



Report

# Evaluation Report: FRNSW's Fire Safety Education Programs for Children

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Community Engagement Unit

**Community Safety and Research Directorate**

## Executive Summary

Fire safety education (FSE) is implemented by fire services around the world to enhance children's capacity to prevent, prepare for, respond to, and recover from fire. In fact, prevention through education is the first line of defence against misuse of fire and fire related injuries and fatalities in children. Despite widespread implementation, there were no overarching evidence-based guidelines informing the development or evaluation of programs.

In light of this gap, and to ensure the implementation of best practice FSE, Fire and Rescue NSW (FRNSW) conducted a comprehensive study, in two parts.

The first part involved the analysis of FRNSW's existing FSE programs for children. This involved the analysis of existing literature, program documents, secondary data, educator surveys, firefighter surveys, firefighter interviews, and expert advice. Collation and meta-analysis of the data revealed 29 evidence-based practices of fire safety education that are empirically associated with effective programming. Based on these findings, program modifications were made to align FRNSW's FSE with evidence-based practice.

The second part of the study involved pilot testing the modified programs. The programs were pilot tested in 13 Early Childhood Education and Care Services and Primary Schools in the Greater Sydney Area, to a total of 67 classes by 41 fire station crews. The programs were also reviewed by the Australian Institute of Disaster Resilience, the NSW Department of Education, and a leading academic in the field of child-centred disaster risk reduction. The programs were modified based on the pilot results, and the final programs were released in May 2021.

The study led to:

- The development of evidence-based, curriculum-mapped fire safety education programs.
- The publication of a peer-reviewed journal article: Pooley, K. Nunez, S, & Whybro, M. (2021). Evidence-based practices of fire safety education programming for children, *Australian Journal of Emergency Management*, 36(2). doi:10.47389/36.2.34
- At invitation, presentation of the programs at the NSW Department of Education Phoenix Conference at the ICC Darling Harbour on 29<sup>th</sup> April 2021.
- The inclusion of FRNSW's programs as a case study of best practice in the Bushfire and Natural Hazards CRC's Practice Framework for Emergency Management.
- Support and release by the Minister for Emergency Services.

## Contents

<b>1</b>	<b>Introduction</b> .....	<b>4</b>
<b>2</b>	<b>Background</b> .....	<b>4</b>
<b>3</b>	<b>Part 1 Evaluation</b> .....	<b>5</b>
	3.1 Part 1 Methodology .....	5
	3.2 Part 1 Findings and Recommendations .....	6
	3.3 Part 1 Program Modifications .....	22
<b>4</b>	<b>Part 2 Pilot Test</b> .....	<b>32</b>
	4.1 Part 2 Methodology .....	32
	4.2 Part 2 Findings and Recommendations .....	34
	4.3 Part 2 Program Modifications .....	42
<b>5</b>	<b>Conclusion</b> .....	<b>43</b>
<b>6</b>	<b>References</b> .....	<b>44</b>

## 1 Introduction

Fire safety education (FSE) is implemented by fire services around the world to enhance children's capacity to prevent, prepare for, respond to, and recover from fire. In fact, prevention through education is the first line of defence against misuse of fire and fire related injuries and fatalities in children. Despite widespread implementation, there were no overarching evidence-based guidelines informing the development or evaluation of programs.

In light of this gap, and to ensure the implementation of best practice FSE, Fire and Rescue NSW (FRNSW) conducted a comprehensive study, in two parts. The study evaluated the theoretical underpinnings, processes, and outcomes of FRNSW's existing fire safety education programs for children and subsequent pilot testing of the modified programs. Three programs underwent evaluation: Pre Ed for children aged three to five years; Fire Ed 1 for students aged five to seven years; and Fire Ed 2 for students aged ten to twelve years.

The first part of the study involved a theoretical, process, and outcomes evaluation of FRNSW's existing FSE programs. The evaluation involved the analysis of existing literature, program documents, secondary data, educator surveys, firefighter surveys, firefighter interviews, and expert advice. Collation and meta-analysis of the data revealed 29 evidence-based practices of fire safety education that are empirically associated with effective programming. Based on these 29 evidence-based practices, nine program modifications were proposed. These modifications were designed to address several evidence-based practices in a manner that will ensure the updated programs meet end-user needs with empirical rigor, while ensuring feasibility and propriety. The proposed program modifications were subsequently implemented to align FRNSW's FSE programs with evidence-based practice.

The second part of the study involved pilot testing the updated programs. Program processes and outcomes were tested in 13 Early Childhood Education and Care Services and Primary Schools in the Greater Sydney Area, to a total of 67 classes by 41 fire station crews. The pilot programs were also reviewed by the Australian Institute of Disaster Resilience, NSW Department of Education, and a leading academic in the field of child-centred disaster risk reduction. The pilot programs were modified based on the pilot results, and the final programs were released in May 2021.

## 2 Background

Fire services are increasingly implementing community risk reduction mechanisms to enhance fire prevention and preparedness (Simpson *et al.* 2014). One community risk reduction mechanism, fire safety education (FSE) for children, plays a pivotal role in fire prevention and preparedness (Brown 2019; Huseyin & Satyen 2006; Satyen, Barnett & Sosa 2004). School-based FSE programs are implemented around the world to improve children's fire safety knowledge and skills (Kendrick *et al.* 2007; Satyen, Barnett & Sosa 2004). Such programs aim to enhance children's understanding of fire and how to respond appropriately to reduce the likelihood they will misuse fire or be harmed by fire (Kendrick *et al.* 2012). Evidence suggests that prevention through education is the single most modifiable strategy that fire services can implement to reduce the risk of fire to children (Monk 2011).

School-based FSE programs are generally delivered by firefighters during school visits that occur periodically or as a stand-alone program, in isolation or coupled with educator delivered components (Satyen, Barnett & Sosa 2004). Despite widespread implementation of FSE in schools, there are no overarching evidence-based guidelines informing the development of new programs or the

evaluation of existing programs (Simpson *et al.* 2014). This is problematic where empirically-derived knowledge is required to determine what works in FSE for children (Huseyin & Satyen 2006; Simpson *et al.* 2014).

To fill this void, a comprehensive study was conducted, in two parts. The first part involved an evaluation of existing literature and FRNSW's existing FSE programs for children, systematic comparison of these findings, and proposed program modifications. The second part involved the pilot testing of the updated programs and the development of finalised programs.

## 3 Part 1 Evaluation

### 3.1 Part 1 Methodology

The evaluation consisted of six parts. The findings from each part were collated and meta-analysed to identify evidence-based findings and recommendations to inform program modifications.

#### 3.1.1 Existing Literature

A theoretical evaluation was conducted to determine if FRNSW's existing FSE programs for children aligned with evidence-based practice. To identify evidence-based practice, a Rapid Evidence Assessment (REA) was conducted. REAs methodically collect relevant empirical evidence about a topic, collate the data, then meta-analyse it to summarise existing research. An iterative search strategy with the following key words was used to search FRNSW's library catalogue and Google: child\* OR young person OR adolescen\* OR youth OR juvenile AND fire AND educat\* OR school OR prevent\* OR program\*. A total of 68 sources were included in the REA. Once the REA data had been collected and collated, it was meta-analysed. The findings revealed 29 evidence-based practices of effective FSE programming for children.

#### 3.1.2 Documentary Analysis

To determine if FRNSW's existing programs aligned with the REA data, the 29 evidence-based practices of effective FSE programming for children were systematically compared to the information in the documents supporting each program. The documentary analysis consisted of theoretical analyses of each program's Facilitator Guide, Firefighter Session Plan, Educator's Kit, and any additional resources.

#### 3.1.3 Secondary Data

Data from the Community Activity Reporting System (CARS), electronic Australasian Incident Reporting System (eAIRS), and Fire Investigation and Research Unit (FIRU) were analysed to determine how often, when, and by whom FRNSW's FSE programs for children have been implemented. The evaluation also aimed to identify any relationships between program implementation and fire related incidents and fatalities in children.

#### 3.1.4 End-User Surveys

##### 3.1.4.1 Educators

The Community Activity Reporting System (CARS) database was searched to identify all Early Childhood Education and Care Services and Primary Schools that received a FSE session by FRNSW firefighters between 1 July 2019 and 30 June 2020. Of these, 861 end-users were contacted via email on the 10<sup>th</sup> September, with a follow-up email sent on the 21<sup>st</sup> September 2020. The email requested participation in a survey to collect information about firefighter-delivered FSE. The email included a link to a survey managed on Microsoft Forms. The survey was also made available via a QR code on

flyers distributed to educators who attended the Museum of Fire on Educator's Day (1<sup>st</sup> and 8<sup>th</sup> October 2020). After a four-week data collection period, 150 educators responded to the survey.

#### 3.1.4.2 Firefighters

Firefighters were invited to complete a Microsoft Forms survey about their perceptions and experiences of FSE through an intranet/FR360 story released on the 21<sup>st</sup> September 2020 and published for a second time on the 12<sup>th</sup> October 2020. The survey was also placed on the Station Planning System (SPS) as an unassigned task on the 1<sup>st</sup> October 2020. After a four-week data collection period, 204 firefighters responded to the survey.

#### 3.1.5 Firefighter Interviews

In 2015, Dr. Briony Towers was commissioned to conduct a process and outcomes evaluation of FRNSW's FSE programs for children. Towers conducted 15 semi-structured interviews with firefighters about their perceptions and experiences of Pre Ed, Fire Ed 1, and Fire Ed 2. Despite conducting an in-depth, qualitative evaluation, Towers' findings were not subsequently implemented. Towers made these findings available for the purposes of this evaluation.

#### 3.1.6 Consultations with Experts

Semi-structured interviews with three experts were conducted: an early childhood educator with seven years' experience, a primary school educator with 17 years' experience, and a behavioural analyst with experience working with children with learning and behavioural disorders. Experts were asked about their perceptions of the existing FSE programs for children and their recommendations for improvement.

### 3.2 Part 1 Findings and Recommendations

#### 3.2.1 FSE should explicitly identify the theory of change underpinning program activities.

FSE programs are generally underpinned by the premise that children have limited capacity to understand the risks and consequences of fire, and an inability to react promptly and rationally to fire (Chen *et al.* 2011; Harpur, Boyce & McConnell 2012; Phillips 2012; Smith *et al.* 2018; UK Office of the Deputy Prime Minister 2003). This lack of knowledge and awareness puts children at risk of misusing fire or being harmed by fire. FSE aims to improve children's knowledge and awareness of fire and fire safety to reduce this risk (Cakiroglu & Gokoglu 2019; Dukes *et al.* 2016; Subramaniam 2004). If children are aware of the risk posed by fire, the need for immediate response to fire, and knowledge of fire safety, they will be more likely to behave and respond appropriately (Office of the Advocate for Children and Young People 2020; Subramaniam 2004).

Although theoretically underpinned by this theory of change, FRNSW's existing programs do not explicitly identify the theory underpinning the program's activities. This is problematic where a strong and comprehensible theory of change is needed to ensure program facilitators understand the purpose and objectives of the program and can implement it with fidelity. FSE programs should explicitly explain the theory of change to ensure facilitators understand how the activities undertaken as part of the program lead to intended effects. This will enhance the likelihood that the program will be implemented as intended, which will in turn improve program effectiveness.

**Recommendation:** Explicitly identify the theory of change within all FSE program material to ensure facilitators understand how the activities undertaken as part of the program lead to intended effects.

### 3.2.2 FSE should be tailored to the developmental stages of children

It is important to deliver FSE to children as early as possible when their sensory input is high (Jankowski 2015). Where generic FSE is more effective for primary school-aged children than pre-school or kindergarten-aged children (Chavez *et al.* 2014), it is necessary to ensure that FSE is implemented with age appropriate increments (Jankowski 2015; Satyen, Barnett & Sosa 2004). This may be achieved by tailoring FSE to the developmental stages of children (Gielan *et al.* 2010; Lidstone 2006). Although not absolute, developmental stages provide a standard and commonly accepted classification of children (Giesler 2017).

Documentary analysis revealed a gap in delivery within FRNSW's programs. Pre Ed targets children aged three to five years (Early Years Learning Framework and Early Stage 1), Fire Ed 1 targets children aged five to seven years (Stage 1), and Fire Ed 2 targets children aged ten to twelve years (Stage 3). FRNSW dualises Stage 3 with the implementation of Fire Ed 2 and the Stage 3 Bushfire program. Meanwhile, there are no programs for children aged eight to nine years (Stage 2).

Further, interviews with firefighters revealed that Fire Ed 1 was perceived as more effective than Pre Ed because children in Early Childhood Education and Care Services (childcare and pre-school) were not able to engage with the content. Firefighters felt that Pre Ed was little more than babysitting or entertainment. This may occur because Pre Ed is targeted towards children aged three to five years, yet there are vast pedagogical differences between children in Early Childhood Education and Care Services who are taught under the Early Years Learning Framework and children in Kindergarten who are taught under the Early Stage 1 curriculum. There is therefore a need to tailor lesson plans and resources to the specific needs of each developmental stage.

**Recommendation:** Develop a staged Pre Ed program that uses different lessons and resources to target Early Childhood Education and Care Services at the lower end (Early Years Learning Framework) and kindergarten at the upper end (Early Stage 1).

**Recommendation:** Target Fire Ed 2 towards children aged eight to nine years (Stage 2) to ensure that there are no gaps in the delivery of FSE and that FSE aligns with the standard developmental stages determined by the curriculum.

### 3.2.3 FSE should be mapped against the education curriculum

FSE must be mapped against the education curriculum to ensure seamless integration into school lessons (Phillips 2012). Direct alignment is essential where an overcrowded curriculum constrains opportunities for the delivery of stand-alone programs (Towers & Whybro 2017). A standardised, integrated curriculum that connects the physical and social world, and helps children understand the complexities of fire, hazards, and disaster risk more broadly, has been linked to reductions in fear and increased preparedness (Phillips 2012; Ronan & Towers 2014).

Documentary analysis revealed that FRNSW's existing FSE programs were not mapped to the curriculum. Although Fire Ed 1 and Fire Ed 2 documents state that the programs align with the Stage 1 and Stage 3 PDHPE curriculum, the program activities are not mapped to curriculum outcomes. Pre Ed is not aligned with the Early Years Learning Framework or the Early Stage 1 curriculum. Further, none of the programs align with Key Learning Areas other than PDHPE.

Despite this, educator and firefighter surveys revealed that schools often requested FSE to meet a component of the education curriculum. When asked how they would improve the program, educators asked for easier access to the programs to ensure they can be incorporated regularly within lesson planning and lessons that are mapped against the curriculum for ease of use.

Firefighter interviews similarly highlighted the need to align FSE with the curriculum due to time pressures educators face as they seek to deliver the mandated curriculum. A lack of alignment between FSE and the curriculum was considered a factor in the low levels of Fire Ed 2 delivery. Curriculum integration was considered one of the most important facilitators of program implementation.

**Recommendation:** Develop and provide educator lesson plans that are mapped against several Key Learning Areas of each respective education curriculum: Early Years Learning Framework, Early Stage 1, Stage 1, and Stage 2.

### 3.2.4 FSE programs should be widely promoted

Educator and firefighter surveys revealed that both end-users held strong positive perceptions of FSE. Educators stated that the programs provide critical, free services that educate children about fire safety. They also connect children to firefighters as members of the community and engender a sense of trust of firefighters within children. Firefighters described FSE as a valuable, useful, worthwhile, essential, satisfying activity that is vital to effective community engagement and risk reduction. Despite this, educators asked for more information about the programs. Firefighters highlighted low demand for Fire Ed 1 and Fire Ed 2 due to poor engagement with schools. Both educators and firefighters recommended wider promotion of the program.

