resulted in fast decisions to evacuate a UDF, informed steps to minimise property damage and stopped people from re-entering the UDF.

Those with fire exit plans had safe exits, reporting straightforward risk assessment and situational decision making in comparison to the experience of others. Aspects of fire safety knowledge give people, typically families, a behavioural response framework on which to inform their risk assessment and situational decision making.

Fire safety knowledge can be obtained from various sources. Sources spontaneously recalled included Fire and Emergency advertisements (such as situational messaging like burning couches

using visual means such as television), youth organisations (such as Girl Guides), workplace training and school fire education programmes.

There is clear evidence provided in this study that many of the actions reported by survivors are contradictory to the prevailing fire safety advice administered by Fire and Emergency. Actions such as attempts to extinguish UDFs, movement through fire and smoke, re-entry into the UDF and risk taking despite strong fire and smoke cues overrode existing fire safety knowledge, suggesting under-estimation of risks of NFFRI in UDF is common. Those who did adhere to fire safety advice, such as the "Get out Stay out" messaging, were strongly influenced by fire safety knowledge, experiences and training.

7.1.2 How do these differ between those who are injured or un-injured in UDF?

Fire-related burn injuries are most likely to be sustained in the context of when the action to extinguish a fire is reflexive, resulting in direct interaction with the fire. This is predominantly motivated by an immediate threat of injury to self/others in cases where a person is on fire, or by an over-riding desire to minimise damage to property in other types of fires, such as when attempting to move cooking fires or other portable/moveable items on fire. Given the high burden of NFFRI due to cooking fires (Lilley, Richardson & Davie, 2019) more focus is needed on educating the public on the risks of moving items on fire.

Fire related smoke-inhalation injuries are often sustained in circumstances where survivors successfully evacuated the UDF but re-entered the dwelling due to concerns about the welfare of pets and/or to obtain items of immediate necessary need. Often the risks of smoke-inhalation injuries were under-estimated by survivors. This is evidenced by many re-entering smoke filled rooms/dwellings, willingly taking calculated risks in these situations despite knowledge of smoke being potentially harmful.

7.1.3 Seeking assistance of Fire and Emergency in a UDF

This research also provided some new insights on the motivations of those people who chose to contact Fire and Emergency to attend their UDF.

Survivors typically contact Fire and Emergency because they assess that they do not have the skills or knowledge to control the situation and need someone who is able to. This decision is often underpinned by the level of safety knowledge of the survivor and is situation dependent. Fire and Emergency was most commonly in attendance in situations where the fire was assessed as being large, well spread, or ambiguous in location and/or cause.

Survivors who did not contact Fire and Emergency did so because they perceived that they could self-manage the situation. In the case of on-person, or small fires, there was a genuine concern that any delay in attempts to extinguish these fires would result in more serious injuries or property damage. Often people were able to self-extinguish the fire, negating any need for professional assistance.

In cases where survivors further judged the fire could escalate while attempting to self-extinguish they reconsidered their situation, evacuated the dwelling and sought the attendance of Fire and Emergency. Many were satisfied at this point that they had done all they could in their situation and it required the attendance of Fire and Emergency to extinguish the fire.

Worryingly, some regrets were also expressed by people who contacted Fire and Emergency. Some survivors were genuinely conflicted about engaging in fire-fighting versus the potential for more property damage while awaiting professional fire-fighting services. The desire to attempt to extinguish the fire themselves was the main reason for this regret. A reluctance to call Professional Fires Services has been identified before, and Wales et al. (2015) reported this to be linked to embarrassment and public expectations of fire services.

The majority of participants greatly appreciated the fire-fighting services and post-fire supports provided by Fire and Emergency, however, there is some confusion regarding who is responsible for securing damaged dwellings after a fire. Greater clarity for the public around the services provided by Fire and Emergency and the organisation's responsibilities following a UDF would address many of the concerns raised in this study.

7.2 Comparison to international findings

This section considers the study findings in relation to available theories of human behaviour in response to unintentional domestic fire incidents.

As outlined in section 4.2.1 the literature and specific theories of human behaviour in single/family occupant dwelling fires is limited in scope. At present, there is no available model that attempts to explain differences in behaviours between those injured or uninjured in single person/family occupant UDFs, however, sub-theories are available to explain parts of the behaviour process. The model of behaviour process of an occupant response in a building fire as proposed by Kuliogowski (2009) which identifies commonalities in behaviours was partially met, however, it is unable to distinguish any differences in behaviours that may lead to an occupant sustaining an injury.

