MONASH University

EVALUATING THE GIRLS ON FIRE: FIRE AND RESILIENCE PROGRAM

Dr Karen Lambert
Associate Professor Justen O'Connor

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EXECUTIVE SUMMARY

Introduction

Our planet's climate is changing, and this is having an impact on our health and wellbeing. Over recent years we have been impacted by global health, natural and manmade disasters, and the associated geopolitical, social, and economic impacts linger. Climate change affects every country in the world. Disasters are linked to climate change. The kinds of extreme weather events, bushfires, and floods in Australia over the last 4-5 years are far from normal and far from over. The tangible costs of climate change soar into the trillions of dollars. The intangible costs on health and wellbeing are unquantifiable. The most vulnerable populations, including First Nations peoples and women, will continue to suffer disproportionately from the adverse effects of climate change. The costs of inaction are high and inequitable. Whilst climate change is inevitable, actions to support the resilience and wellbeing of individuals, the fire and emergency service (FES) workforce, and community members in response to it can be undertaken. *The Girls on Fire Resilience Program* (the Program) claims to be a climate action, health and wellbeing and education initiative that inspires young women to pursue volunteering and career opportunities, and empowers them to take an active role in building community safety and resilience.

Research aim

The aim of this research was to measure the impact of (the Program) against its stated objectives.

Method

A quasi-experimental pre-post design without a comparison control group was conducted. Ethics approval was obtained from the relevant University Human Research Ethics Committee (No. 32825). In consultation with *Girls on Fire* (GOF) four outcomes were identified for evaluation of the program. These were then used to select or design robust measures to assess the stated program outcomes. The primary program outcome for evaluation was to 'enhance individual and community resilience'. To measure this outcome, two scales were used; *Ten-item Connor-Davidson Resilience Scale (CD-RISC-10)* and *Thrive-Oriented Community Resilience Scale*. Secondary program outcomes that also formed a target for evaluation were related to 'increasing knowledge about emergency situations', 'increasing preparedness to take action in emergency situations', and 'increasing interest in emergency services'. As no measures existed for these three outcomes in consultation with GOF scale was developed to evaluate these aspects. A quasi-experimental, pre- and post-test design without a comparison control was adopted for this initial pilot phase of the evaluation. Participants were identified via the program registration process and sent a link containing the digital survey using the Qualtrics XM platform. Prior to undertaking the Program, participants completed the survey anonymously. Participants completed the survey again following the program. Following screening and data cleaning, data were analysed descriptively and parametrically using repeated measures analysis of variance. Data were analysed using SPSS version Xx.

Findings

Results revealed a significant improvement across all measures ($p<.001$) with moderate effect sizes. Interpretation of these results needs to be tempered by the study limitations and in particular, future research will require a control comparison group. Despite limitations, findings indicate the potential of the program to produce change across a range of participant measures. Further high quality quantitative and qualitative research is required.

Conclusion

The results suggest that the Program has the potential to evolve into an initiative to develop the individual and community resilience of participants. Overall, the findings of this study indicate support to continue exploring the impact of the *Girls Fire and Resilience program* in supporting the development of individual and community resiliency strategies to mitigate the impact of disastrous climatic events in Australia.

INTRODUCTION

Our planet is an amazing place to live. We are connected globally through our planet and our shared experiences are becoming increasingly more common across the globe. Beyond trade and economic benefits, globalisation has opened doors to each other. For example, during the COVID-19 pandemic we opened a window to our shared fear and uncertainty, sense of loss and powerlessness. In Australia, at the end of 2019 bushfires ravaged New South Wales (NSW) and Victoria, only to be replaced in those very same states by super storms and record-breaking flooding at the start and end of 2022. Our planet's climate is changing, and this change will continue to have an impact on our health and wellbeing.