Interviews with firefighters revealed that the largest perceived barrier to the delivery of FSE was a lack of awareness of FRNSW's programs within schools. Due to a reliance on school initiated visits and an absence of proactive engagement on behalf of firefighters, only a small proportion of schools were aware of the programs offered by FRNSW. Firefighters suggested that a lack of appropriate marketing materials and a lack of collaboration with the Department of Education impeded delivery.

**Recommendation:** Wider promotion of FSE through the formation of strong ongoing relationships between FRNSW and the Department of Education, and local fire stations and schools.

**Recommendation:** Wider promotion of FSE online through targeted use of the Brigade Kids website.

### 3.2.5 Child centred disaster risk reduction mechanisms should be ingrained within FSE

Child-centred disaster risk reduction (CCDRR) draws upon the rights, needs, and capacities of children to reduce risk and enhance resilience (Back, Cameron & Tanner 2009). CCDRR positions children as dynamic agents of change who can prevent and prepare their families and communities for fire, influence response to fire, and grow from the challenges associated with fire (Hayes, Lassa & Towers 2010; Office of the Advocate for Children and Young People 2020). CCDRR mechanisms can be ingrained in FSE by empowering children to actively engage with and maintain ownership over program activities (Back, Cameron & Tanner 2009; Office of the Advocate for Children and Young People 2020). CCDRR learning should be inquiry-driven, action-oriented, and interactive (Brown 2019; Gielan *et al.* 2010), while engendering engagement with the wider community, ownership, and a social consciousness (Hayes, Lassa & Towers 2010).

Documentary analysis revealed that none of the existing FSE programs contain any mechanisms through which children can actively engage with and maintain ownership over program activities. This contrasts with evidence that empowering children leads to greater investment, agency, and resilience.

**Recommendation:** Ensure educator and firefighter lesson plans include inquiry-driven, action-oriented, and interactive activities that engender engagement with the wider community, ownership over their personal safety and the safety of others, and a social consciousness.



**Recommendation:** Embed digital resources within FSE to facilitate interactive and self-directed learning.

### 3.2.6 FSE should be educator delivered and firefighter reiterated

Stand-alone firefighter-delivered FSE is not sufficient to reduce fire-related risks in children (Jankowski 2015; Monk 2011), meaning firefighters should not be the primary source of FSE (Gerald 2019; Ogier 2008). Instead, FSE is more effective when education professionals teach fire safety concepts and skills to children, and firefighters reiterate lessons learned (Monk 2011). This requires a coordinated approach (Jankowski 2015; Monk 2011; Ogier 2008). While educators are best placed to provide age appropriate and accessible education, coupled with opportunities to practice and consolidate lessons learned (Gerald 2019; Towers *et al.* 2014), firefighters are best placed to familiarise children with their appearance and roles while reiterating the fire safety messages taught by educators (Gerald 2019).

Documentary analysis revealed that two of the three existing FSE programs (Pre Ed and Fire Ed 1) do include educator resources to facilitate the delivery of FSE prior to, or after, firefighter attendance. Fire Ed 2 does not. Despite this, educator surveys revealed that only a small proportion of educators received an Educator's Kit prior to firefighter attendance. Less than one third of firefighters reported providing educators with resources prior to their attendance.

Similarly, interviews with firefighters revealed that although FRNSW's existing FSE programs included educator-delivered components, instruction to educators and the provision of resources were not a routine part of program implementation. This meant that the educator delivered lessons did not usually occur. When educators did not deliver FSE before firefighter attendance, firefighters felt that the effectiveness of FSE was impeded, and that their visit was often reduced to 'entertainment' or 'babysitting'.

Educator and firefighter surveys revealed that when children had good fire safety knowledge before firefighter attendance, the firefighter delivered session was more effective. However, children were also more likely to get bored or distracted during the firefighter session. This highlights the need to ensure the firefighter lesson does not repeat the educator-led lessons but consolidates knowledge through unique engagement.

**Recommendation:** Structure each FSE program to contain four to five educator delivered lessons, followed by a firefighter delivered session that consolidates lessons learned through unique engagement.

### 3.2.7 Separate FSE from community engagement

It is important that the firefighter-delivered component of the program does not become an entertainment or goodwill exercise (Ogier 2008). Focusing on the fire truck and playing with water hoses distracts children from the fire safety messages delivered and may impede program effectiveness (Ogier 2008).

Documentary analysis revealed that fire truck and water hose play is a component of Fire Ed 1 lesson plans only. Despite this, educator and firefighter surveys revealed that fire truck and water hose play were one of the most common activities reported, regardless of the type of program delivered. However, educators were unsure about the fire truck and water hose session. While some suggested that this was the most engaging part of the session for the children, others stated that it detracted from the fire safety messages and was difficult to manage. Firefighters were also weary. Some stated that this component of the program was inappropriate and that fire safety messages were often

forgotten as children appeared more interested in looking at the truck and playing with the hose than the fire safety messages delivered. Some firefighters suggested that this component was often the only reason they were invited to a school or centre and that FSE was secondary.

Where both educators and firefighters agreed that the main reasons for organising a FSE session were to improve children's fire safety knowledge and skills and to reduce the risk that children will play with fire or be harmed by fire, it is critical that these outcomes are prioritised. Fire truck and water hose play have engagement rather than educational outcomes. Where there is evidence that these activities impede the effectiveness of FSE, it is important to separate FSE conducted for risk reduction purposes from activities conducted purely for engagement.

**Recommendation:** The firefighter delivered component of FSE programs should not contain fire truck or water hose play. These sessions should be implemented during community engagement activities only.

### 3.2.8 FSE should implement the 'instruction, modelling, rehearsal, and feedback' approach

There is evidence to suggest that FSE should be taught using the 'instruction, modelling, rehearsal, and feedback' approach (Cakiroglu & Gokoglu 2019; Dukes *et al.* 2016; Giesler 2017). Instruction refers to information given to children about the correct behaviour in specific situations; modelling to the imitation of demonstrated behaviour; rehearsal to the practice of this newly learnt behaviour; and feedback to positive reinforcement when behaviours are modelled correctly and instructive feedback when they are not (Cakiroglu & Gokoglu 2019; Dukes *et al.* 2016). Importantly, this approach has been identified as effective in teaching fire safety skills to children with learning or behavioural problems, such as autism (Dukes *et al.* 2016).

Documentary analysis revealed that none of the FSE programs explicitly follow the 'instruction, modelling, rehearsal, and feedback' approach. Although most of the lessons do involve instruction and/or modelling, with the opportunity to rehearse, the lesson plans do not explicitly include feedback. It is important that children receive positive reinforcement when behaviours are modelled correctly and instructive feedback when they are not.

**Recommendation:** Ingrain the instruction, modelling, rehearsal, and feedback approach within all educator and firefighter delivered lessons that aim to teach fire safety skills in specific scenarios.

### 3.2.9 FSE should be gain-framed, caregiver mediated, and portrayed as a social norm

Children's understanding of fire safety messages is affected by framing and scripting (Borzekowski *et al.* 2013; Gielan, Borzekowski & Rimal 2010). Fire safety messages that are gain-framed (show the correct behaviour followed by a positive outcome) and are combined with scripted caregiver mediation (discussion between the child and caregiver that follows pre-determined talking points) have been identified as effective in communicating safety behaviours (Borzekowski *et al.* 2013; Gielan, Borzekowski & Rimal 2010). Evidence also suggests that creating the perception that a certain behaviour is a social norm is effective in changing behaviour and reducing risk-taking in children (Morrongiello & Schwebal 2017). If children are exposed to gain-framed messages and caregiver mediation, correct behaviour may be perceived as a social norm that, in turn, may instigate safe fire behaviour (Morrongiello & Schwebal 2017).

Documentary analysis revealed that none of the FSE programs implement gain-framing. Although children are taught the correct behavioural responses to certain situations, the lesson plans do not explicitly require firefighters or educators to inform children about the positive outcomes of their actions. This contrasts with evidence that following correct behaviour with a positive outcome is more effective in communicating safety behaviours.

**Recommendation:** Embed the demonstration of the correct behavioural responses to fire followed by positive outcomes, within educator and firefighter lesson plans.

**Recommendation:** Provide take-home resources for caregivers to facilitate caregiver mediation of fire safety messages delivered at school by educators and firefighters.

### 3.2.10 FSE should be short in duration and repeated over time to consolidate learning

Children need time to repeat and rehearse skills to consolidate learning and add new skills to their behavioural repertoire (Gerald 2019; Jankowski 2015; Lidstone 2006; Rimmer *et al.* 2010). FSE should therefore be delivered over several different sessions to facilitate repetition (Jankowski 2015).

Further, younger children have shorter attention spans than older children, while older children have shorter attention spans than adolescents (Gerald 2019; Lidstone 2006). FSE sessions should thus be short in duration, with lesson time adjusted to suit the developmental stages of children.

Despite this, secondary data analysis revealed that firefighter delivered FSE sessions varied greatly in duration, ranging from one quarter of an hour to 10.5 hours. The average session was conducted in 1.23 hours with the most frequent duration being one hour.

This may have occurred because the Pre Ed Facilitator Guide does not specify the duration of the firefighter delivered session or the individual fire safety lessons within this session. Further, the Fire Ed 1 session plan instructs firefighters to deliver a 60-minute session while the Fire Ed 2 session plan instructs firefighters to deliver a 50-minute session. This contrasts with the evidence.

**Recommendation:** FSE should be delivered over multiple sessions that are short in duration. This can be facilitated by ensuring educators deliver four to five educator-led lessons, followed by one firefighter delivered session. Each lesson and session must be structured and scripted to ensure the lessons are short in duration.

### 3.2.11 FSE should be delivered using the 'multiple messages/multiple methods' approach

Not all children learn the same way; what works for some children will not work for others (Hickman & Lawrence 2010; Lehna *et al.* 2013). Further, not all children experience the same risks, where culture, race, ethnicity, and socioeconomic disparities influence risk of fire and child injury (Istre *et al.* 2002; Morrongiello & Schwebal 2017). To ensure FSE is targeted towards the needs of participants (Kirsch 2016; Lehna *et al.* 2013), and the risks experienced by each community (Monk 2011), the 'multiple messages/multiple methods' approach should be employed. This requires the use of a variety of techniques and resources to ensure all children get equal access to education that is suitable and relevant (Hickman & Lawrence 2010; Kirsch 2016). This may include presenting the same message using a variety of modes and media (instruction, role play, video, and online interactive resources), the use of translated resources and culturally appropriate fire safety advice and scenarios (Kirsch 2016; Lidstone 2006; Rimmer *et al.* 2010), and the inclusion of community diversity within publications and illustrations (Gielan *et al.* 2010).

Documentary analysis revealed that existing FSE programs rely on limited resources such as flashcards and posters. The limited use of resources contrasts with evidence that FSE programs should involve a variety of resources and techniques to ensure all children get equal access to education.

Educator surveys revealed that the FSE programs were perceived as more effective for Australian Caucasian children than ethnically diverse or ethnic minority children. This may be a product of the limited use of resources and a reliance on language-heavy resources to teach fire safety concepts.

Despite this, interviews with firefighters revealed that FSE provides firefighters with an opportunity to engage with children from CALD communities who are not otherwise accessible. Where CALD communities are at risk communities, the delivery of FSE provides a critical opportunity to provide fire safety messages to children to take home to their families.

**Recommendation:** Provide educators, children, and caregivers with a diverse array of resources that are cross-translatable, such as digital and infographic resources that do not rely heavily on language.

**Recommendation:** Use children as the conduit through which ethnically diverse or ethnic minority families learn about FSE through the provision of take-home resources such as digital and infographic resources provided to children.

**Recommendation:** Pilot test the new programs in schools of ethnically diverse children to ensure effectiveness across ethnicities.

### 3.2.12 FSE should be behaviourally focused

FSE should be behaviourally focused (Jankowski 2015; UK Office of the Deputy Prime Minister 2003). Lessons should involve stimulating and interactive activities that facilitate the transfer of knowledge and skill to the practical environment (Jankowski 2015; UK Office of the Deputy Prime Minister 2003). Skills such as 'get down low and go, go, go' to safely exit a room with a smoke layer and 'stop, drop, cover, and roll' when clothing catches alight teach children how to respond appropriately to fire (Gielser 2017; Hickman & Lawrence 2010; Huseyin & Satyen 2006; Kendrick *et al.* 2007; Smith *et al.* 2018). Such skills are important where a child's behavioural response to fire increases their risk of fire fatality (Chen *et al.* 2011).

Documentary analysis revealed that existing FSE programs include lessons on crawling low in smoke (get down low and go, go, go) and what to do when your clothing catches alight (stop, drop, cover, and roll). Likewise, educator and firefighter surveys revealed that the vast majority of FSE sessions included these key fire safety behaviours. Despite this, documentary analysis highlighted a lack of resources to facilitate the transfer of knowledge and skill into the home and family.

**Recommendation:** Continue to deliver key fire safety behaviours using stimulating and interactive activities that facilitate the transfer of knowledge and skill to the practical environment.

**Recommendation:** Provide take-home resources that encourage children and caregivers to practice fire safe behaviours, such as digital and infographic resources.

### 3.2.13 FSE should involve fire escape planning and drilling

Although FSE often teaches children how to exit a room safely, studies have found that the self-rescue capabilities of children are limited (Najmanova & Ronchi 2017). Although at the age of three, children are capable of self-preservation and have the capacity to understand and follow simple instructions and walk without support (Taciuc & Dederichs 2013), they have limited understanding of risk, an undeveloped sense of danger, a lack awareness of the need to escape unsafe or dangerous situations, and an inability to react promptly and rationally to fires (Chen *et al.* 2011; Harpur, Boyce & McConnell 2012; Smith *et al.* 2018). Further, younger children take longer to evacuate than older children and are more likely to need an adult to accompany them or instructions to follow (Harpur, Boyce & McConnell 2012; Najmanova & Ronchi 2017; Smith *et al.* 2018). Older children have the capacity to self-rescue and evacuate unsafe environments without adult support or guidance, with many older children experiencing periods of being home alone (Giesler 2017). However, evidence suggests that children who are home alone and face an emergency do not know how to respond

appropriately (Durso 2013). It is therefore important to educate older children about how to handle emergencies and make difficult decisions without adult guidance (Giesler 2017).

This evidence highlights the importance of fire escape planning and drilling (Chen *et al.* 2011; Lehna *et al.* 2013). Educators and caregivers should guide children through the process of creating and practicing fire escape plans at school and home (Giesler 2017). Plans and drills increase fire safety knowledge and accuracy of response to fire (Giesler 2017; Hickman & Lawrence 2010; Huseyin & Satyen 2006; Tatebe & Mutch 2015). Fire escape planning and drilling should reinforce appropriate behaviour, such as alerting an adult to the alarm or fire, initiation of own evacuation, going to a pre-arranged safe place, and calling emergency services (Mytton, Goodenough & Novak 2017). It is also important to note that fire alarms differ in tone, pitch, and rhythm (Dukes *et al.* 2016), and may trigger adverse reactions in some children (Cohen 2012). Pre-instruction and repetition are therefore important to ensure children can differentiate between fire alarms and other sounds and are desensitised to the sound yet know how to respond appropriately (Cohen 2012; Dukes *et al.* 2016).