Our study findings broadly support the only other study of experiences of injured single/family occupant dwelling fire survivors as attended by Professional Fire Services in Kent, UK (Thompson and Wales, 2015). Our study, however, expands this work by considering the experiences, motivations and actions of those without injury, as well as including survivors of UDF not attended by Fire and Emergency.

Observed experiences and actions in common between our study and that of Thompson and Wales (2015) included survivor decision making evolving in direct response to an initial investigation of fire cues and a lay assessment of risk. There was a clear desire observed in both studies to investigate and take some form of action to tackle or mitigate the effects of fire and smoke, with our study additionally observing this for both injured and uninjured participants. Active responses were typically a rational decision which balanced the perceived risks of harm to self/others, or to property, posed by the fire with the importance of an early, unassisted intervention.

Consistent with the observations of Thompson and Wales (2015) our study observed behaviours in response to a UDF are heightened, possibly emotional or stressed, but largely rational in the context of limited information or knowledge, or in response to an immediate threat to life or property. Our study indicated that rapid reactive responses and actions that resulted in direct interaction with a fire invariably resulted in a NFFRI. This behaviour appeared to be largely motivated by the immediate need to respond to an immediate threat of injury to self/others, or threat to property. Panicked, irrational behaviour was rarely observed despite a number of survivors self-describing their response in these terms. The role of irrational, panicked behaviour in explaining the

motivations and actions of survivors during a UDF is often debated, yet it is clear this behaviour is often deliberate, controlled, rational and adaptive (Fahy, Proulx, Aiman, 2012). Our study findings additionally suggest that the more fire safety training and knowledge and situational awareness of the fire a person has, the less stressed and anxious the reaction to a UDF is, resulting in a lower likelihood of NFFRI.

While both studies found that NFFRI occurred in the context of fire-fighting, unlike the UK study, the majority of our participants did not enter the room of fire origin to extinguish or suppress the fire. This appears to be a key difference between studies with the majority of uninjured participants seeking to evacuate the dwelling, rather than engage in extinguishing the UDF, pointing to a key behavioural difference between those who were injured compared with those uninjured. Injuries, however, did not exclusively occur in those who chose to fight a UDF.

Our study additionally observed smoke inhalation injures also occurred in the context of re-entry of a UDF to retrieve important necessary items or to rescue pets. Despite injury, participants often indicated that they would repeat these risky behaviours again should similar circumstances arise. Those that did not sustain an injury typically engaged in decision making and responses that were informed by fire safety knowledge and training.

The motivations and desires to take actions, like re-entering a UDF or extinguishing a fire, appear to be common across studies. A strong desire to ensure family, household member or pet welfare, and to minimise property damage is strong motivation for certain people to take risks.

Under-estimation of risk of fire-related injury was observed in common between studies, particularly unfamiliarity and under-appreciation of the speed at which an uncontrolled fire can develop, the large volume of smoke generated by this fire and the risks these pose for physiological health. The under-estimation, or failure to consider, the potential risks led to increased likelihood of an interviewee sustaining a NFFRI.

7.3 Strengths and weaknesses of the study

This study has a number of important strengths.

The semi-structured nature of interviews allowed for flexibility in topics raised by participants, ensuring that novel ideas could be examined. This is the first attempt we are aware of to generate a model of occupant response behaviour leading to fire related injury that includes both injured and un-injured survivors of UDF.

This study utilised constructivist grounded theory to construct meaning of interviewee's experiences, motivations and action, allowing for the differences and distinctions in how people understand and behave in particular UDF situations to be understood. Constructivist theory recognises that there are multiple realties as the world is socially constructed and explores how people think and behave as a result of their perception of reality (Charmaz, 2014). This has allowed for the creation of a theoretical formulation relating to people's response to fires in residential settings which is able to be used by Fire and Emergency to identify the opportunities to minimise the harm from unintentional single occupant/family UDF.

This study focused on survivors' interactions with UDF but also captures many cases of "on-person fires" often not attended by professional fire services. Inclusion of this group is important and on-

person fires are particularly common in some high-risk groups. Elderly in particular are likely to be involved in dwelling fires where their clothing is the seat of the fire. Subsequently, this group has higher risk of succumbing to these injuries (Lilley, McNoe, Duncanson, 2018; Lilley, Richardson, Davie, 2019). Elderly are a rapidly growing demographic in New Zealand's population (Statistics New Zealand, 2020) and as a result the prevalence of fires involving this group, including on-person fires, is likely to increase.