The last 4-5 years have been particularly intense in terms of global health and wellbeing, natural and manmade disasters, climate change, and associated geopolitical, social, and economic concerns. This unprecedented global change from 2018-2022 has had its impact on humans, wildlife and the planet with at times disastrous effects; bushfires and floods have been experienced globally in concentrated, rapid, unpredictable and extreme ways that test our ability to respond under pressure and to 'bounce back'. Given the frequency and intensity of potentially disastrous events are forecast to increase (Rice et al., 2021) disaster resiliency becomes increasingly important.

The United Nations has identified a pressing need for climate action in all countries (UN, n.d.a) in the face of ongoing climate change. In addition to agreed global goals and targets, there is an increasing need for high level reactive responses like strategic planning and management systems that incorporate technology (Natural Hazards Research Australia [NHRA], 2022) and Indigenous knowledge (Perry & Hayman-Reber, 2020; Williamson & Weir, 2021).

In addition, the recruitment and training of a diverse and skilled workforce is needed to mitigate the impact of global and local disasters and to sensitively work with local communities during disasters (NHRA, 2022). To achieve impacts for the whole community such a workforce should be assembled using a diversity lens. Matters of equality must sit centrally to the future management of, responses to and rebuilding of communities after disasters (Gender and Disaster, [GAD], n.d.).

In thinking to the future, it is clear that education will play a key role in individual and community responses to, and recovery from, disasters. This includes education that supports diverse recruitment pathways into emergency services, about climate change as well as its associated impacts (e.g., poor mental health), ways to mitigate harms (e.g., how to respond in an emergency), and strategies for healthy recovery (e.g., support systems, building resilience). This kind of education should not fall solely to schools and should instead be integrated into the policies, procedures and practice of all emergency services as well as all levels of government (Dibley et al., 2019; GAD, n.d.; NHRA, 2022). Given the frequency and intensity of disasters is forecast to increase, impacting our health and wellbeing, it is imperative that we develop the skills, competencies and confidence to respond to and recover from disasters.

The *Girls on Fire Resilience program* has been developed as an education initiative that inspires young women to pursue volunteering and career opportunities, and empowers them to take an active role in building community safety and resilience.

BACKGROUND

There are many reasons for taking a resilience approach to educating individuals and communities about ways to recover from, respond to, and prepare for disasters. Of relevance to this report are links to the impact of climate change on individuals and communities, including health and wellbeing and matters of equity and equality; a national focus on developing disaster resilience, including preparedness to act, individual and community resilience; the need for a more diverse fire and emergency service (FES) workforce; and the possible role of community-based resilience education programs.

Impact of climate change

Natural disasters are an experiential reality for millions of global citizens, with the adverse consequences of unprecedented events threatening livelihoods. Within Australia untold damage has occurred as the result of devastating bushfire seasons and flooding. Of the 2019-2020 Black Summer fires, scientists at the CSIRO (Cook et al., 2021) unequivocally state, 'that these fires were far from normal… We need to be ready for more Black Summers – and worse'. At the other extreme, in March 2022 relentless rain caused record-breaking floods in Queensland and NSW, leading the Climate Council (Rice et al., 2022) to conclude that this wide-ranging extreme weather and devastation will continue to intensify with further global warming. Rice and colleagues (2022, p.1) put the future problem succinctly.

> *For many communities dealing with flood emergencies, this is the latest in a long line of climate change-driven extreme weather events they have faced in recent years, including unprecedented drought, unprecedented Black Summer bushfires, unprecedented powerful storms, and unprecedented scorching heatwaves (p.1).*

Health and wellbeing

The health and wellbeing cost of disaster inaction is high. In the 2019-2020 Black Summer alone, the Royal Commission (Binskin et al., 2020) concluded that the fires burnt an estimated 24.3–33.8 million hectares killing over 3 billion animals. Further, they destroyed over 5,900 buildings (including 2,779 homes) and killed 33 people. A further 450 deaths have been linked to respiratory problems as a result of the fires (Cook et al., 2021). The tangible cost of that season is estimated to be over $103 billion (Daley, 2020), with unaccounted and intangible costs for impacts to firefighter and civilian wellbeing and mental health likely to linger for decades to come (Duckett et al., 2020).