Documentary analysis revealed that existing FSE programs do not contain sufficient information on fire escape planning and drilling. This is concerning where FIRU data revealed that a large proportion of fire fatalities in children occurred in buildings where smoke alarms were not installed or activated or did not sound. Most of the time, another person successfully escaped the premises, suggesting children were unable to escape or be saved. Most children died in situ and on scene at the fire. In three cases, children were found in their bedroom; in one case a child was found in their bedroom cupboard. This data highlights the critical need to educate children and caregivers about home fire escape planning and drilling.

**Recommendation:** Ensure FSE teaches children about the purpose and importance of Home Fire Escape planning and drilling and provide children with take-home resources that facilitate the transfer of knowledge and skill to the home and family.

**Recommendation:** Provide caregivers with information booklets about the fire safety risks facing children and the measures they should take to mitigate these risks.

### 3.2.14 FSE should include firefighter identification and awareness

Education that teaches children how to identify a firefighter and the roles of firefighters is effective at improving firefighter awareness and the need to go to a firefighter in an emergency (Cole, Krandell & Kourofsky 2004; UK Office of the Deputy Prime Minister 2003). It is important to emphasise that children should not run or hide from a firefighter in an emergency but gain their attention and approach them if safe to do so (Giesler 2017). While firefighters should dress in their full structural uniform during lessons to aid identification, their appearance may initially frighten younger children. It is therefore important for the firefighter to sit or crouch down when delivering FSE so that they are on the same level as the children (Giesler 2017).

Documentary analysis revealed that all FSE programs contain a lesson on firefighter identification and awareness. Most educators reported that they received a lesson about firefighter identification and awareness, while firefighters similarly reported delivering such lessons. Nearly all educators and firefighters agreed that the FSE programs increased children's trust in firefighters. This appears to be one of the most effective components of existing FSE programs.

**Recommendation:** Continue to include firefighter identification and awareness sessions within all FSE programs. Improve on these sessions by teaching children how and when to go to a firefighter during a fire.

**Recommendation:** Provide better firefighter instruction that teaches firefighters to sit or crouch down when delivering FSE so that they are on the same level as the children.

### 3.2.15 FSE should include match/lighter safety

Education that positions matches and lighters as tools for adults improves children's awareness of the need to tell an adult if they see matches or a lighter (Cole, Krandell & Kourofsky 2004; Giesler 2017), which in turn reduces match/lighter play (Kendrick *et al.* 2007). This is important where match/lighter play is associated with an increased risk of fire injury and fatality in children (Chen *et al.* 2011; Istre *et al.* 2001). Although there is evidence to suggest that children should be educated about the medical and social consequences of misusing fire (UK Office of the Deputy Prime Minister 2003), this finding contrasts with the need to use gain-framing. Instead, match/lighter safety should focus on informing an adult if children see matches or lighters and the positive outcome of that response.

Documentary analysis revealed that there is limited education on match/lighter safety within existing FSE programs. The lessons that are included do not provide children with the opportunity to model or rehearse the correct behavioural response to finding matches or lighters. This contrasts with evidence that FSE should be behaviourally focused and should provide children with the opportunity to translate their knowledge into practice.

Educator and firefighter surveys revealed that less than half of educators reported receiving a lesson on match/lighter safety, while less than three-quarters of firefighters reported delivering lessons on match/lighter safety.

**Recommendation:** Include match/lighter safety lessons within all FSE programs, ensuring that the correct behavioural response to finding matches or lighters is modelled and rehearsed.

### 3.2.16 FSE should include messaging about when and how to dial Triple Zero (000)

Children should be taught to dial Triple Zero (000), identify the circumstances under which to call Triple Zero (000), and develop knowledge of the repercussions of making hoax calls (Hickman & Lawrence 2010; Towers & Whybro 2017; UK Office of the Deputy Prime Minister 2003). It is also important that children get the opportunity to practice dialling Triple Zero (000) using the numbers as they would appear on a phone and learn how to navigate to the emergency dial pad on a phone (Giesler 2017).

Documentary analysis revealed that all FSE programs contain a lesson on calling Triple Zero (000). Similarly, educator and firefighter surveys revealed that nearly all FSE sessions involved lessons on how and when to dial Triple Zero (000). Despite this, further analysis revealed that lessons on calling Triple Zero (000) do not include information on how to navigate to the emergency dial pad on a mobile phone, how to differentiate an emergency from a non-emergency, the different types of emergencies that can occur and how to respond, or education about the ramification of making hoax calls.

**Recommendation:** Ensure lessons on Calling Triple Zero (000) include knowledge of what constitutes an emergency, the repercussions of making hoax calls, and how to navigate to the emergency dial pad on a phone. Resources must include a poster or picture of a phone to allow children to practice.

### 3.2.17 FSE should include bushfire safety

Due to the heightened risk of bushfire and increased impact of natural disasters on children, there is a need to provide bushfire education within FSE (Brown 2019; Office of the Advocate for Children and Young People 2020). When children are aware of the risk factors for bushfire, how to prepare and stay safe, they are more likely to assist in prevention and preparedness (Brown 2019) and

maintain resilience to respond and recover (Office of the Advocate for Children and Young People 2020). Bushfire education should assist children in understanding the importance of bushfire escape plans and how and when to implement them (Office of the Advocate for Children and Young People 2020). There is also a need for bushfire information packs that inform children what to do to prepare for a bushfire, what to pack in readiness, and where to go when leaving early (Office of the Advocate for Children and Young People 2020).

Documentary analysis revealed that FRNSW's existing FSE programs do not contain bushfire safety education. In fact, educator and firefighter surveys revealed that some end-users specifically requested bushfire safety education be included in FSE programs, particularly for older children.

**Recommendation:** Include bushfire safety education in Fire Ed 1 and Fire Ed 2 to ensure children have sufficient knowledge to ensure their safety and the safety of others during a bushfire emergency.

### 3.2.18 FSE should include fire hazard identification and mitigation

Lessons in fire hazard identification and mitigation improve children's understanding of how to identify and react to hazardous situations (Gielser 2017; Morrongiello 2012; Smith *et al.* 2018; Tatebe & Mutch 2015). A valid approach is to show children various hazard scenarios, including combustibles stored too close to a heat source, blocked exits, matches/lighters lying around, unsupervised candles and cooking, and overloaded power boards (Morrongiello 2012). This should be followed by the implementation of mechanisms to mitigate these hazards. Education that involves both identification and mitigation promote active engagement in hazard reduction (Office of the Advocate for Children and Young People 2020). Importantly, if children see their contributions implemented, they are more likely to engage with the material, maintain a sense of ownership over their safety, and promote a safe environment (Office of the Advocate for Children and Young People 2020).

Documentary analysis revealed that existing FSE programs have limited hazard identification and mitigation information. Lessons are limited to safe and unsafe fires and identifying items that are hot. Fire Ed 2 contains more advanced hazard identification, but this is taught using a video and students are not provided with the opportunity to implement lesson learned. This contrasts with evidence that hazard education should involve interactive exercises that require children to identify hazards in their environment and develop or implement mechanisms to mitigate these hazards.

**Recommendation:** Ensure FSE programs include interactive activities that teach children what a hazard is, how to identify various fire hazards, the consequences of fire hazards, and the appropriate actions to take to make each fire hazard safe.

### 3.2.19 FSE for older children should include fire science

FSE for older children must extend beyond specific fire safety skills (UK Office of the Deputy Prime Minister 2003). Older children need a good level of understanding of fire, the science behind fire, and all its characteristics, to enhance their capacity to identify risks and take appropriate actions (UK Office of the Deputy Prime Minister 2003). Fire science lessons should be concerned with what fire is, how it works, why it grows and spreads, and how it can be controlled and extinguished (UK Office of the Deputy Prime Minister 2003). Evidence indicates that children appreciate information that provides them with a deeper knowledge of why emergencies, such as house fires and bushfires, occur (Office of the Advocate for Children and Young People 2020).

Documentary analysis revealed that fire science is not included in Pre Ed or Fire Ed 1 lesson plans. Fire Ed 2 does contain a fire science lesson, but this limited to one lesson that does not facilitate repetition or the practical application of lessons learned. Educator and firefighter surveys revealed

that fire science was rarely taught. Despite being specifically applicable to Fire Ed 2, less than half of firefighters delivered a lesson on fire science.

**Recommendation:** Ensure Fire Ed 1 and Fire Ed 2 contain education on the science of fire, including the fire triangle and how to remove or reduce each element of the fire triangle to suppress or extinguish fire.

**Recommendation:** Include a video of a bedroom burn in Fire Ed 2 to demonstrate the interaction between oxygen, heat and fuel, fire growth, and flashover, based on relatable furnishings.

### 3.2.20 FSE should be relatable to children's lived experiences of fire

Research suggests that children desire the opportunity to share their stories and find common understanding with others (Office of the Advocate for Children and Young People 2020). By providing opportunities to share stories with their peers, the school, and the broader community, children can cognise fire safety messages in a meaningful and relatable manner (Office of the Advocate for Children and Young People 2020), which will in turn enhance the effectiveness of FSE.

Documentary analysis revealed that existing FSE programs do not provide an opportunity for children to share their stories and find common understanding with others. This contrasts with evidence that FSE is more effective when children cognise fire safety messages in a meaningful and relatable manner.

**Recommendation:** Provide children with the opportunity to share their lived experiences of fire through homework exercises that are completed under the care and supervision of their caregivers. Children should receive feedback about their behavioural response and changes they could make to enhance the safety of themselves and others in the future.

### 3.2.21 FSE should use actual resources and create a realistic training environment

FSE that uses actual resources, such as the firefighter uniform, smoke alarms, and a pretend phone to dial Triple Zero (000), creates a realistic training environment that facilitates the transfer of knowledge and skills to the practical environment (FEMA n.d.). Further, when children are educated in a simulated environment, such as a mock house prop or trailer, they can practice their fire safety skills in situ (Phillips 2012). This may enhance their capacity to identify and respond to hazards and understand the practical implications of their knowledge and skills (Phillips 2012).

Documentary analysis revealed that existing FSE programs include the use of a smoke alarm and the structural firefighter uniform with breathing apparatus. Similarly, educator and firefighter surveys revealed that FSE programs were usually delivered using a smoke alarm and the structural firefighter uniform with breathing apparatus. The use of actual resources occurs but is limited.

**Recommendation:** Use actual resources, such as a smoke alarm, the structural firefighter uniform with breathing apparatus, evacuation procedure, safe meeting place (evacuation point) to create a realistic environment that facilitates the transfer of knowledge and skills to the practical environment.

### 3.2.22 FSE should incorporate digital resources, activities, and social media

Children spend a large proportion of their time online, both in educational and recreational settings (Kirsch 2016) and often seek out information online (Durso 2013). Digital resources, activities, and social media provide a cost-effective means through which to engage with children, disseminate and reiterate fire safety information, and implement prevention strategies (Morrongiello & Schwebel 2017; Towers & Whybro 2017). New and emerging research suggests that serious games and



augmented/virtual reality should be used to train older children and adolescents to respond to a fire, make sound decisions, and evacuate safely (Almeida & Rossetti 2015; Cakiroglu & Gokoglu 2019). Serious games recreate situations that are difficult to simulate in the real world with a high degree of immersion and realism. They assist children in transferring their knowledge and skills to the practical environment (Cakiroglu & Gokoglu 2019).

Documentary analysis revealed that existing FSE programs do not provide links to any digital resources, activities, or social media.

Educator and firefighter surveys highlighted the need for interactive, digital resources that assist learning. Educators recommended play-based, interactive resources and activities to improve the programs, while firefighters similarly recommended the inclusion of interactive digital resources for children and caregivers.

**Recommendation:** Where the 'Ask a Firefighter' series on the Brigade Kids website is targeted towards young children, this resource should be embedded within lesson plans and resources for Pre Ed. Where the Triple Zero Kids Challenge is targeted towards Stage 1 students, this resource should be embedded within lesson plans and take home resources for Fire Ed 1. Given an absence of existing resources for Fire Ed 2, there is a need to develop a targeted digital resource for older children. This will ensure that each FSE program is accompanied by a digital resource that is specifically designed to reiterate lesson learned and transfer fire safety messages from school into the home.

### 3.2.23 Educators should be provided with resources and support

Although educators are best placed to deliver FSE, they are not subject matter experts. Nor do they have the time or resources to develop comprehensive FSE programs on their own (Ogier 2008). As a result, fire services must provide educators with resources and support to successfully teach fire safety concepts (Brown 2019; Towers *et al.* 2014; Ogier 2008). Correct and consistent information should be provided to educators to ensure that they can implement evidence-based and curriculum-aligned FSE (Brown 2019; Towers *et al.* 2014; Ogier 2008).

Documentary analysis revealed that while there are educator resources for Pre Ed and Fire Ed 1, there are none for Fire Ed 2. Despite this, the information provided in Pre Ed is contradictory, indicating a lack of consistency within Pre Ed resources. Further, the links to the Fire Ed 1 resources do not work. Fire Ed 2 does not include an educator delivered component and does not provide educators with support to reiterate lessons learned.

This is problematic where educator surveys revealed that less than half of educators knew how to find FSE resources and that this impacted on their capacity to deliver FSE before and after firefighter attendance. Where the delivery of FSE before and after firefighter attendance enhanced the perceived effectiveness of FSE, educators must be provided with all necessary resources to deliver FSE. Further, educators stated that, if they could make one change to the program, they would create an Educator's Kit that is attractive and easy to use to facilitate FSE delivery pre and post firefighter attendance.

**Recommendation:** Develop and provide free educator delivered lesson plans that are mapped against the curriculum and contain all necessary resources to ensure ease of use and delivery.

### 3.2.24 Caregivers should be provided with resources and support

Caregivers play a pivotal role in supervising and modelling appropriate fire behaviour for children (Bahr 2000). In fact, it is the behaviour and lifestyles of caregivers, rather than that of children, that is

paramount to reducing risk. Caregivers must be provided with education and information to ensure they are aware of the importance of home fire safety, adequate supervision, limiting access to incendiary materials, and safe modelling behaviour (Bahr 2000; Gielser 2017; Harpur, Boyce & McConnell 2012; Istre *et al.* 2002). Caregivers should be educated in fire-related risks associated with developmental stages (Smith *et al.* 2018) and should be educated to identify the indicators of misuse of fire in children (Giesler 2017). If caregivers practice safe fire behaviour throughout their lifetime, children are more likely to model this behaviour (Gielser 2017). Further, when caregivers are educated, they are more likely to create a safe environment for children (Gielser 2017).

Further, like educators, caregivers are best placed to educate children about fire safety. Caregivers have the capacity to deliver age appropriate and accessible education, while providing opportunities to practice and consolidate lessons learned (Johnson *et al.* 2014; Towers *et al.* 2014). To capitalise on the capacity of caregivers, they must be provided with resources to facilitate the practical application of fire safety knowledge learned by children (Kourofsky & Cole 2010; Rimmer *et al.* 2010; Towers *et al.* 2014). Take-home resources, such as checklists, factsheets, or homework exercises, facilitate sustained knowledge retention and the transfer of knowledge from children to caregivers that extends learning beyond classroom instruction (Chavez *et al.* 2014; Gielan *et al.* 2010; Johnson *et al.* 2014; Lehna *et al.* 2013; Ogier 2008; Rimmer *et al.* 2010; Tatebe & Mutch 2015; UK Office of the Deputy Prime Minister 2003).

Documentary analysis revealed that although existing FSE programs provide links to caregiver resources, including a letter to parents, an information booklet, and a feedback form, the links to these resources do not work and the resources are not readily available to firefighters. Existing FSE programs do not currently provide access to caregiver resources.