This study included those with UDF not unattended by Fire and Emergency. This group is rarely included in fire safety research. It is assumed that "non-attended fires are typically small in size and self-extinguish, or are dealt with safely by those present without the need for emergency attendance" (Wales et al., 2015). While the incidence of non-attended fires is unknown in New Zealand it is estimated that up to two thirds of dwelling fires in the UK are unattended (Wales et al., 2015). The number of ACC fire-related burns medical claims are 5 times greater than Fire and Emergency attendances (Lilley, Richardson, Davie, 2019), which suggests unattended fire incidents make a major contribution to the burden of NFFRI in New Zealand. Inclusion of participants who experienced fires not attended by Fire and Emergency gives new insights into behaviours associated with the motivations and actions of those that discovered and extinguished a UDF in its early stages. This group represents a possible gap in fire service provision and points to the importance of clear public advice on how to safely fight fire as this is the only opportunity to influence the behaviour of those who choose not to seek Professional Fire Services.

The experiences, motivation and actions of survivors of UDF have not specifically been examined in a New Zealand context. Previous research was limited to fire fatalities reported in Coronial case files which are recognised as having different actions and motivations from non-fatal fires in UDF (Heimdiall Consulting Ltd, 2005). A limitation of this previous research it that is based on reports of a fire victim's actions from a Coronial case file, which are often not supported by eye-witness or victim accounts, therefore the experiences, actions and motivations of victims are for the most part surmised.

Likewise, there are a number of limitations to this study that must be taken into consideration.

It was challenging to recruit an injured sample. Despite comprehensive advertising and provision of an incentive to participate we may be missing some views and perspectives, therefore interview of more injured survivors of UDFs may reveal other factors involved.

While not intended to be a representative sample, a diverse range of people from different age groups, with varying levels of financial support, participated in interviews.

Due to the qualitative nature of the study, results may not be generalisable to other people or other settings (e.g. there may be significant differences in the experiences of people in rural versus urban dwellings, for Māori and other cultural groups etc). As is the aim of grounded theory our findings present an initial theory and hypotheses based on our participant sample. While this is an important first step continued research though application of recommendation and tracking of their effectiveness is needed to support and further develop this theory.

While we initially intended for all interviews to be in person, many were conducted over the phone (due to Covid-19). It may be that people were more likely to share information in the face-to-face format.

8. Potential Risk Reduction Strategies & Recommendations

This study provides new qualitative evidence to inform the development and evaluation of national and local fire safety strategies and to target interventions at vulnerable populations. This section outlines recommendations for the secondary prevention of NFFRI injuries as informed by these research findings and builds upon the limited understanding of the experiences, motivations and actions of survivors of UDF from international literature.

From this study's key findings, it is clear that many take early action to extinguish or contain a dwelling fire when this task is believed to be manageable, often when the fire cues are assessed to be small with the desire to limit property damage, or when a fire poses an immediate threat to life or of serious injury to self/others. Of those who chose to exit the dwelling, the majority re-entered the dwelling regardless of the size, or speed, of the fire to retrieve items perceived as necessary at the time. These actions are often contrary to prevailing fire safety messaging, which is well known at the time the person choses to tackle a fire or to re-enter a UDF. Changing dominant motivations and actions in response to unintentional dwelling fires requires recognition that many ignore fire safety messaging for self-justified, rational and understandable reasons.

Injury prevention is based on the principle that injuries are predictable and preventable. There are clear commonalities in NFFRI that are prime for intervention to avoid unnecessary injury. Opportunities to intervene focus in the main on primary prevention, thus prevention efforts are aimed at preventing the fire from occurring in the first place. The Haddon matrix suggests suitable approaches for primary prevention should focus on: preventing the existence of the fire causing agent; preventing the release of the fire causing agent; separating the fire from the host; and providing protection for the host (Haddon, 1980). Recommendations for primary injury prevention have previously been provided to Fire and Emergency New Zealand by the research team (Lilley, McNoe, Duncanson, 2018; Lilley, Richardson, Davie, 2019).