Inequality

Climate change and its consequences are experienced unevenly and unequally within and across communities globally. There is a 'vicious cycle' link between climate change and social inequality 'whereby initial inequality causes the disadvantaged groups to suffer *disproportionately* from the adverse effects of climate change, resulting in greater *subsequent* inequality' (Islam & Winkell, 2017, p.1, italics in original). The already disadvantaged and most vulnerable populations will wear the brunt of the impact whilst having least access to resources to mitigate them. Enarson (2012) explains that the impact of climate change and natural disasters is more pronounced on women globally as they account for the majority of those living in poverty, performing most crop growing, and caring for children. There is also evidence that domestic violence against women increases after disasters (Austin, 2008; Department of Health and Human Services, Victoria [DOHHS], 2016; GAD, n.d.; Parkinson, 2011, 2022). By linking pre-existing societal gender expectations and roles to disasters, GAD (n.d.) provides a convincing argument for the importance of taking a gender lens to disaster support and recovery responses from emergency services. They argue that 'applying a gendered analysis to emergency management assists in predicting… social vulnerabilities and the particular risks and hazards people are likely to face' (GAD, n.d., para. 1).

Research also suggests that Indigenous Australians experience the impact of fires differently and disproportionately to non-Indigenous Australians. For example, alongside the loss of lands, habitat and place sits fears of damage to sacred sites (Perry & Hayman-Reber, 2020). Acknowledging the social conditions of people's lives results in more accurate assessments and effective responses based upon the realities of people's lives (GAD, n.d.).

There are clear links between health, inequality and climate change, 'and although we are too late to prevent climate change from harming our health, we can act now to prevent greater damage' (Duckett et al., 2020, p. 3). An equity lens is needed to support Australians to cope with the adverse effects of unforeseen disasters and emergencies before, during and after they happen. A focus on developing resilience in emergencies or disasters also appears to be a logical and practical strategy.

A focus on developing disaster resilience

The American Psychological Association (APA) (2022) define resilience as,

> *the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioral flexibility and adjustment to external and internal demands (para. 1)*

When applied to climate and disaster risk reduction individuals, services, agencies, organisations, governments, and communities direct their attention to 'planning for, mitigating, responding to, and recovering from all types of disasters, emergencies or disruptions' (Monash University, 2022, para. 4). This coupling ensures 'that connected communities remain strong and resist, absorb, accommodate, adapt to, transform, recover and thrive from expected or unexpected disruptive events' (Monash University, 2022, para. 4).

The coupling of resilience to disasters has led to the emergence of the term disaster resilience. The Bushfire and Natural Hazards CRC (2020) defines disaster resilience as, 'the capacity to prepare for, absorb and recover from natural hazards, and to learn, adapt and transform in ways that enhance these capacities in the face of future events' (para. 3). Disaster resilience will continue to be an important government strategy in Australia (Australian Institute of Disaster Resilience [AIDR], 2022a; Commonwealth of Australia, 2018; Dibley et al., 2019; Price-Robertson & Knight, 2012; Natural Hazards Research, Australia, 2022).

Relatedly, policy and research approaches to disaster resilience implicate education as a suitable strategy to build the assets and strengths of communities and individuals. Psychological research shows that the resources and skills required for greater resilience 'can be cultivated and practiced' (APA, 2022, para. 1). It follows that it is incumbent upon government and support agencies to increase the knowledge as well as skills of young people in order to support their future disaster responses.