Secondary data analysis revealed that fires caused by young people have very specific characteristics that can be targeted through caregiver intervention, such as access to matches/lighters and periods of unsupervised, unstructured time. Further, fire fatalities in young people were associated with preventable factors, such as smoke alarms that were not installed or activated or did not sound, risk factors that can also be targeted through caregiver education.

Educator and firefighter surveys similarly highlighted the importance of caregiver resources. End-users asked for better take-home resources for caregivers and families to transfer fire safety messages to the home and family.

**Recommendation:** Provide caregivers with a digestible, translatable take-home resource that contains all necessary fire safety messages to ensure caregivers can maintain fire safety in the home.

**Recommendation:** Provide children with homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.

### 3.2.25 Children should be provided with take-home resources

Educator and firefighter surveys revealed that the provision of children's take-home resources increased the likelihood that the firefighter delivered session was perceived as effective. Despite this, many firefighters thought that the resources were out of date. They recommended updated, interactive, online resources that were engaging for children and caregivers. Educators also asked for updated, interactive, and digital resources for educators, children, and caregivers.

Interviews with firefighters revealed that the provision of children's take-home resources has historically been ad hoc; firefighters provide children with whatever resources they have available at the station at the time. This was reiterated in firefighter surveys, where firefighters stated that they

provided children with a combination of activity books, stickers, tattoos, balloons, spatulas, hats, and home fire safety booklets. Some firefighters specifically stated that they provided children with whatever was available at the station at the time, usually due to budget constraints. Despite this, take-home resources were critical to the transfer of fire safety messages from children to the home and family.

**Recommendation:** Provide firefighters with clearer instructions as to what constitutes take-home resources for children.

**Recommendation:** Consolidate take-home resources for children so that they include two resources that are easy to identify and order and can be provided within station budgets.

**Recommendation:** Provide children with updated take-home resources, such as activity books that are engaging and interactive and that provide links to digital resources to consolidate lessons learned and transfer learnings to the home and family.

### 3.2.26 FSE should be designed to ensure consistency in implementation

FSE programs should be designed to ensure consistency in implementation (Gerald 2019; Phillips 2012). Firefighters must be provided with training packages to assist in the systematic delivery of FSE (Gerald 2019; Monk 2011; UK Office of the Deputy Prime Minister 2003). The delivery of FSE should also be embedded within recruit training and career development (Monk 2011; UK Office of the Deputy Prime Minister 2003).

Documentary analysis revealed that although existing FSE programs are embedded within business as usual, firefighters are not trained in delivery during recruit training. Delivery is only embedded within the promotional pathway from Level 1 to Qualified Firefighter; however, the links to the learning resources do not work. Although there are facilitator guides and/or session plans for firefighters for each program, guidance is limited to written lesson plans and there is no instruction on how firefighters should deliver the lessons. Given most firefighters are not trained educators, further instruction is necessary.

Firefighter surveys revealed that there was a lack of understanding of the differences between Pre Ed, Fire Ed 1, and Fire Ed 2. Firefighters delivered all three programs to all age groups. They also delivered the same activities and used the same resources regardless of program type. Interviews with firefighters similarly highlighted that program fidelity is low. Firefighters generally did not use facilitator guides or session plans and tended to base their programming on personal experience and the approaches used by others at the station. This is problematic where firefighter surveys revealed that the use of resources to prepare for the delivery of FSE enhanced the perceived effectiveness of the session.

In the surveys, some firefighters stated that they felt ill-equipped and unprepared to deliver FSE due to a lack of experience in education and training, a lack of awareness of the programs, and inadequate training. This was reiterated within firefighter interviews. Here, firefighters stated that they learned from experience, colleagues, and self-directed research, rather than training resources such as facilitator guides and session plans. Firefighters felt that training and resources that taught firefighters about program objectives, content, and processes would enhance their capacity to deliver FSE.

There is therefore a need to provide firefighters with training and lesson plans that are easy to deliver to ensure a standardised approach that reduces inconsistencies caused by differences in preparation, knowledge, and prior experience.

**Recommendation:** Train firefighters in the delivery of FSE during recruit training, and reiterate during promotional program modules, from Firefighter to Qualified Firefighter, and Qualified Firefighter to Senior Firefighter.

**Recommendation:** Provide factsheets, online information, and training to clearly define and distinguish the purposes and target audiences of each program.

**Recommendation:** Provide firefighters with simple instructions, session plans, and letter templates to schools to guide planning and delivery, including instructional videos that demonstrate implementation.

### **3.2.27 FSE should be managed through a centralised booking system that facilitates regular, proactive engagement with schools**

The delivery of FSE should be embedded within normal workplace practices (Monk 2011; UK Office of the Deputy Prime Minister 2003). Firefighters should form ongoing relationships with local schools to ensure regular and consistent inclusion within the curriculum (Ogier 2008). Firefighters must be given ownership over the organisation and delivery of the program to encourage investment and commitment (Ogier 2008).

Documentary analysis revealed that although existing FSE program facilitator guides inform firefighters of the need to proactively identify and contact centres and schools within station areas to promote and support the delivery of FSE, there are no mechanisms to facilitate the development of ongoing relationships with local centres or schools to ensure regular and consistent delivery.

Secondary data analysis revealed that fire stations do not systematically implement FSE based on engagement in community risk reduction more broadly, call rate, or specific community risk (fires caused by young people). Further, call rate does not systematically impede the delivery of FSE. Despite this, there is a large disparity in FSE delivery at station, region, and zone levels. Further, Pre Ed is implemented significantly more often than Fire Ed (1 & 2), and there is an overall decreasing trend in the delivery of FSE since 2015. This indicates ad hoc, declining engagement with FSE.

Interviews conducted with firefighters highlighted the same: that sessions were conducted on an ad hoc basis, were mostly Pre Eds, initiated by educator requests, and the same schools requested sessions regularly. When firefighters did contact schools to offer program delivery, schools were either unresponsive or could not facilitate a session. Firefighters also stated that they had the desire and capacity to meet demand for FSE when sessions were distributed evenly between platoons, although this capacity was greater for primary schools than Early Childhood Education and Care Services. These results suggest there is capacity to implement FSE in a more systematic way, but that this is not common practice.

Educator and firefighter surveys similarly revealed that educators experienced difficulties contacting local fire stations due to limited availability and rotating shifts and firefighters experienced difficulties planning and organising sessions with schools. Both educators and firefighters requested a standardised, centralised booking system that facilitates regular, proactive engagement and assists planning and delivery annually and systematically.

**Recommendation:** Proactive: Create a centralised booking system that guides firefighters through the process of planning and booking a FSE session with schools, including when to send out Educator's Kits, what resources to order, and how to conduct a session.

**Recommendation:** Reactive: Create a centralised booking system that guides educators through the process of planning and booking a FSE session with firefighters, including when to use the Educator Resource Kit, what lessons to deliver, and what resources to use.

### 3.2.28 FSE should be widely promoted within FRNSW to ensure firefighters understand its value

There is a risk that firefighters' attitudes towards FSE may impede effectiveness. It is therefore important that firefighters are made aware of the value of FSE and its implications for the health and safety of children and their families (Ogier 2008).

Documentary analysis revealed that there are currently no mechanisms through which firefighters are made aware of the value of FSE and its implications for the health and safety of children and their families.

Firefighter surveys revealed a lack of understanding of the purpose and value of FSE. Firefighters highlighted that program effectiveness was dependant on the motivation and passion of the crew. A few firefighters thought that FSE was a waste of resources or not relevant to their jobs. Some firefighters asked for justification of the need for FSE programs so that firefighters understand their worth.

Interviews with firefighters highlighted that FSE delivery is not a compulsory activity and relies on high levels of support and motivation at the station level. Most interviewees felt that FSE was an integral part of their role, but that this level of support varied amongst firefighters and stations.

**Recommendation:** Promote the value of FSE by regularly communicating success stories, such as when children have used their knowledge or skills to mitigate risks or reduce harm.

### 3.2.29 FSE programs should be subject to rigorous record-keeping, monitoring, and evaluation

All FSE programs should be subject to rigorous record keeping, monitoring, and evaluation to ensure that they continue to be relevant, effective, and evidence-based (Giesler 2017; Monk 2011; Lidstone 2006; Towers *et al.* 2014). Although it is important to measure post-implementation changes in knowledge, it is difficult to measure how children behave in emergency situations or if FSE changes a child's behavioural repertoire during emergencies (Johnson *et al.* 2014). Where fire safety knowledge does not always translate to fire safety skills and prevention strategies in the home (Senthilkumaran *et al.* 2019), measuring knowledge alone is insufficient. Despite this, fire safety knowledge is a precursor of behavioural change (Senthilkumaran *et al.* 2019). To ensure completeness, evaluative mechanisms should measure fire safety knowledge and behaviour in children and their caregivers before and after program implementation using qualitative and quantitative instruments (Gielan *et al.* 2010; Johnson *et al.* 2014; Senthilkumaran *et al.* 2019). Instruments may include surveys of home fire safety practices, skill testing, drills, fire scenarios, or other activities to measure knowledge and behavioural change (Gerald 2019).

Documentary analysis revealed that existing FSE programs do promote evaluation through feedback forms designed for educators and caregivers. Despite this, the links to the forms do not work and are not available on the intranet, meaning evaluation cannot be undertaken. Further, there is no central repository of evaluation forms, so the collection of feedback from end-users is meaningless. Further, program facilitator guides ask firefighters to record program delivery in CARS. Despite this, record keeping in CARS is inconsistent and error-prone. Further, CARS does not differentiate between Fire Ed 1 and Fire Ed 2. As a result, CARS does not provide valid and reliable records of program implementation, meaning the program does not currently align with evidence-based practice in this regard.

Interviews with firefighters revealed that although evaluation mechanisms have been made available through educator and caregiver feedback forms, these were not disseminated as a routine part of program delivery.

**Recommendation:** Embed evaluative mechanisms within all FSE programs by asking educators to complete pre and post-test measures of children's knowledge and skill and surveys to measure perceptions of program effectiveness. Ask firefighters to complete post-test surveys to measure perceptions of effectiveness and children's knowledge and skill.

**Recommendation:** Ensure firefighters correctly record delivery using existing record keeping tools (CARS) or an online booking system (as above) that collects data as firefighters plan and conduct FSE sessions. If using CARS, ensure records can differentiate between Fire Ed 1 and Fire Ed 2.

### 3.3 Part 1 Program Modifications

The following program modifications were implemented to address all evidence-based practices in a manner that will ensure the updated programs meet end-user needs with empirical rigor, while ensuring feasibility and propriety.

Under each modification, there is a list of findings and recommendations that will be met by the implementation of the modification. By implementing each modification, and thus each finding and respective recommendation, FRNSW's FSE programs will align with evidence-based practice.

#### 3.3.1 Use Brigade Kids as a central portal for all FSE resources

By using the Brigade Kids website as a central portal for all FSE resources, the programs will meet the following findings and recommendations:

- FSE programs should be widely promoted
  - Wide promotion of FSE programs and resources to educators, caregivers, and children.
  - Wide promotion of all resources to facilitate broader engagement with FSE material.
- Child centred disaster risk reduction mechanisms should be ingrained within FSE
  - The inclusion of child centred disaster risk reduction mechanisms such as inquiry-driven, action-oriented, and interactive activities that engender ownership over personal safety and the safety of others through interactive and self-directed learning.
- FSE should be delivered using the 'multiple messages/multiple methods' approach
  - The provision of a diverse array of resources that are cross-translatable, such as digital and infographic resources that do not rely heavily on language.
- FSE should incorporate digital resources, activities, and social media
  - The use of digital resources to consolidate and expand on lesson learned.
  - Links to digital resources to facilitate broad accessibility to promote fire safety and facilitate the transfer of lessons learned to the home and family.
  - The inclusion of a dedicated digital resource within Pre Ed lesson plans.
  - CEU ownership of all online resources to ensure they can be updated regularly to maintain the interest and engagement of educators, children, and caregivers.
- Educators should be provided with resources and support

- Ease of access to all educator lesson plans and resources to facilitate educator delivered components of the programs.
- Enhanced program fidelity where educators have access to all necessary resources to deliver the educator-led components of the programs.
- Caregivers should be provided with resources and support
  - Links to digital resources to facilitate broad accessibility to promote fire safety and facilitate the transfer of lessons learned to the home and family.
- Children should be provided with take-home resources
  - Videos of firefighter delivered sessions for each respective program to ensure home schooled, chronically ill, disabled, rural, and remote students can access the same resources and lessons as other students.
  - Links to digital resources to facilitate broad accessibility to promote fire safety and facilitate the transfer of lessons learned to the home and family.

### 3.3.2 Embed developmentally appropriate digital resources within each FSE program

By embedding developmentally appropriate digital resources within each FSE program, the programs will meet the following findings and recommendation:

- FSE should be tailored to the developmental stages of children
  - Where the 'As a Firefighter' series on the Brigade Kids website is targeted towards young children, this resource should be embedded within lesson plans and resources for Pre Ed.
  - Where the Triple Zero Kids Challenge is targeted towards Stage 1 students, this resource should be embedded within lesson plans and take home resources for Fire Ed 1.
  - Given an absence of existing resources for Fire Ed 2, there is a need to develop a targeted digital resource for older children. This will ensure that each FSE program is accompanied by a digital resource that is specifically designed to reiterate lesson learned and transfer fire safety messages from school into the home.
- Child centred disaster risk reduction mechanisms should be ingrained within FSE
  - The inclusion of child centred disaster risk reduction mechanisms such as inquiry-driven, action-oriented, and interactive activities that engender ownership over personal safety and the safety of others through interactive and self-directed learning.
- FSE should be delivered using the 'multiple messages/multiple methods' approach
  - The provision of a diverse array of resources that are cross-translatable, such as digital and infographic resources that do not rely heavily on language.
- FSE should be behaviourally focused
  - The provision of take-home resources that encourage children and caregivers to practice fire safe behaviours, such as digital and infographic resources.
- FSE should involve fire escape planning and drilling
  - The provision of FSE that teaches children about the purpose and importance of Home Fire Escape planning and drilling and provide children with take-home resources that facilitate the transfer of knowledge and skill to the home and family.
- FSE should include match/lighter safety
  - The inclusion of match/lighter safety lessons within all FSE programs, ensuring that the correct behavioural response to finding matches or lighters is modelled and rehearsed.

- FSE should include messaging about when and how to dial Triple Zero (000)
  - The inclusion of lessons on Calling Triple Zero (000) include knowledge of what constitutes an emergency, the repercussions of making hoax calls, and how to navigate to the emergency dial pad on a phone. Resources must include a poster or picture of a phone to allow children to practice.
- FSE should include bushfire safety
  - The inclusion of bushfire safety education in Fire Ed 1 and Fire Ed 2 to ensure children have sufficient knowledge to ensure their safety and the safety of others during a bushfire emergency.
- FSE should include fire hazard identification and mitigation
  - The inclusion of interactive activities that teach children what a hazard is, how to identify various fire hazards, and the appropriate actions to take to make each fire hazard safe.
- Educators should be provided with resources and support
  - The provision of free educator delivered lesson plans that are mapped against the curriculum and contain all necessary resources to ensure ease of use and delivery.
- Caregivers should be provided with resources and support
  - The provision of digestible, translatable take-home resource that contain all necessary fire safety messages to ensure caregivers can maintain fire safety in the home.
  - Broad dissemination and reiteration of FSE where children are likely to share fun and engaging resources with their family and friends.
  - The provision of stimuli that encourages children and caregivers to practice their fire safety skills.
- Children should be provided with take-home resources
  - The provision of homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.
  - The capacity to educate children regardless of their geographical location (regional or remote) or engagement with schooling (home-schooled, distance education, chronically ill).
  - Broad dissemination and reiteration of FSE where children are likely to share fun and engaging resources with their family and friends.
  - The transfer of fire safety skills and knowledge to the physical environment.
  - The provision of stimuli that encourages children and caregivers to practice their fire safety skills.