Where a fire occurs, secondary prevention efforts to reduce the likelihood or severity of injury, while less effective than primary prevention, should focus on: minimising the amount of the fire causing agent present, controlling the pattern of release of fire to minimise damage, controlling the interaction between the fire and host to minimise damage and increasing the resilience of the host (Haddon, 1980). This research specifically examined the opportunities to minimise the harm from fires by understanding the interactions between humans and the fire, and identifying the opportunities to control the interaction between the fire and humans.

Fire and Emergency has a stated aim of "reducing the consequences from emergencies" through "reductions in harm from fire". The following outlined strategies and recommendations, if implemented, will contribute to reductions in NFFRI and better organisational understanding of real world experiences of survivors of UDF.

Recommendation 1: That Fire and Emergency continue to sponsor and develop fire safety campaigns and messaging which focuses on the primary prevention of fires in residential dwellings.

This remains the single most effective means of reducing both fatal and non-fatal fire-related injuries in the population.

Recommendation 2: That in addition to the primary prevention measures above, Fire and Emergency consider reviewing and re- developing existing fire safety campaigns, messaging and

strategies such that they reflect the real-world experiences of how people are likely to assess and respond to UDF.

Key areas for consideration in the redevelopment of messaging include how these messages can influence the:

- appropriate lay assessment of the risks posed by a UDF;
- methods and techniques for safely extinguish dwelling fires, especially cooking fires;
- appropriate use of common household fire extinguishing equipment, especially fire extinguishers; and
- address public perceptions of what services provided by Fire and Emergency are appropriate to call and when.

Fire and Emergency New Zealand's "get out and stay out" messaging, while clearly appropriate for many fire circumstances, is routinely disregarded by those confronted by fires, regardless of fire size, in single/family occupant UDF. Many are not willing to be passive bystanders in UDFs. Secondary prevention messaging should consider the provision of advice on how to assess the risks of dwelling fires and how to tackle these fires safely given that in these circumstances many survivors attempt to put fires out, or re-enter UDF's, increasing their risk of sustaining a NFFRI.

Recommendation 3: That Fire and Emergency continue and expand collaborative relationships with community groups and workplaces to provide fire safety training and knowledge, with a view to increasing overall levels of fire safety knowledge in the general public.

This knowledge clearly had a positive effect on participants' responses to the fire, therefore improving the general public's fire safety knowledge through many community channels could be expected to have benefits in terms of influencing people's motivations and actions during all types of fires, including UDF.

Recommendation 4: That Fire and Emergency, alongside other heath and emergency service agencies and services, provide public advice on the importance of timely and appropriate treatment of fire-related burns in order to minimise the severity of the burn injury.

Recommendation 5: That Fire and Emergency, alongside other emergency agencies and services, consider how they can mitigate the disruptive aftermath of UDF on survivors' lives.

Opportunities exist in consistent messaging around being prepared for unexpected emergency evacuation of a household (such as advocating for preparation of emergency grab bags), as well as public knowledge of the availability of immediate support post-UDF (such as a simplified process for obtaining temporary cell phones, replacement bank cards, etc). This could provide sufficient motivation to avoid re-entering a UDF to retrieve necessary immediate items, as well as alleviating some of the stress of the aftermath for UDF survivors.

Recommendation 6: That Fire and Emergency purposely collect and analyse qualitative and quantitative data from Fire and Emergency attended UDF on survivor experiences, motivations and actions.

This data and analysis will serve as a necessary foundation from which to consider the provision of relevant advice to the public, identify opportunities for intervention, and on which to plan other

roles and services provided by Fire and Emergency.

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10. Appendices

Appendix A. Semi-structured interview guide

My name is XXX and I'm a researcher in the Injury Prevention Research Unit at the University of Otago.

For this current project, my colleagues and I are interested in learning about the experiences of people who have been involved in a house fire.

Before we get started, I would just like to get your verbal permission to audio-record this interview. I am now going to ask you to complete a written consent form and also a sheet to collect some basic information on your age, ethnicity, area of residence, and financial security – thank you.