Primary prevention: Community based resilience programs

With regards to disaster risk reduction, there is a need to develop primary prevention strategies to educate and upskill individuals and communities to respond in the event of disasters. As previously suggested, from an equity perspective, a primary focus for such education should be women and girls. Such an approach is supported at a global level by the United Nations Office for Disaster Risk Management (UNDRR) in the *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNDRR, 2022). Additional global policy support can be found in the *Sustainable Development Goals* (UN, n.d.b).

In Australia, the Australian Institute for Disaster Resilience (AIDR) has established the Education for Young People program which 'promotes disaster resilience education for all young Australians, in schools and other educational settings. (AIDR, 2022a, para. 1). AIDR uses the notion of Disaster Resilience Education (DRE) to provide a web-based hub where educators and schools can meet and collaborate, access and create resources, and influence curriculum reform with the aim of developing resilient, confident, successful and responsible learners. The AIDR defines DRE as, 'learning about natural hazards in the local environment and ways to keep communities safe from harm before, during and after an emergency or disaster' (AIDR 2022b, para. 1). This suggests that any programs or initiatives that seek to improve the capacity of individuals and communities to prepare for, respond to and/or recover from disasters should base their work around increasing knowledge and skills/competencies as well as confidence. In fact, the AIDR is quite clear in this regard, and provides instructive advice about what disaster resilient young people might look like and be able to do. The outcomes listed below from AIDR direct attention to a focus on enhancing resilience, increasing knowledge about emergency situations and increasing preparedness to take action in emergency situations. The AIDR state that 'disaster resilient young people:

- recognise natural hazards in their local environment
- understand the harmful impacts that natural hazards have on people and places
- demonstrate strategies for staying safe, seeking help and helping others in an emergency
- design solutions to local challenges related to hazards and emergencies
- share their learning, opinions and ideas with local decision-makers
- participate in actions for recovery following a disaster or other traumatic event.'
  (AIDR, 2022b, para. 2).

The DRE is guided by the *Sendai Framework* (UNDRR, 2022) and the *National Disaster Risk Reduction Framework* (Commonwealth of Australia, 2018). Thus, policy is linked to education and action. An additional

outcome of building the disaster resilience of young people, and especially with an equity lens is highlighting fire and emergency services as possible volunteer and/or career paths.

Diversifying the fire and emergency service (FES) workforce

The acknowledgement of the social conditions of disaster risk and development of individual and community disaster resilience also means that FES could take the opportunity to scrutinise their cultural practices (GAD, n.d.; Griffith et al., 2016; O'Byrne, 2016) in alignment with the changing occupational demands of the FES (O'Byrne, 2015) as well as social expectations around equality.

Fire & Rescue NSW (2013, 2014) reported that the majority of Australian firefighters' time is spent on non-fire related rescue incidents and medical emergencies (Benest & Grijalva, 2002) meaning the demands, both physical and mental, are not the same as they were even 5 years ago. Additionally, gendered perspectives are also absent from environmental research, policy, planning and implementation (GAD, n.d.). If the educational goals and visions of organisations like the AIDR are realised a possible outcome is the preparation of young women for FES workplace participation. Not only do communities need to see themselves reflected in the faces of the people who respond to their needs in moments of disaster, but they also need for those same faces to act in respectful ways that appreciate the depth and breadth of the social conditions of people's lives. This requires a change in responder skill-sets. Therefore, new capabilities and skills are needed in modern emergency services where 'women have an integral role to play in disaster planning, prevention, rescue and recovery' (GAD, n.d., para 9) and leadership (Parkinson et al., 2019).

THE GIRLS FIRE & RESILIENCE PROGRAM

The *Girls Fire & Resilience Program* (the Program) develops individual and community resilience via an intervention of various lengths which centres around the development of knowledge, skills, attitudes, and behaviours associated with fire and emergency safety and services. The program also promotes fire and emergency services (FES) as a possible career option for young women. Associated with this is the development of mentoring programs between FES personnel, mainly women, and the program attendees. Further, the Program provides a mentoring model with a focus on improving mental health and wellbeing, social competencies, and community attachment of the young women who attend. It is noteworthy that the Program claims to work through a diversity lens and seeks to engage, educate and inspire young women from diverse backgrounds (e.g., youth at-risk, Indigenous youth, LGBTIQA+ youth, and youth from culturally and linguistically diverse backgrounds).