### **3.3.3 Target FSE programs to the developmental stages of children and map the programs to each respective education curriculum**

By targeting FSE programs to the developmental stages of children and mapping them to each respective curriculum, the programs will meet the following findings and recommendation:

- FSE should be tailored to the developmental stages of children
  - The clear differentiation of Pre Ed, Fire Ed 1, and Fire Ed 2 to enhance end-user understanding of the programs and their target audiences.
  - Pre Ed lesson plans and resources will be staged to target Early Childhood Education and Care Services at the lower end and kindergarten at the upper end. To avoid confusion, the firefighter delivered component will be the same.
  - There will be no gaps in the delivery of FSE for children aged 12 years and younger.



- FSE should be mapped against the education curriculum
  - Pre Ed – Early Childhood Education and Care Services will be mapped against the Early Years Learning Framework.
  - Pre Ed – Kindergarten will be mapped against the Early Stage 1 curriculum Key Learning Area PDHPE.
  - Fire Ed 1 will continue to be targeted towards children aged five to seven years and will be mapped against the Stage 1 curriculum Key Learning Areas of PDHPE, Geography, Science & Technology, and HSIE.
  - Fire Ed 2 will be targeted towards children aged eight to nine years and will be mapped against the Stage 2 curriculum Key Learning Areas of PDHPE, Geography, Science & Technology, and HSIE.
  - The Rural Fire Service FSE program 'Project Firestorm' will be made available for children aged ten to twelve years. This program is mapped against the Stage 3 curriculum.
- FSE should be short in duration and repeated over time to consolidate learning
  - The delivery of FSE over multiple sessions that are short in duration. This can be facilitated by ensuring educators deliver four to five educator-led lessons, followed by one firefighter delivered session. Each lesson and session must be structured and scripted to ensure the lessons are short in duration.
- Educators should be provided with resources and support
  - The provision of free educator delivered lesson plans that are mapped against the curriculum and contain all necessary resources to ensure ease of use and delivery.
- FSE should be designed to ensure consistency in implementation
  - The provision of factsheets, online information, and training to clearly define and distinguish the purposes and target audiences of each program.
  - The provision of simple instructions, session plans, and letter templates to schools to guide planning and delivery, including instructional videos that demonstrate implementation.

### **3.3.4 Provide educators with detailed, structured, and scripted lesson plans, and all associated resources**

By providing educators with detailed, structured, and scripted lesson plans and all associated resources, the programs will meet the following findings and recommendation:

- FSE should explicitly identify the theory of change underpinning program activities.
  - Access to program materials that explicitly identify the theory of change underpinning all FSE programs to ensure all facilitators understand how the activities undertaken as part of the programs lead to the intended effects
- FSE should be mapped against the education curriculum
  - The provision of educator lesson plans that are mapped against several Key Learning Areas of each respective education curriculum: Early Years Learning Framework, Early Stage 1, Stage 1, and Stage 2.
- FSE programs should be widely promoted
  - Wide promotion of FSE through the formation of strong ongoing relationships between FRNSW and the Department of Education, and local fire stations and schools.
  - Wide promotion of FSE online through targeted use of the Brigade Kids website.

- Child centred disaster risk reduction mechanisms should be ingrained within FSE
  - The inclusion of inquiry-driven, action-oriented, and interactive activities that engender engagement with the wider community, ownership over their personal safety and the safety of others, and a social consciousness.
  
- FSE should be educator delivered and firefighter reiterated
  - The inclusion of four to five educator delivered lessons, followed by a firefighter delivered session that consolidates lessons learned through unique engagement.
  
- FSE should implement the 'instruction, modelling, rehearsal, and feedback' approach
  - The use of the instruction, modelling, rehearsal, and feedback approach within all educator lessons that aim to teach fire safety skills.
  
- FSE should be gain-framed, caregiver mediated, and portrayed as a social norm
  - The use of gain-framing through lesson plans that involve the demonstration of the correct behavioural responses to fire followed by positive outcomes.
  - The provision of homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.
  
- FSE should be short in duration and repeated over time to consolidate learning
  - The delivery of FSE over multiple sessions that are short in duration.
  
- FSE should be delivered using the 'multiple messages/multiple methods' approach
  - The use of the 'multiple messages, multiple methods' approach to ensure fire safety messages are reiterated multiple times using a diverse array of resources and techniques.
  
- FSE should be behaviourally focused
  - The inclusion of critical FSE content including: Appropriate behavioural responses to fire; Home Fire Escape Planning and Drilling; Firefighter identification and awareness; Matches/lighter safety; How and when to call Triple Zero (000); Bushfire safety; Hazard identification and mitigation; Fire science; and Children's lived experiences of fire.
  
- FSE should involve fire escape planning and drilling
  - The inclusion of FSE that teaches children about the purpose and importance of Home Fire Escape planning and drilling and provide children with take-home resources that facilitate the transfer of knowledge and skill to the home and family.
  
- FSE should include firefighter identification and awareness
  - The continuation of FSE that teaches firefighter identification and awareness sessions. Improve on these sessions by teaching children how and when to go to a firefighter during a fire.
  
- FSE should include match/lighter safety
  - The inclusion of match/lighter safety lessons within all FSE programs, ensuring that the correct behavioural response to finding matches or lighters is modelled and rehearsed.
  
- FSE should include messaging about when and how to dial Triple Zero (000)
  - The inclusion of lessons on Calling Triple Zero (000) include knowledge of what constitutes an emergency, the repercussions of making hoax calls, and how to navigate

to the emergency dial pad on a phone. Resources must include a poster or picture of a phone to allow children to practice.

- FSE should include bushfire safety
  - The inclusion of bushfire safety education in Fire Ed 1 and Fire Ed 2 to ensure children have sufficient knowledge to ensure their safety and the safety of others during a bushfire emergency.
- FSE should include fire hazard identification and mitigation
  - The inclusion of interactive activities that teach children what a hazard is, how to identify various fire hazards, and the appropriate actions to take to make each fire hazard safe.
- FSE for older children should include fire science
  - The inclusion of education on the science of fire, including the fire triangle and how to remove or reduce each element of the fire triangle to suppress or extinguish fire.
- FSE should be relatable to children's lived experiences of fire
  - The provision of opportunities for children to share their lived experiences of fire through homework exercises that are completed under the care and supervision of their caregivers. Children should receive feedback about their behavioural response and changes they could make to enhance the safety of themselves and others in the future.
- FSE should use actual resources and create a realistic training environment
  - The use of actual resources such as smoke alarms, evacuation procedures, and safe meeting places (evacuation point) to create a realistic environment that facilitates the transfer of knowledge and skills to the practical environment.
- FSE should incorporate digital resources, activities, and social media
  - The use of digital resources to consolidate and expand on lesson learned.
- Educators should be provided with resources and support
  - The provision of free educator delivered lesson plans that are mapped against the curriculum and contain all necessary resources to ensure ease of use and delivery.
  - Enhanced program fidelity where educators will be aware of the requirement to deliver FSE before firefighter attendance.

### **3.3.5 Provide firefighters with a toolkit that contains all necessary information and resources**

By providing firefighters with a toolkit that contains all necessary information and resources, the programs will meet the following findings and recommendations:

- FSE should explicitly identify the theory of change underpinning program activities.
  - Access to program materials that explicitly identify the theory of change underpinning all FSE programs to ensure all facilitators understand how the activities undertaken as part of the programs lead to the intended effects
- Child centred disaster risk reduction mechanisms should be ingrained within FSE
  - The inclusion of inquiry-driven, action-oriented, and interactive activities that engender engagement with the wider community, ownership over their personal safety and the safety of others, and a social consciousness.
- FSE should be educator delivered and firefighter reiterated

- The inclusion of four to five educator delivered lessons, followed by a firefighter delivered session that consolidates lessons learned through unique engagement.
  - Firefighters will be aware of the requirement to deliver one session after the educator-led sessions have been delivered.
  - Firefighters will be aware of their responsibility to consolidate lessons learned during the educator-led components.
- FSE should implement the 'instruction, modelling, rehearsal, and feedback' approach
    - The use of the instruction, modelling, rehearsal, and feedback approach within all educator lessons that aim to teach fire safety skills.
  - FSE should be gain-framed, caregiver mediated, and portrayed as a social norm
    - The use of gain-framing through lesson plans that involve the demonstration of the correct behavioural responses to fire followed by positive outcomes.
    - The provision of homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.
  - FSE should be short in duration and repeated over time to consolidate learning
    - The delivery of FSE over multiple sessions that are short in duration.
  - FSE should be delivered using the 'multiple messages/multiple methods' approach
    - The use of the 'multiple messages, multiple methods' approach to ensure fire safety messages are reiterated multiple times using a diverse array of resources and techniques.
  - 
  - FSE should be behaviourally focused
    - The inclusion of critical FSE content including: Appropriate behavioural responses to fire; Home Fire Escape Planning and Drilling; Firefighter identification and awareness; Matches/lighter safety; How and when to call Triple Zero (000); Bushfire safety; Hazard identification and mitigation; Fire science; and Children's lived experiences of fire.
  - FSE should involve fire escape planning and drilling
    - The inclusion of FSE that teaches children about the purpose and importance of Home Fire Escape planning and drilling and provide children with take-home resources that facilitate the transfer of knowledge and skill to the home and family.
  - FSE should include firefighter identification and awareness
    - The continuation of firefighter identification and awareness sessions within all FSE programs. Improve on these sessions by teaching children how and when to go to a firefighter during a fire.
  - FSE should include match/lighter safety
    - The inclusion of match/lighter safety lessons within all FSE programs, ensuring that the correct behavioural response to finding matches or lighters is modelled and rehearsed.
  - FSE should include messaging about when and how to dial Triple Zero (000)
    - The inclusion of lessons on Calling Triple Zero (000) include knowledge of what constitutes an emergency, the repercussions of making hoax calls, and how to navigate to the emergency dial pad on a phone. Resources must include a poster or picture of a phone to allow children to practice.

- FSE should include bushfire safety
  - The inclusion of bushfire safety education in Fire Ed 1 and Fire Ed 2 to ensure children have sufficient knowledge to ensure their safety and the safety of others during a bushfire emergency.
- FSE should include fire hazard identification and mitigation
  - The inclusion of interactive activities that teach children what a hazard is, how to identify various fire hazards, and the appropriate actions to take to make each fire hazard safe.
- FSE for older children should include fire science
  - The inclusion of education on the science of fire, including the fire triangle and how to remove or reduce each element of the fire triangle to suppress or extinguish fire.
- FSE should be relatable to children's lived experiences of fire
  - The provision of opportunities for children to share their lived experiences of fire through homework exercises that are completed under the care and supervision of their caregivers. Children should receive feedback about their behavioural response and changes they could make to enhance the safety of themselves and others in the future.
- FSE should use actual resources and create a realistic training environment
  - The use of actual resources such as smoke alarms, evacuation procedures, and safe meeting places (evacuation point) to create a realistic environment that facilitates the transfer of knowledge and skills to the practical environment.
- FSE should be designed to ensure consistency in implementation
  - The provision of factsheets, online information, and training that clearly defines and differentiates the purposes and target audiences of each program.
  - The inclusion of instructional videos that demonstrate best-practice implementation.
  - The provision of training in the planning and delivery of FSE during recruit training, and reiterate during promotional program modules, from Firefighter to Qualified Firefighter, and Qualified Firefighter to Senior Firefighter.
  - Links to the requirements of the relevant promotional program modules, from Firefighter to Qualified Firefighter, and Qualified Firefighter to Senior Firefighter.
  - The provision of simple instructions, session plans, and letter templates to schools to ensure consistency in planning and delivery.
  - The provision of clear instructions to firefighters as to what constitutes take-home resources for children and caregivers.
  - The provision of better firefighter instruction that teaches firefighters to sit or crouch down when delivering FSE so that they are on the same level as the children.
- FSE should be widely promoted within FRNSW to ensure firefighters understand its value
  - The promotion of the value of FSE by regularly communicating success stories, such as when children have used their knowledge or skills to mitigate risks or reduce harm.

### **3.3.6 Provide updated take-home resources for children and caregivers**

By providing updated take-home resources for children and caregivers, the programs will meet the following findings and recommendations:

- FSE programs should be widely promoted
  - Wide promotion of FSE online through targeted use of the Brigade Kids website.

- FSE should be delivered using the 'multiple messages/multiple methods' approach
  - The use of digital resources that teach fire safety actions and skills without a reliance on language and infographic booklets that use pictures rather than language to communicate fire safety messages. This will ensure at-risk communities, such as CALD communities, are catered for within program resources.
  - The use of children as the conduit through which ethnically diverse or ethnic minority families learn about FSE through the provision of take-home digital resources and infographic booklets provided to children.
  
- FSE should incorporate digital resources, activities, and social media
  - Where the 'Ask a Firefighter' series on the Brigade Kids website is targeted towards young children, this resource should be embedded within lesson plans and resources for Pre Ed.
  - Where the Triple Zero Kids Challenge is targeted towards Stage 1 students, this resource should be embedded within lesson plans and take home resources for Fire Ed 1.
  - Given an absence of existing resources for Fire Ed 2, there is a need to develop a targeted digital resource for older children. This will ensure that each FSE program is accompanied by a digital resource that is specifically designed to reiterate lesson learned and transfer fire safety messages from school into the home.
  - The availability of pre-recorded firefighter delivered sessions to ensure children in regional, remote, and distance students, can access firefighter-delivered education.
  
- Caregivers should be provided with resources and support
  - The facilitation of caregiver mediation to ensure reiteration of the fire safety messages delivered to children.
  - The provision of homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.
  - The provision of digestible, cross-translatable resources that contain all necessary fire safety messages to ensure caregivers maintain fire safety in the home.
  - The provision of caregiver booklets with information about the fire safety risks facing children and the measures they should take to mitigate these risks.
  - The provision of stimuli that encourages children and caregivers to practice their fire safety skills.
  
- Children should be provided with take-home resources
  - The provision of homework exercises that encourage caregiver and family participation to reiterate lessons learned for children and transfer fire safety messages into the home and family.
  - The consolidation of take-home resources for children to two resources that are easy for firefighters to identify and order and can be provided within station budgets.
  - The provision of activity books that are engaging and interactive and that provide links to digital resources to consolidate lessons learned and transfer learnings to the home and family.

### 3.3.7 Separate FSE from community engagement

By separating FSE conducted for risk reduction purposes from activities conducted purely for the purposes of community engagement, the programs will meet the following findings and recommendations:

- FSE should explicitly identify the theory of change underpinning program activities.

- Access to program materials that explicitly identify the theory of change underpinning all FSE programs to ensure all facilitators understand how the activities undertaken as part of the programs lead to the intended effects
- Separate FSE from community engagement
  - Fire truck and water hose play have engagement rather than educational outcomes. Where there is evidence that these activities impede the effectiveness of FSE, it is important to separate activities conducted for pedagogical purposes from those conducted for engagement.
  - The firefighter delivered component of FSE programs will not contain fire truck or water hose play. These sessions should be implemented during community engagement activities only.
- FSE should be designed to ensure consistency in implementation
  - The training of firefighters in the delivery of FSE during recruit training, and reiterate during promotional program modules, from Firefighter to Qualified Firefighter, and Qualified Firefighter to Senior Firefighter.
  - The provision of factsheets, online information, and training to clearly define and distinguish the purposes and target audiences of each program.
  - The provision of simple instructions, session plans, and letter templates to schools to guide planning and delivery, including instructional videos that demonstrate implementation.