Core Questions	Follow Up questions;
Could you start by telling me about the fire you experienced?	How did you first become aware of the fire? Where did it start? What was the material ignited and what types of equipment were involved? What was the extent of the damage to your residence/property? Were safety equipment/devices (e.g. smoke alarms) in the house at the time of the fire event? If so, were these in working order?
Were you injured?	How did the injury occur? What sort of injury was it? What sort of treatment did you have? In hindsight, do you think the injury could have been prevented in some way? (If so, what sorts of things could have been done? / If not, why not? By whom?)
What actions did you undertake in response to finding the fire? For what reason did you do this action?	If other people were in the house, what actions did they take in response to the fire? Did you attempt to put the fire out yourself? Did someone else attempt to put the fire out? Did you alert anyone else in the house to the fire? Did you alert anyone else outside the house to the fire? Did you contact Fire and Emergency or another emergency agency after becoming aware of the fire? Why/why not?
Did you evacuate the property? For what reason did you do this action?	Did others in the house evacuate the property as well?
Did you re-enter into the	Did anyone other than yourself or the emergency services

property? For what reason did you do this action?	re-enter the property while it was alight? Why do you think they did this?
In hindsight would you do anything differently?	Have your experiences of a household fire changed your fire safety practices in anyway? If so, how? What did you believe the level of physical danger to be for yourself and/or others *at the time* of the fire event? What do you believe the level of physical danger for yourself and/or others was *reflecting back* on the fire event?
What do you think are some of the best ways to prevent people being injured by household fires?	
Is there anything else you would like to share about your experience of a household fire event and the consequences this had for you?	

Appendix B. Participant information and consent forms

Participant Information Sheet

What is the aim of this research project?

The aim of this research is to examine the experiences and reactions of individuals who have been involved in an accidental house fire. This information will used to effectively prioritise and target preventive action to reduce fire-related injury through fire safety strategy and prevention programmes.

Who are we seeking to participate in the project?

People aged 18 years and over who have been involved in an accidental house fire occurring in a house (dwelling) in the past 5 years are invited to take part.

What will participants be asked to do?

You will be asked to take part in a face-to-face, skype/zoom or telephone interview at a time and location that is convenient for you. Interviews are likely to be between 30-60 minutes long and will ask about your experience of being involved in an accidental fire event and your responses to the fire. Your interview will be audio recorded to allow for comprehensive analysis of your experience.

If you decide to participate, you will receive a $30 voucher in recognition of your participation in the study.

Is there any risk of discomfort or harm from participation?

There is a small risk that talking about your experiences during the interview could leave you feeling upset or unsettled. If this did happen for you, we would encourage you to contact one of the following supports:

- your General Practitioner (GP)
- your local church
- Victim Support - 0800 VICTIM (0800 842 846)
- Life Line – 0800 543 354
- Health Line – 0800 611 116

You can also free call or text **1737** any time for support from a trained counsellor.

Your family/whanau or other support people are welcome to be in attendance during the interview if you wish. If at any point you feel unhappy or upset about the study or your interview experience please do not hesitate to contact a member of the research team (see contact details provided at the end of this information sheet).

What information will be collected and how will it be used?

In the interviews you will be asked about your experience of the fire event and your actions during the fire event. If you sustained any injuries during the fire, a few additional questions will be asked about how you came to be injured. You can choose not to answer any question and you can also leave the interview at any point without needing to tell us why.

All interviews will be audio-recorded. After the interviews we will enter the audio-recordings onto password-protected computers. The audio-recordings will be typed into text by an independent experienced transcription company. These will be looked at by the research team to identify the key ideas (themes) you and other people interviewed talked about. No other people will have access to your information.

At the end of the study, data will be securely stored and only the research team will have access to it. Data will be retained for at least 10 years in secure storage.

If you are interested in learning about the study results you can indicate this on the consent form and a summary of the results will be sent to you.

What about anonymity and confidentiality?

The transcription company will be required to sign a confidentiality agreement. Upon receiving the transcripts, the research team will replace any names mentioned during the interviews with code names. Furthermore, each transcript will be assigned a unique identification number and will not be linked to the name of the participant who completed the interview.

Sometimes, the words you speak will explain the ideas better than just a key theme. In these cases we would like to use a quote from you, which could be included in a presentation or report. We would not use your name, or others' names, as part of the quote, and we would endeavour to ensure that no identifying information is included. However, although we will try to ensure anonymity, due to the nature of the research, it is possible that someone could be identifiable (e.g. by recognising expressions you use). If you do not want your quotes to be used you can tell us this on the participant consent form.

If you agree to participate, can you withdraw later?

After the interview, you can contact a member of the research team by email if you decide that you do not want your information to be used in the study with no disadvantage to you. You may withdraw from participation in the project anytime before 1st November 2020.

Who funds the project?

This project is funded by Fire and Emergency New Zealand.