### 3.3.8 Develop a centralised booking system

By developing a centralised booking system, the programs will meet the following findings and recommendations:

- FSE programs should be widely promoted
  - Educators will be contacted proactively and will be provided with all necessary resources to deliver the educator-led components of the program, enhancing program fidelity.
- FSE should be designed to ensure consistency in implementation
  - Firefighters will be able to engage schools systematically and proactively, ensuring that FSE is delivered according to program requirements.
  - Firefighters will be guided through the process of planning and delivering FSE, enhancing program fidelity.
  - Firefighters will be able to form strong ongoing relationships with local schools.
  - Enhanced program fidelity where educators will be informed and provided with access to all necessary resources to ensure they deliver the educator-led components of the program before firefighter attendance.
- FSE should be managed through a centralised booking system that facilitates regular, proactive engagement with schools
  - Firefighters will be able to manage bookings to ensure every centre or school in their station area receives one session annually.
  - Educators will be able to contact fire stations with ease, enhancing the likelihood FSE will be delivered according to program requirements.

### 3.3.9 Embed evaluative mechanisms within all FSE programs

By embedding evaluative mechanisms within all FSE programs, the programs will meet the following findings and recommendations:

- FSE programs should be subject to rigorous record-keeping, monitoring, and evaluation

- The use of online data collection instruments to collect all evaluative data and record data in a central repository.
- The use of online data collection instruments as record-keeping tools that collect data on program implementation.
- The provision of pre and post-test measures of children's knowledge and skill to measure short term program effectiveness.
- The dissemination of post-test surveys to educators to measure perceptions of program effectiveness.
- The dissemination of post-test surveys to firefighters to measure perceptions of effectiveness and perceptions of children's knowledge and skill.
- Accurate record keeping using existing tools (CARS) or an online booking system (as above) that collects data as firefighters plan and conduct FSE sessions. If using CARS, ensure records differentiate between Fire Ed 1 and Fire Ed 2.

## 4 Part 2 Pilot Test

### 4.1 Part 2 Methodology

The programs were modified based on the results detailed above. These updated programs were pilot tested in 13 Early Childhood Education and Care Services and Primary Schools in the Greater Sydney Area, to a total of 67 classes by 41 fire station crews.

Pilot testing involved the delivery of four educator-led lessons followed by one firefighter delivered session.

The educator-led lessons were delivered between the 15<sup>th</sup> February and 13<sup>th</sup> March. The four lessons were delivered over four weeks, one per week. The lessons followed prescribed lesson plans accompanied by student workbooks, educator resource kits, and digital resources.

The firefighter-led sessions were delivered between the 15<sup>th</sup> and 26<sup>th</sup> March. The single session followed a prescribed session plan script. The sessions were conducted by firefighters stationed at fire stations that were in proximity to the pilot schools. The sessions were distributed between platoons where possible.

The pilot programs were also reviewed by the Australian Institute of Disaster Resilience, the NSW Department of Education, and a leading academic in the field of child-centred disaster risk reduction.

#### 4.1.1 Pre and Post Tests

Pre and post-tests were embedded within the lesson plans. They required educators to conduct a pre-test one week before the start of the program and a post-test immediately after the completion of the firefighter delivered session. A short post-test follow-up time was required due to time, resource, and budget constraints. Each pre and post-tests were specifically designed to measure the outcomes of each program.

The Pre Ed pre-post measured fire safety knowledge and skill through the use of a skill-based activity that required educators to ask the children what they would do in certain scenarios, such as what to do if their clothes catch on fire, or if they need to call the Fire Brigade. This test was a group-based activity that required educators to record the proportion of children within the class that responded correctly and with confidence (none or almost none, a quarter of the class, one half of the class,



three quarters of the class, or all or almost all of the class). This was deemed the most appropriate measure of knowledge and skill for children aged three to six years, without placing undue time and resourcing constraints on educators.

The Fire Ed 1 pre-post measured fire safety knowledge and skill through the use of a written activity and a card sequence task. The written activity was a multiple choice test that required students to circle the correct responses, all of which were images rather than words, such as 'Circle the tools for adults' followed by images of tools, matches, lighters, and toys. The card sequence task required educators to provide all students with cards depicting the eight steps to safely escaping a house fire. These cards were shuffled and placed face down. Students were then given two minutes to place the cards in the correct order. Educators recorded the number of students who correctly responded to the questions in the written activity and the number of students who correctly ordered the cards.

The Fire Ed 2 pre-post measured fire safety knowledge and skill through the use of a written activity and a card sequence task. The written activity included multiple choice and fill-in-the-blank questions. The card sequence task required educators to provide all students with cards depicting the eight steps to safely escaping a house fire. These cards were shuffled and placed face down. Students were then given one minute to place the cards in the correct order. Educators recorded the number of students who correctly responded to the questions in the written activity and the number of students who correctly ordered the cards.

#### **4.1.2 Educator Feedback**

Educators were asked to record their reflections at the end of every lesson. They were also invited to complete a feedback form after the completion of the program. The link to the Microsoft Form was embedded at the end of the lesson plans. The feedback form asked educators to record their reflections on every lesson and their perceptions of program processes and outcomes.

#### **4.1.3 Student Feedback**

Educators were asked to collect student feedback at the end of every lesson. Educators asked students about their perceptions of the lesson, their favourite part of the lesson, what they learnt, and what they were still wondering about. Educators recorded this feedback in the educator feedback form.

#### **4.1.4 Firefighter Feedback**

Firefighters were invited to complete a feedback form after completing the firefighter delivered component of the program. The link to the Microsoft Form was embedded the Firefighters Guide to Fire Safety Education provided to all Station Officers before the pilot session was conducted. The feedback form asked firefighters to record their perceptions of program processes and outcomes.

#### **4.1.5 Observations**

Members of the project team attended to observe the firefighter delivered sessions. Observers completed an Observation Schedule that recorded perceptions of program processes and outcomes. Observations were recorded via a link to a Microsoft Form.

#### **4.1.6 Expert Review**

The pilot programs were reviewed by:

- A Senior Project Officer at the Australian Institute of Disaster Resilience
- The NSW Department of Education School Performance Directorate
- The NSW Department of Education Early Childhood Education curriculum team
- The NSW Department of Education Primary PDHPE curriculum team
- The NSW Department of Education Primary Science & Technology curriculum team; and

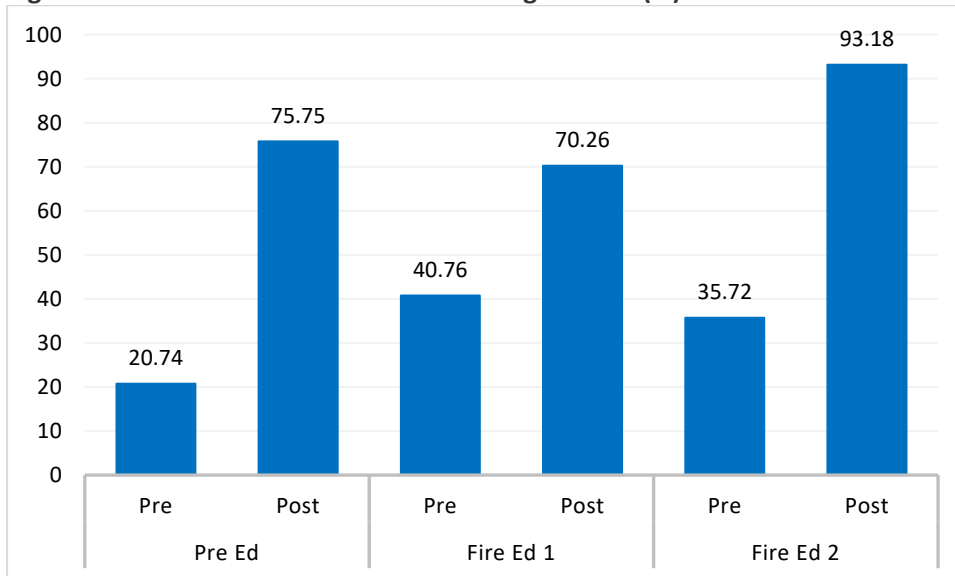
- Dr Briony Towers, child centred disaster risk reduction expert and author of the Bushfire Natural Hazards CRC Practice Framework for Emergency Management.

## 4.2 Part 2 Findings and Recommendations

### 4.2.1 Pre and Post Tests

Pre and post test measures identified significant increases in average scores (%) on fire safety knowledge and skill tests after participation (see Figure 1).

Figure 1. Pre and Post Test Results – Average scores (%)

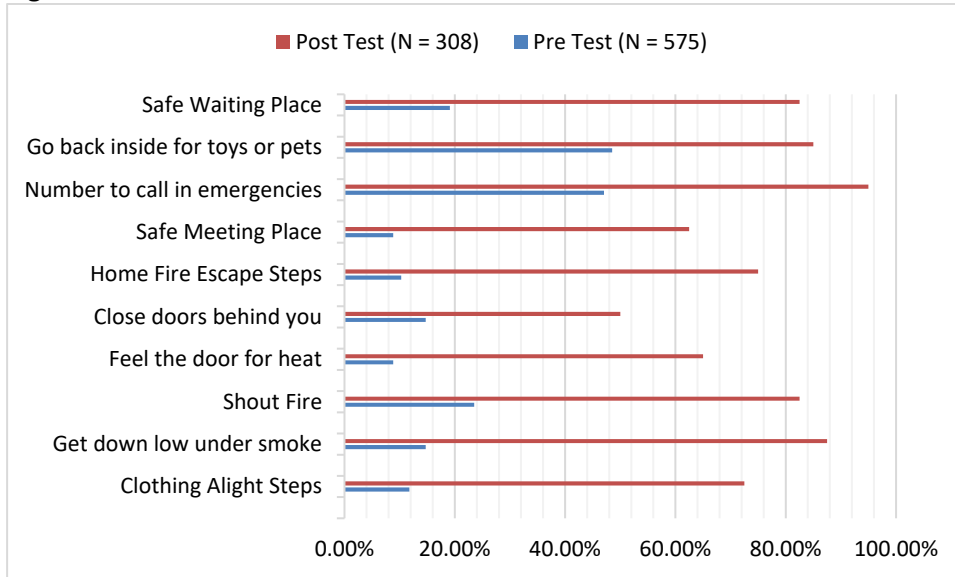


While there were significant increases in fire safety knowledge and skill in Pre Ed (55.01%) and Fire Ed 2 (57.46%) participants, the increase was smaller, yet still significant, in Fire Ed 1 participants (29.5%).

#### 4.2.1.1 Pre Ed

As shown in Figure 2, when Pre Ed results were disaggregated by measure, the greatest increases were observed in knowledge of the need to get down low under smoke (72.79%), the steps to safely escape a house fire (64.71%), the need to wait for firefighters in a safe place (63.38%), and the steps to take if your clothes catch on fire (60.74%).

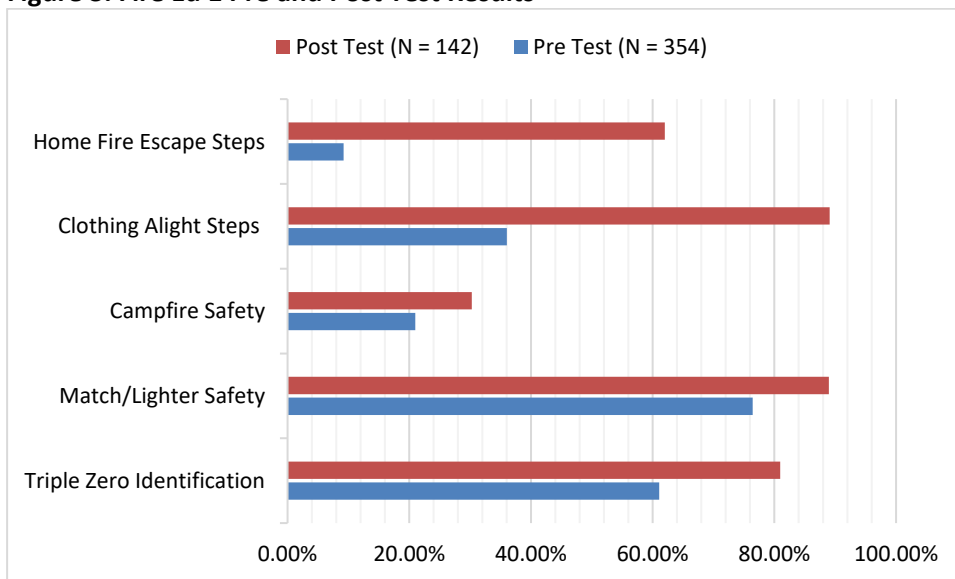
Figure 2. Pre Ed Pre and Post Test Results



4.2.1.2 Fire Ed 1

As displayed in Figure 3, when Fire Ed 1 results were disaggregated by measure, the greatest increases were observed in knowledge of the steps to take if your clothes catch on fire (53.04%) and the steps to take to safely escape a house fire (52.79%).

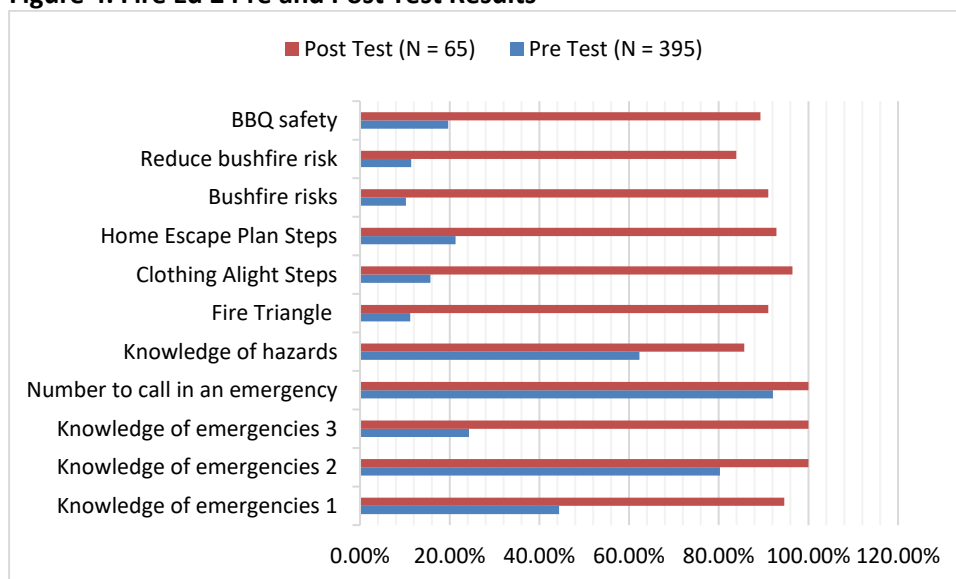
Figure 3. Fire Ed 1 Pre and Post Test Results



4.2.1.3 Fire Ed 2

As shown in Figure 4, when Fire Ed 2 results were disaggregated by measure, the greatest increases were observed in knowledge of bushfire risks (80.83%), the steps to take if your clothes catch on fire (80.72%), the elements of the fire triangle (79.89%), how to identify an emergency (75.69%), how to reduce bushfire risk (72.75%), and the steps to take to safely escape a house fire (71.57%).

Figure 4. Fire Ed 2 Pre and Post Test Results



**Recommendation:** Edit lesson plan content to improve the increase in fire safety knowledge and skill in Fire Ed 1 participants. Additional activities in campfire safety should be included.