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (phone +64 3 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

CONSENT FORM FOR PARTICIPANTS

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project before its completion *(1 September 2020*);

3. My interview will be audio-recorded and that personal identifying information [*including audio recordings*] may be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. I understand the nature and size of the risks (e.g. possibly feeling upset talking about the fire event) which are explained in the Information Sheet;

5. I know that I will receive a $30 voucher in recognition of my participation in the study and that this study is funded by Fire and Emergency New Zealand;

6. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand). Every attempt will be made to preserve my anonymity;

7. I, as the participant:
   a) would like to receive a results summary ☐
   b) would not like to receive a results summary ☐

8. I, as the participant:
   a) agree to my anonymised quotes being used ☐
   b) do not agree to my quotes being used ☐

I agree to take part in this project.

....

(Signature of participant) (Date)

.....

(Printed Name)

……..
Name of person taking consent

....

Signed Date

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

Appendix C: Interview coding scheme

Code long form	Code short form	Full description
Alert		
Alerted to fire by smoke alarm	Alert SA	People who first became aware that something was going on as a result of the smoke alarm going off.
Alerted to fire by smell of smoke	Alert smoke	People who first became aware that something was going on as a result of seeing or smelling smoke.
Alerted to fire by someone else in house	Alert person IS	Participant alerted to the fire by someone else inside the house.
Alerted by someone outside of house	Alerted person OS	Participant alerted to the fire by someone else outside of the house.
Alerted by seeing fire	Alert flames	Participant became aware of the fire or that the event was a fire through seeing flames.
Power Event	Power Event	Prior to the fire someone in house noticed a power surge or unusual power event.
Smoke alarm didn't activate	SA X	Smoke alarm were in the house but didn't activate
Alerted by noise	Alert noise	A loud or unusual noise somewhere in the house let them know something was wrong.
Conditions		
Explosions inside house/fire	Explosions	People who indicate that the material ignited during the course of the fire caused explosions.
Often initially small seem manageable	Initial Small	People who indicate that when you first find a fire it can still be quite small and seems like something that you could put

		out which might motivate people to try.
Acknowledged short time between life and death	Life Death	People who talk about knowing that there was a real chance of danger and the time between being in the house and being fine to having the whole house ablaze and that people would have died being very short.
Acknowledge the speed at which the fire spread/ escalated.	Moved fast	Indicated surprise at fast the fire moved or indicated the speed at which the fire went from something small to the property being engulfed in smoke and flames.
Low oxygen in house	No oxygen	People who indicate that at some point when they were in the house there was low/no oxygen.
Smoke caused low visibility	Smoke LV	At some point while they were in the house or they re-entered the house was filled with lots of smoke.
Surprised at toxicity of smoke	Smoke toxicity	Indication that they didn't realise how toxic the smoke was and how much smoke damage occurred as result.
Contact		
Contact family partner	Contact fam	People who indicate that at some point in response to the fire they contacted family or partner.
Contacted the fire service	Contact FS	People who indicated that they or someone else in the house contacted FS.
Contacted FS but felt overreaction	Contact FS OR	Contacted FS but felt at the time they contacted that it was an overreaction.
Contacted neighbour	Contact Neigh	At some point in response to the fire they contacted a

		neighbour or neighbours.
Contact family partner prior to FS	First contact fam	People who indicate that they contacted family before calling FS.
Didn't contact fire service	No contact FS	People who indicated that they didn't contact the fire service and the various reasons they noted for this.
Didn't contact as bigger fires for them to deal with	No contact FS bigger fires	Didn't contact for this reason.
Didn't want to inconvenience FS	No contact FS Inconvenience	Didn't contact for this reason.
Someone outside of house contacted FS	OS contact FS	People who indicate that someone not in the household contacted FS.
Damage		
House destroyed	House destroyed	The extent of the fire, smoke and water damaged or some combination of these things meant the house was written off.
Isolated and limited damage	Limited damage	People who indicate that damage to the property was minimal and isolated to a small area.
Small amount of damage because FS arrived quickly	Low damage close FD	The close proximity and quick response of the FS minimised damage to property.
Whole room destroyed	Room destroyed	Damage of fire required whole room to be gutted and redone.
Smoke damage	Smoke	Property only suffered smoke damage there was nothing structural.
Sporadic damage	Sporadic damage	The damage done by the fire/incident was sporadic with rather than total destruction.
Water damage	Water	Property damaged due to water used to put out fire.
Fire Safety		
Cautious around fire	Cautious	Fire event has caused them to be a lot more cautious around fires.