#### 4.2.2 Educator Feedback

Of the 13 Early Childhood Education and Care Services and Primary Schools involved in the pilot, educators from five (38.5%) schools completed feedback forms.

Some educators noted surprise at the students' low level of fire safety and knowledge and skill before the program. As one educator noted, *"We were surprised by the children's initial knowledge base when we did the pre-test (knew very little)."*

All educators agreed or strongly agreed that the programs built on student knowledge over time and increased children's fire safety knowledge and skills. Respondents also all agreed or strongly agreed that the students paid attention throughout; comprehended, were interested in, and engaged with the material; appeared to have good fire safety knowledge after the program; that risk of playing with fire likely reduced; risk of being harmed by fire likely reduced; and that trust in firefighters likely increased.

All educators also agreed or strongly agreed that the lesson plans and resources were clear and easy to follow; enabled them to meet components of the curriculum; were varied and interesting; and flowed well. Educators made particular reference to the digital resources. These were often described as *"a very effective way of getting the information across to the children."*

Educators described the programs as 'highly rated' and 'engaging with extensive variety'. One educator wrote, *"Brilliant! Thank you very much for your hard work and dedication. This program is something that we can use over and over and over. I have raved about it."* Another wrote, *"An engaging program on fire safety that can be integrated across the curriculum. Resources were accessible and the program was easy to follow with detailed learning sequences. The students enjoyed the activities and loved having the unit finished off with firefighters visiting their school and consolidating what they have learnt during their lessons."*

There were some concerns over the volume of activities included in each lesson and the age-appropriateness of some activities for Pre Ed participants. Some educators noted that they did not complete the extension activities and amended lessons to suit the developmental levels of their students and the timeframe they had allowed for the session. Although the intention was that the resources would be implemented according to the educators' discretion, this must be made clearer in the lesson plan content.

Some educators also noted that they were unable to make progress with Pre Ed students remembering their address, although this was not the case for most Pre Ed participants.

A few educators also noted the need to include a school fire evacuation drill within the programs.

**Recommendation:** Include a disclaimer within the Pre Ed lesson plans that inform educators that the resources have been provided to meet the many and varied developmental needs of students between the ages of three and six years and that educators should use their discretion when deciding which activities to implement within what timeframes.

**Recommendation:** Encourage educators to ask caregivers to help students learn their address. Include activities in take-home activities and oral/play activities to reiterate the importance of learning this information.

**Recommendation:** Include a school fire evacuation drill within the programs.

#### 4.2.3 Student Feedback

Educators from five (38.5%) schools collected students' feedback via class reflections after every lesson. While students appeared to prefer the interactive, digital, and practical activities, educators often stated that there was nothing in the lessons that the students perceived negatively. As one educator stated, *"Can honestly say they enjoyed all aspects of this lesson. Everyone was happy to participate."* Another educator stated that, *"The children were all so excited to explain their Home Fire Escape Plan... there was lot of discussion... they were very excited and keen to discuss all the information"*.

Educators reported that the only activities that some students disliked were the sound of the smoke alarm and an inability to recite their address (for Pre Ed participants).

Educators reported that the students 'engaged in the activities', and that the lessons 'led to a lot of discussion, questions, and connections to themselves'. One educator stated that, *"The practical activities were a favourite and really reinforced their learning. Some children said they make their family practise at home."* Another wrote, *"Lessons were well received by the children as this was very hands on learning. There was lots of shared learning through spontaneous discussions as well as increased understanding of what to do in an emergency. The children now had lots of background information which helped them transfer the knowledge and apply it to different situations around fire safety."*

**Recommendation:** Include the need for educators to warn students about the noise of the smoke alarm and encourage students to put their hands over their ears during the first activation. Provide advice to educators and firefighters regarding noise sensitive children.

**Recommendation:** Encourage educators to ask caregivers to help students learn their address. Include activities in take-home activities and oral/play activities to reiterate the importance of learning this information.

#### 4.2.4 Firefighter Feedback

Of the 164 firefighters (41 crews) who participated in a pilot session, only 9 (5.5%) firefighters completed a feedback form as requested. Of these, one was removed from the analysis because the crew chose not to implement the pilot program. The following results relate to the eight remaining feedback forms that reported on the pilot programs.

All firefighters agreed or strongly agreed that the session plan scripts and videos were easy to follow and understand, helped them understand the structure and content of the session, and helped them understand what was expected of them.

All firefighters held positive perceptions of the new Brigade Kids Activity Book, stating that it was 'engaging', 'educational', and 'a good resource'. One firefighter thought that some of the content was not age appropriate; however, the resource has been designed to target the variable developmental levels of children between three and 10 years with activities that increase in complexity or difficulty throughout.

All firefighters held positive perceptions of the new Home Fire Safety Visual Guide, stating that it is a 'good' resource that is 'easy to follow'. One firefighter wrote, *"Great for use with children that have English as a second language, well thought out and structured."*

Firefighter perceptions of the children revealed that most firefighters perceived that the children had good fire safety knowledge before the session (87.5%), paid attention throughout (87.5%), and were interested in the material (87.5%). Most firefighters agreed or strongly agreed that the children answered questions correctly (75.0%); demonstrated actions and movements correctly (100.0%); appeared to have good fire safety knowledge after the session (87.5%); that their risk of being harmed by fire was likely reduced (87.5%); and their trust in firefighters was likely increased (100.0%).

When compared to the existing programs, most firefighters agreed or strongly agreed that the programs were easier to follow (75.0%), easier to deliver (62.5%), more comprehensive (100.0%), structured better (100.0%), and were more effective (75.0%).

Interestingly, one firefighter felt that the programs should still be delivered by trained professionals instead of firefighters, while another wrote that even though the program was effective in the pilot session, it probably wouldn't be effective in the future because the children who participated in the pilot were brighter and more interactive than average. When compared to the pre and post test results, it is clear that these assumptions do not reflect the data.

One firefighter noted that the Pre Ed session plan was not interactive enough, despite Pre Ed consisting of all interactive activities. This suggests there is a need to provide clearer instruction in the firefighter session plan script.

Despite this, 75.0% of firefighters provided positive overall feedback. Firefighters stated that the updated programs were 'excellent', 'fantastic', and 'better than the old one'. One firefighter wrote, *"I was very impressed with the new program. A firefighter with zero experience with children could deliver an effective lesson on fire safety if this were their only tool."* Similarly, another wrote, *"I really like the program and look forward to seeing it rolled out with the minor changes that will occur following the pilot. I know there will be pushback about the appliance not being part of the session, but I am prepared to give the program a solid go as is, I can see the thought and planning behind it and like the educational aspect being reinforced."*

**Recommendation:** Provide clearer instructions in the firefighter session plan scripts so that firefighters are aware of the need to physically demonstrate and interact with students during delivery.

**Recommendation:** Given the majority of firefighters held positive perceptions of the updated programs, and negative perceptions held by firefighters are not reflected in the pre and post test results, it is recommended that the programs are implemented as intended.

#### 4.2.5 Observations

Observations of 28 of the firefighter-delivered sessions were conducted. Of these, 24 (86.0%) fire stations followed the session plan script as requested.

Observers identified high levels of knowledge and skill in the children. Most observers agreed or strongly agreed that the students asked appropriate questions (89.3%), gave correct answers (92.9%), and appeared to learn the fire safety messages (96.4%) and skills (100.0%) correctly. Most observers noted that there was clear evidence that the children had been taught fire safety prior to the firefighter visit (89.2%).

The students were described as 'very engaged' and 'interested', while the sessions were described as 'really effective'. The children were observed asking interesting questions which demonstrated their understanding of the material. One observer wrote, *"The children were the most engaged I have seen. Being familiar with the content helped them to participate in the activities"*.

When discussing the educators who facilitated the session, observers noted that the educators were invested and maintained ownership over the children's newly acquired skills and knowledge. One observer wrote, *"Educators now have an interest in what we are consolidating and in the responses the children are giving."*

When asked about the firefighters who delivered the session, most observers agreed or strongly agreed that the firefighters appeared confident (89.3%), maintained the attention of the children (92.8%), responded appropriately to questions (92.9%), provided clear instruction (100.0%), and appeared prepared (85.8%). Observers commonly noted initial hesitance or resistance in firefighters until they realised the level of knowledge and skill in the children. As one observer noted, *"They were surprised how knowledgeable the children were."*

When asked to provide their overall perceptions of the session, observers noted that the sessions were effective when the children had participated in the educator-delivered lessons prior to the firefighter session and when the firefighters followed the session plan script. Even when firefighters were resistant, the sessions were perceived as effective due to the high level of knowledge and skill in the children and the consistent messaging that arose from using the script. As one observer wrote, *"Very effective, even though the firefighters were disgruntled and resistant. This just goes to show how effective consistent messaging is (by following a script) even when the firefighters don't want to be there."*

Some observers identified the need for more interactive activities within Fire Ed 2. The first half of the program was perceived as too static, using mostly discussion and question and answer components.

**Recommendation:** Include a more interactive activity in the first half of Fire Ed 2 so that the students are more engaged with the material and the firefighters.

#### 4.2.6 Expert Review

The pilot programs were reviewed by:

- A Senior Project Officer at the Australian Institute of Disaster Resilience
- The NSW Department of Education School Performance Directorate
- The NSW Department of Education Early Childhood Education curriculum team
- The NSW Department of Education Primary PDHPE curriculum team
- The NSW Department of Education Primary Science & Technology curriculum team; and
- Dr Briony Towers, child centred disaster risk reduction expert and author of the Bushfire Natural Hazards CRC Practice Framework for Emergency Management.

##### 4.2.6.1 Australian Institute of Disaster Resilience

Feedback from the Senior Project Officer at the Australian Institute of Disaster Resilience was positive. They highlighted the need to make minor modifications to data collection, resource format, and student presentation. The AIDR noted the need to ask students to provide feedback on what they learnt and what they were still wondering about, rather than just what they liked or disliked about the lessons. The review also highlighted the need to provide resources to educators in PowerPoint format to facilitate use on interactive whiteboards and for students to present a fire safety wall to firefighters rather than selected individual pieces of work.

**Recommendation:** Ask educators to collect students' feedback on what they learnt and what they are still wondering about at the end of every lesson.

**Recommendation:** Provide resources to educators in PowerPoint format as well as PDF, where appropriate.

**Recommendation:** When preparing for the firefighter visit, provide educators with the option of preparing a fire safety wall of student works.

##### 4.2.6.2 The NSW Department of Education School Performance Directorate

Feedback from the NSW Department of Education School Performance Directorate was overwhelmingly positive. As a result of their review, the Directorate invited CEU to present the updated programs at the Phoenix Conference at the ICC Darling Harbour on the 29<sup>th</sup> April 2021. The Directorate also requested the opportunity to collaborate with CEU into the future to co-release the programs and embed them within the curriculum.

**Recommendation:** Maintain ongoing communication with the Directorate to ensure future collaboration and co-release of the programs to embed them within the curriculum.

##### 4.2.6.3 The NSW Department of Education Early Childhood Education curriculum team

Feedback from the NSW Department of Education Early Childhood Education curriculum team was positive. The team recommended minor modifications including the need to use the terms 'educator' rather than 'teacher', 'service' rather than 'school', 'rooms' rather than 'classes', and 'children' rather than 'students' within all Pre Ed (Early Years) resources. The team also recommended use of the term 'Early Childhood Education and Care Service' rather than 'childcare centre and/or preschool'.



The team noted that the resources and lesson plans, *"...are great and offer a variety of choices to suit differing abilities. Activities included in the lesson plans will be more suited for children aged 3-5 years. Educators may need to adapt the activities based on the needs of the children in the group (a disclaimer could be added in the document to allow for this)."* The team also noted the need to consider noise sensitive children during the smoke alarm activation.

Overall, the team stated that, *"This is a great package to build children's understanding of fire safety, emergency procedures and safe meeting places."*

**Recommendation:** Edit all terminology as recommended for Pre Ed (Early Years).

**Recommendation:** Include a disclaimer within the Pre Ed lesson plans that inform educators that the resources have been provided to meet the many and varied developmental needs of children between the ages of three and six years and that educators should use their discretion when deciding which activities to implement within what timeframes.

**Recommendation:** Include the need for educators and firefighters to warn children about the noise of the smoke alarm and encourage them to put their hands over their ears during the first activation. Provide advice to educators and firefighters regarding noise sensitive children.

#### 4.2.6.4 The NSW Department of Education Primary PDHPE curriculum team

Feedback from the NSW Department of Education Primary PDHPE curriculum team was also positive. The team noted that the programs were age appropriate, aligned with the PDHPE syllabus outcomes, were consistent with unit based assessment strategies, were engaging, contained extensive variety, were easy to follow, and contained good inclusion of gender and ethnic diversity. The team also acknowledged the flexibility embedded within the lesson plans and the great use of digital resources, including the video of the firefighter sessions.

The team identified the need for two minor modifications: the addition of a few physical activities within the lesson plans, and the need to reference the 'Healthy, Safe, and Active Lifestyles' stream within the relevant content strand.

**Recommendation:** Shift the activities within the lesson plans so that the physical activities that were included as additional activities are core components of the lesson plans.

**Recommendation:** Include the 'Healthy, Safe, and Active Lifestyles' stream within the relevant content strand.

#### 4.2.6.5 The NSW Department of Education Primary Science & Technology curriculum team

Feedback from the NSW Department of Education Primary Science & Technology curriculum team was also positive. The team identified the inclusion of the fire triangle and fire experiment as meeting the outcomes of Science and Technology. The team stated that the lesson plans and resources were age appropriate and inclusive in nature. The team stated, *"The lesson plans and associated resources follow a clear and logical sequence. Resources complement the activities and are well presented."*

The team recommended the inclusion of a video that shows students how to draw a Home Fire Escape Plan. They also suggested an extension to the fire experiment activity that includes different

sized jars so that students can learn about different volumes of oxygen and the different times they take to consume. They also suggested the need to remove the blank pages from the Student Workbooks and Educator Resource Kits. Finally, the team identified some inconsistencies in messaging between the use of water to extinguish a candle and messaging around not using water to extinguish a fat (cooking) fire.

**Recommendation:** The inclusion of a 'Ask a Firefighter' video that shows students how to draw a Home Fire Escape Plan.

**Recommendation:** An extension to the fire experiment activity that includes different sized jars so that students can learn about different volumes of oxygen and the different times they take to consume.

**Recommendation:** Removal of the blank pages from the Student Workbooks and Educator Resource Kits.

**Recommendation:** Removal of the fat fire content so as not to confuse students about the use of water to extinguish a candle flame.

#### 4.2.6.6 Dr Briony Towers, child centred disaster risk reduction expert and author of the Bushfire Natural Hazards CRC Practice Framework for Emergency Management

Feedback from Dr Briony Towers was overwhelmingly positive. Dr Towers identified the rigour underpinning the programs as best practice and suggested that this level of rigour, to her knowledge, had not been applied to any other fire safety education program in Australia, and possibly internationally. Dr Towers requested permission to include the study and updated programs as a case study of best practice in the Bushfire and Natural Hazards CRC's Practice Framework for Emergency Management.

## 4.3 Part 2 Program Modifications

The pilot programs were modified based on the recommendations identified during the pilot test. To ensure the programs remain evidence-based while meeting end-users needs, the following modifications have been made.