Cooking safety	Cooking safety	People who talk about changing their cooking safety habits or recommending others do as a fire prevention method.
Change way put out fire	Different extinguish	People who indicate that they would still try and put the fire out but would use a different method to do so.
More education about fire safety	Education	Suggestion that fire safety training and more education about fires will help reduce fires and injury.
Hyper vigilant about electronics	Electronic safety	Changed fire safety behaviours to be more careful about electronics and electrics within the house.
Now have fire exit plan	Exit plan	Since the fire have developed a fire exit plan for their house.
Exit the house quickly	Fast exit	Suggest that preventing fire and fire injury
Get fire extinguisher	Fire extinguisher	People who would suggest fire extinguishers are a good way to prevent fires. Or those who have got them since the fire.
Smoke alarms to prevent fires/injury	Have SA	Suggest that having working smoke alarm can help prevent fires/injury.
Power maintenance	Power MT	People who talked about powerline maintenance or other household electrical maintenance as an important prevention strategy
Ring FS right away	Ring FS first	People who suggest that if the same thing happened again or if there was another fire they'd call the FS right away.
Think about location of smoke alarms	SA locations	People who indicate that their fire safety practices changed to include installing more smoke alarms or installing them in specific locations
Changing smoke alarm type	SA type	Changing smoke alarms to longer lasting 10 year battery types.

Shifting flammable materials	Shift materials	People who talk about changes in fire safety behaviours that involve them shifting flammable materials away from certain places
Recommend system to alert neighbours to fires	Sys alert neigh	People who think part of the process of responding to fires should include some kind of system that makes it easy to inform your neighbours.
Talked with others about fire safety	Taught others	People who talk about telling others about their experience and promoted use of fire safety plans and smoke alarms and other fire safety practices.
Injury		
Burn injury	Burn injury	People who suffered burns as a result of the fire.
Minor smoke inhalation	Minor smoke inhal	People who had minor smoke inhalation as result of fire.
Overnight hospital stay	Overnight Hos	People who indicate that their injury meant that they had to stay in hospital for at least one night.
Outpatient treatment	OutP treatment	People who had to have on-going outpatient treatment as a result of injury.
Knowledge		
Fire exit plan	Exit plan	At the time of the fire there was a fire plan in place and house occupants had practiced evacuating the house.
Previous experience with fire informed actions	Previous experience	Previous experience with house or scrub fires informed decisions. Had some knowledge of the danger and heat of fire.
Similar event had happened	Previous similar	Participants indicate that a previous experience had happened to them or in the property where the fire happened.

Fire safety training	Previous training	Had an idea about how to respond as a result of fire safety training.
Re-enter		
After fire	After fire	People who indicate that they would have liked more guidance about when and if they could re-enter after the fire had been extinguished along with the potential danger of re-entering.
Entered house to find source	Enter to find source	People who indicate being outside of the house at the time of the fire starting but re-enter to establish the source of the fire.
Planned to re-enter	Plan re-enter	People who planned to re-enter the property to get particular items but did not as the fire got bad enough they realised they couldn't
Re-entered the house to find source	Re-enter find source	People who exited but re-entered the house to find the source of the fire.
Re-enter multiple	Re-enter multi	Went back into the house more than once.
Re-enter pet	Re-enter pet	Went back in to get a pet
Re-enter phone	Re-enter phone	Went back in to get a phone so they could contact FS or family member.
Re-enter put out	Re-enter put out	Went back in to put fire out or to help someone put the fire out.
Wouldn't change re-enter behaviour	Re-enter same	People who indicate that if they were in the situation again they would still chose to re-enter the house.
Re-enter to retrieve other possessions	Re-enter stuff	Went back into house to get other possessions.
Now understands the risks of re-entering fire	Risk re-enter	Talks about not really knowing how as risk they were re-entering the fire at the time but now has an understanding