### 4.3.1 Educator lesson plan content

#### 4.3.1.1 Pre Ed

- Inclusion of a disclaimer within the Pre Ed lesson plans that inform educators that the resources have been provided to meet the many and varied developmental needs of children between the ages of three and six years and that educators should use their discretion when deciding which activities to implement within what timeframes.
- All terminology edited as recommended for Pre Ed (Early Years).
- Educators encouraged to ask caregivers to help children learn their address. The inclusion of activities in take-home activities and oral/play activities to reiterate the importance of learning this information.
- Inclusion of the need for educators and firefighters to warn children about the noise of the smoke alarm and encourage them to put their hands over their ears during the first activation. Provision of advice to educators and firefighters regarding noise sensitive children.

#### 4.3.1.2 Fire Ed 1

- Lesson plan content edited to improve the increase in fire safety knowledge and skill in Fire Ed 1 participants. Additional activities in campfire safety included.

#### 4.3.1.3 Fire Ed 2

- Added extension to the fire experiment activity that includes different sized jars so that students can learn about different volumes of oxygen and the different times they take to consume.
- Removal of the fat fire content so as not to confuse students about the use of water to extinguish a candle flame.

#### 4.3.1.4 All programs

- Educators asked to collect students' feedback on what they learnt and what they are still wondering about at the end of every lesson.
- Provision of resources to educators in PowerPoint format as well as PDF, where appropriate.
- Provision of the option of preparing a fire safety wall of student works.
- Activities within the lesson plans shifted so that the physical activities that were included as additional activities are core components of the lesson plans.
- Inclusion of the 'Healthy, Safe, and Active Lifestyles' stream within the relevant content strand.
- Inclusion of a 'Ask a Firefighter' video that shows students how to draw a Home Fire Escape Plan.
- Removal of the blank pages from the Student Workbooks and Educator Resource Kits.
- Inclusion of a school fire evacuation drill within the programs.

#### 4.3.2 Firefighter session plan content

- Provision of clearer instructions in the firefighter session plans so that firefighters are aware of the need to physically demonstrate and interact with students during delivery.
- Inclusion of the need for educators and firefighters to warn students about the noise of the smoke alarm and encourage students to put their hands over their ears during the first activation. Provision of advice to educators and firefighters regarding noise sensitive children.
- Inclusion of a more interactive activity in the first half of Fire Ed 2 so that the students are more engaged with the material and the firefighters.
- Implementation of the firefighter delivered sessions as intended.

#### 4.3.3 Process

- Formation of relationships to maintain ongoing communication with the NSW Department of Education to ensure future collaboration and co-release of the programs to embed them within the curriculum.

## 5 Conclusion

FSE is implemented by fire services around the world to reduce the likelihood children will misuse fire or be harmed by fire. Although there is a large body of evidence informing practice in this space, there were no overarching, evidence-based frameworks informing effective FSE programming. Such guidelines are needed to inform the development of new, and the evaluation and modification of existing, FSE programs.

A comprehensive evaluation of FRNSW's FSE programs for children was conducted to inform effective FSE programming. FSE is most effective when programs are underpinned by a strong and comprehensible theory of change, are mapped against the education curriculum, and are educator delivered and firefighter reiterated. When lessons incorporate CCDRR principles and are behaviourally focused, they have the capacity to enhance fire safety knowledge and skills in children. Actual, interactive, and digital resources are needed to facilitate the acquisition and transfer of knowledge and skill to the practical environment, while educator and caregiver resources are needed to support the delivery and reiteration of fire safety messages. When programs are embedded within business as usual, fire services have the capacity to establish consistency in implementation, and ongoing record-keeping, monitoring, and evaluation to ensure continued relevance and effectiveness.

To ensure FRNSW's FSE programs align with this overarching, evidence-based framework, nine program modifications were made. These culminated in the developed of pilot programs and resources which were subsequently pilot tested. Pilot testing revealed significant increases in children's fire safety knowledge and skills after participation in the programs. Feedback from educators, students, observers, and firefighters was positive. Where recommendations for improvement were made, they have been implemented to ensure the programs meet the needs of end-users.

Expert review of the programs highlighted their rigour and quality. While the programs have the capacity to enhance children's resilience to fire, the programs and the study underpinning them can be transferred to other communities. Dr Briony Towers identified the rigour underpinning the programs as best practice and has included them as a case study in the updated Practice Framework for Emergency Management. The theoretical underpinnings of the programs were peer-reviewed and have been published in the Australian Journal of Emergency Management to contribute to the body of knowledge concerned with evidence-based fire safety education for children. Finally, the study, results, and resources have been made available to other fire services in Australia to enhance knowledge sharing.

Evaluative evidence indicates that the programs are effective at improving children's fire safety knowledge and skills. Where fire safety knowledge and skill increase the likelihood that children will understand the risks and consequences of fire, and will react promptly and rationally to fire, these programs have the capacity to reduce risk and enhance resilience. These improvements are not only expected within the children who participate in the programs directly, but in their households and broader communities.

Ongoing monitoring and evaluation will be conducted to ensure these updated programs maintain their relevance and effectiveness into the future.

## 6 References

- Almeida J & Rossetti R 2015, *Using serious games to train children and elicit fire safety behaviour*. World CIST, April 1-3, 2015, Azores, Portugal.
- Back E, Cameron C & Tanner T 2009, *Children and disaster risk reduction: taking stock and moving forward*. At: [https://www.researchgate.net/publication/265184281\\_Children\\_and\\_Disaster\\_Risk\\_Reduction\\_Taking\\_Stock\\_and\\_Moving\\_Forward](https://www.researchgate.net/publication/265184281_Children_and_Disaster_Risk_Reduction_Taking_Stock_and_Moving_Forward) [24 August 2020].

- Bahr P 2000, *A false sense of security: A study into children's access to cigarette lighters and their use as a fire lighting tool. Theses and Dissertations, University of South Australia.*
- Barends E, Rousseau D & Briner R 2017, *CEBMA Guideline for Rapid Evidence Assessments in Management and Organisations (version 1). Centre for Evidence Based Management, Amsterdam. At: <https://cebma.org/wp-content/uploads/CEBMA-REA-Guideline.pdf> [24 August 2020].*
- Borzekowski D, Clearfield E, Rimal R & Gielan A 2013, *Young children's perceptions of fire safety messages: Do framing and parental mediation matter? Journal of Burn Care & Research, 35: 303-312.*
- Brown L 2019, *Child-centred disaster resilience education in Australia's north-west. Australian Journal of Emergency Management, 34(3): 22-23.*
- Cakiroglu U & Gokoglu S 2019, *Development of fire safety behaviour skills via virtual reality. Computers & Education: 56-68.*
- Chavez A, Duzinski S, Wheeler T & Lawson K 2014, *Teaching safety at a summer camp: Evaluation of a fire safety curriculum in an urban community setting. Burns, 42(40).*
- Chen Y, Bridgeman-Acker K, Edwards J & Lauwers A 2011, *Pediatric fire deaths in Ontario: a retrospective study of behavioural, social, and environmental risk factors. Canadian Family Physician, 57: 169-177.*
- Cohen D 2012, *Children with Autism and fire drills and fire alarms. Mountain Brook Fire Department, Alabama. At: <https://www.hsd.org/?view&did=804455> [24 August 2020].*
- Cole R, Krاندell R & Kourofsky C 2004, *We can teach young children fire safety. Young Children, 59(2): 14-18.*
- Dierkman S, Ballestros M & Ahrens M 2011, *Home fires in America: progress and opportunities. American Journal of Lifestyle Medicine, 6(2): 141-151.*
- Dukes C, Brady M, Scott J & Wilson C 2016, *Using modelling and rehearsal to teach fire safety to children with autism. Journal of Applied Behaviour and Analysis, 49: 699-704.*
- Durso F 2013, *Young + Fire Smart: NFPA develops a youth program on wildfire safety. NFPA Journal, March/April: 11-12.*
- FEMA n.d, *Fire safety trailer curriculum: Tools for developing FSE messages using a fire safety trailer. At: [www.usfa.fema.gov/downloads/pdf/publications](http://www.usfa.fema.gov/downloads/pdf/publications). [24 August 2020].*
- Gerald J 2019, *Descriptive analysis of public education for children. Baton Rouge Fire Department, Louisiana. At: <https://usfa.kohalibrary.com/app/work/249849>. [24 August 2020].*
- Gielan A, Borzekowski D, Rima R & Kumar A 2010, *Evaluating and creating fire and life safety materials: a guide for the fire service. At: <https://www.nfpa.org/-/media/Files/Public-Education/Resources/Educational-messaging/EMAC/NFPAGuideForTheFireService.pdf>. [24 August 2020].*
- Gielan A, Borzekowski D & Rimal R 2010, *Understanding the impact of fire and life safety messages on children. At: <https://www.nfpa.org/~media/files/public-education/resources/educational-messaging/johnshopkinsmessagingreport.pdf?la=en>. [24 August 2020].*
- Giesler M 2017. *Fire and life safety educator: principles and practices (2<sup>nd</sup> ed.). Jones and Bartlett Learning, Massachusetts.*
- Harpur A, Boyce K & McConnell N 2012, *An investigation into the circumstances surrounding fatal dwelling fires involving very young children. Fire Safety Journal, 61: 72-82.*
- Haynes K, Lassa J & Towers B 2010, *Child centred disaster risk reduction and climate change adaption: roles of gender and culture in Indonesia. At: [https://www.researchgate.net/publication/210194710\\_Child\\_centred\\_disaster\\_risk\\_reductions\\_and\\_climate\\_change\\_adaptation\\_roles\\_of\\_gender\\_and\\_culture\\_in\\_Indonesia](https://www.researchgate.net/publication/210194710_Child_centred_disaster_risk_reductions_and_climate_change_adaptation_roles_of_gender_and_culture_in_Indonesia). [24 August 2020].*
- Huseyin I & Satyen L 2006, *Fire safety training: its importance in enhancing fire safety knowledge and response to fire. The Australian Journal of Emergency Management, 21(4): 48-53.*

- Istre G, McCoy M, Carlin D & McClain J 2002, *Residential fire related deaths and injuries among children: fireplay, smoke alarms, and prevention*. *Injury Prevention*, 8: 128-132.
- Jankowski P 2015, *Evaluating FSE outreach in K-5 students in La Verne*. La Verne Fire Department, California. At: <https://usfa.kohalibrary.com/app/work/234045>. [24 August 2020].
- Johnson V, Ronan K, Johnston D & Pease R 2014, *Evaluations of disaster education programs for children: a methodological review*. *International Journal of Disaster Risk Reduction*, 9: 107-123.
- Kendrick et al. 2012, *Home safety education and provision of safety equipment for injury prevention (review)*. *Evidence based child health: a Cochrane Review Journal*, 8(3): 761-939.
- Kendrick et al. 2007, "Risk Watch": *Cluster randomised controlled trial evaluating an injury prevention program*. *Injury Prevention*, 13:93-98.
- Kirsch J 2016, *Determining needs of minority populations in order to promote fire safety programs*. Bergenfield Fire Department, New Jersey. At: <https://usfa.kohalibrary.com/app/work/237666>. [24 August 2020].
- Kourofsky C & Cole R 2010, *Young children can be key to fire-safe families*. *Young Children*, 65(3): 84-87.
- Lehna et al. 2013, *Impact of children with special needs on differences in fire-safety education priorities, preferred method of education, and parent actions*. *Journal of Burn Care & Research*, 35(2): 162-168.
- Lidstone J 2006, *Blazer to the rescue! The role of puppetry in enhancing fire prevention and preparedness for young children*. *Australian Journal of Emergency Management*, 21(2): 17-28.
- Monk J 2011, *Fire prevention and life safety education in schools: a collaborative effort*. Hampton Division of Fire and Rescue, Virginia. At: <https://www.semanticscholar.org/paper/Fire-Prevention-and-Life-Safety-Education-in-A-Monk>. [24 August 2020].
- Morrongiello B 2012, *Innovations in child injury prevention: evidence-based strategies that address fire safety for young children and playground safety for older children*. *Injury Prevention*, 18: A1-A246.
- Morrongiello B & Schwebal D 2017, *Pediatric psychology and child unintentional injury prevention: current state and future directions for the field*. *Journal of Pediatric Psychology*: 721-726.
- Mytton J, Goodenough T & Novak C 2017, *Children and young people's behaviour in accidental dwelling fires: a systematic review of the qualitative literature*. *Safety Science*, 96:143-149.
- Najmanova H & Ronchi E 2017, *An experimental data-set on pre-school children evacuation*. *Fire Technology*, 53: 1509-1533.
- Ogier S 2008, *Evaluation of the Firewise Programme for year one and two students: final report*. At: [https://fireandemergency.nz/assets/Documents/Educators-and-schools/Research\\_FirewiseEvaluationMartinJenkins.pdf](https://fireandemergency.nz/assets/Documents/Educators-and-schools/Research_FirewiseEvaluationMartinJenkins.pdf). [24 August 2020].
- Phillips M 2012, *Evaluation of the Cedar City Fire Department's fire prevention and life safety house program*. Cedar City Fire Department, Utah. At: <https://usfa.kohalibrary.com/app/work/175844> [24 August 2020].
- Office of the Advocate for Children and Young People 2020, *Children and young people's experience of disaster*. At: <https://www.acyp.nsw.gov.au/disaster-report-2020>. [24 August 2020].
- Rimmer et al 2010, *The effectiveness of a culturally sensitive burn and fire prevention program designed for inner city school students and parents*. *Injury Prevention*, 16: A1-A289.
- Ronan K & Towers B 2014, *Systems education for a sustainable planet: preparing children for natural disasters*. *Systems*, 2: 1-23.
- Satyen L, Barnett M & Sosa A 2004, *Effectiveness of fire safety education in primary school children*. *Human Behaviour in Fire: Public Fire Safety Professionals in Partnership*, 3rd International Symposium. Belfast, Northern Ireland: Interscience Communications
- Senthilkumara M, Nazari G, MacDermid J & Roche K 2019, *Effectiveness of home fire safety interventions: a systematic review and meta-analysis*. *PLoS ONE*, 14(5): 1-17.

- Simpson T, Wheatley D, Brunsden V & Hill R 2014, *Fire and rescue service community safety initiatives: measuring impact. Safer Communities*, 13(2), 88-100.
- Smith et al. 2018, *The epidemiology of residential fires among children and youth in Canada*. At: <https://cjr.ufv.ca/wp-content/uploads/2018/04/UBC-Epidemiology-of-Residential-Fires-Children-and-Youth.pdf>. [24 August 2020].
- Subramaniam C 2004, *Human factors influencing fire safety measures. Disaster Prevention and Management*, 13(2): 110-116.
- Tacuic A & Dederichs A 2013, *Determining self-preservation capability in pre-school children*. At: <https://www.nfpa.org/News-and-Research/Data-research-and-tools/Building-and-Life-Safety/Determining-Self-Preservation-Capability-in-Pre-School-Children>. [24 August 2020].
- Tatebe J & Mutch C 2015, *Perspectives on education, children and young people in disaster risk reduction. International Journal of Disaster Risk Reduction*, 14: 108-114.
- Towers B & Whybro M 2017, *A formative evaluation of the Triple Zero Kids' Challenge Educator's Guide. Australian Journal of Emergency Management*, 33(3): 64-70.
- Towers et al. 2014. *Child-centred disaster risk reduction in Australia: progress, gaps and opportunities. Australian Journal of Emergency Management*, 29 (1): 31-38.
- UK Office of the Deputy Prime Minister 2003, *Working with young people in the community*. At: <https://webarchive.nationalarchives.gov.uk/20060619133258/http://www.communities.gov.uk/index.asp?id=1162371>. [24 August 2020].
- Varker et al. 2015. *Rapid evidence assessment: Increasing the transparency of an emerging methodology. Journal of Evaluation in Clinical Practice*, 21(5): 1199-1204.