		of how dangerous it was.
Someone else wanted to enter	Someone else wanted to enter	Someone who was not originally in the house wanted to enter, or did enter the house.
Understood unsafe to go any further into the house	Stopped unsafe	Indicated that they tried to re-enter the property but were stopped by thick smoke of flames and knew couldn't proceed.
Thought about re-entering house	Thought re-enter	People who indicate that they thought about going back in or were tempted to but thought better of it.
Responses behaviours		
Functioning on adrenalin	Adrenalin	People who indicate they were functioning on adrenalin did things they would not or might not be able to do in other circumstances.
Alerted others in house	Alerted others	Alerted other by yelling or some other method that the house was on fire.
Automatic reaction was to extinguish	Auto extinguish	People who indicate that their automatic reaction was to find someway to put the fire out.
Exited house	Exit house	People indicate that they and others in the house exited the house.
Exited the house quickly	Exit house urgent	People indicate that they and others in the house exited the house swiftly after finding the fire.
Attempted to put out fire to protect person	Extinguish PP	People who indicate that their interaction with the fire was because they felt that it was a danger to someone else in the house.
Extinguish success	Extinguish Success	People who indicate that they or someone other than the FD managed to successfully put the fire out.
Got fire extinguisher but did	Fire Extg X	People who indicate that after finding the fire they got a fire

use		extinguisher with the intention of putting out the fire but then did not attempt to extinguish using the fire extinguishers
Moved vehicles away from the fire.	Move cars	People who moved cars away from the fire either to stop damage to car or to allow FS better access to property.
Someone attempted to move source of fire	Move fire	Someone tried to move the source of the fire to another location in an attempt to put if out or put it in a safer location.
Fire out didn't evacuate	No Exit	People who indicate that they felt they had dealt with the fire and didn't need to leave the house.
Remained in house to check that everyone was out before leaving	Person sweep	People who indicate that they did some kind of intentional check of the house for people before leaving.
Put pets outside	Pets outside	In the process of evacuating the house pets were put outside.
Shut door when exited	Shut door	People who indicate the when exiting they shut the door to house or room.
Shut door when exited intentional	Shut door intentional	People who indicate the when exiting they shut the door to house or room intentionally to slow the fire.
Worked together to get out	Teamwork	People in the house communicated and worked together to establish the best/safest way to get everybody out of the house.
Grabbed useful items in the process of exiting the house	Took items incidental	People who indicate that they took things with them in the process of leaving because they went by them in the process of leaving the house.
Found important items before leaving	Took items intentional	People who indicate that they looked for a specific item or items before leaving the

		house.
Someone tired to put out	Tried extinguish	Someone, the participant or someone else in house took some action to put out fire.
Turned off electricity	Turn off electricity	In response to the fire someone turned off the electricity.
Unsure how to respond	Unsure respond	People who indicated they weren't sure what to do once they discovered the fire.
Thoughts feelings		
Assessed fire and decided that they could put it out themselves.	Assess manage	People who indicate that at the time they looked at the fire and decided that it was something that they could put out themselves.
Assessed situation to establish what was possible	Assess situation	People who indicate that they took the time to assess the situation and how they could and should do in response to it.
Felt aware of their own limits	Aware limits	People who indicated that they knew their own limits and that they only did as much as they believed they safely could.
Calm collected personality	Calm personality	People who indicate that their reaction and behaviour was a result of their personality, know how to react in risk situations.
Was not thinking at the time of fire.	No think	People who indicate that their actions in response to the fire were not thought out it was something that they did instinctually.
Did not think could put out fire	Not handle	People who talk about assessing the situation and realising the fire was too big for them to manage.
Things happened very quickly	Quick	People who indicate that the series of events moved very

		fast.
Understood relative danger of situation	Relative danger	People who indicate that they didn't feel like they were in a lot of danger at the time but that they were also aware of how quickly that could change.
Shocked	Shocked	Shocked at some aspect of the fire. E.g it being there or how quickly it moved.
Thought that they should attempt to put it out if it was possible	Think try extg	People who thought at the time that they should try and put it out if they could
When alerted thought something else	Thought something else	When they became aware that something was going on they didn't realise it was a fire and initially attributed it to another cause.
Didn't have clear idea of danger	Unaware of danger	Indicated that at the time of the fire they were not aware of how dangerous the situation actually was.
Unaware of extent of situation	Unaware of extent of sit	People indicating that at the time they didn't realise how much damage had been done to the house or that they were injured.
Not something that you expect to happen	Unexpected	People who indicate they weren't prepared and didn't think that this was something that would happen to them.
Feel useless watching house burn	Useless	People who indicate that having to stand back and watch things burn made them feel useless and that they felt like they wanted to do something.
Weren't worried about possessions	X possessions	People who talk about not focusing on or being worried about their possessions at the time of the incident.