As an inclusion strategy and disaster resilience education activity the program has potential to develop the capacity of young women to respond to, recover from and rebuild after accidents, emergencies and disasters. This supports the literature previously discussed.

The Program represents a significant investment of both private and public money, human resources and the diverting of agency expertise (i.e., funding constituted from public donations, government support and private investment, resources from emergency services). Without reliable and quantifiable evidence of the impact of resilience-based programming, claims about its impact will remain largely unsubstantiated and resources invested without understanding the true value of this investment, or how systems and processes might be improved. To fill this gap researchers at Monash University were commissioned to conduct an independent evaluation in order to explore the impact of the program and inform cycles of improvement so the return for communities and investors can be further enhanced and grown with confidence.

Achievements to date include

- Proof of concept research in North America, including two high quality publications (Lambert 2018, 2020).
- An industry partnership for 5 years with GOF, Australasian Fire and Emergency Services Authority (AFAC), and Fire & Rescue NSW (FRNSW).
- Proof of concept research in Australia, including industry reports (Lambert 2019).
- GOF secured funding from NAB and DET to conduct programs across NSW in 2022.

Aim

The aim of this research was to measure the potential impact of the *Girls Fire and Resilience Program* against its stated objectives.

Outcomes

The intent of the Program was to inspire young women to pursue volunteering and career opportunities and empower them to take an active role in building community safety and resilience.

The primary program outcome for evaluation was to enhance:

1. Individual and community resilience.

Secondary program outcomes that also formed a target for evaluation were related to increasing:

2. Knowledge about emergency situations.
3. Preparedness to take action in emergency situations.
4. Interest in emergency services.

Methods

Study Design

A quasi-experimental, pre- and post-test design without control group comparison was adopted for this initial pilot phase of the evaluation. The pre-post design enabled repeated measures to be analysed to assess change over time. Given the lack of a suitable control group, any changes that did occur could not be directly attributable to participation in the Program. Despite this limitation, findings indicate the potential of the Program to produce change across a range of participant measures. Ethics approval was obtained from the relevant University Human Research Ethics Committee (No. 32825).

Recruitment and Resulting Sample

Participants were identified via the Program registration process. The Program providers sent a link containing the digital survey using the Qualtrics XM platform. Participants 15 years of age and over were invited to read an explanatory statement, consent to their participation and complete the survey. Participants who were 14 years of age in addition to their own consent, required parental consent to complete the survey. People 13 years of age and under were excluded from participating. Following the provision of consent, participants were invited to provide their email address for the purpose of receiving the follow up survey. Participants who were late signing up to the program or who had forgotten to complete the survey, were invited to participate a second time 1-2 days prior to undertaking the program. In total 385 participated in the Program. Of the 159 young people (41.3% eligible) who provided consent and started to complete the survey, 7 failed to complete the entire survey. Following the program, participants were invited via email to complete the post-program survey with reminders from the program leaders. 71 participants (45%) submitted the post-survey and only 61 complete cases were able to be analysed.

Participants completing both pre- and post-surveys were aged between 14 and 18 years (M=15.65; SD=.94). 17% of participants identified as being Aboriginal or Torres Strait Islander (First Nations Australian/ Indigenous). Most identified as female or woman with one participant noting their gender wasn't listed (see Table 1). Table 2 provides details about the number of respondents that attended the various programs.

Table 1: Participant Characteristics

SAMPLE CHARACTERISTIC	N	%
Gender		
Female/Woman	70	99
Gender not listed	1	1
Cultural Background		
First Nations Australian	12	17
Anglo or Non-Indigenous Australian	51	72
Pacific Islander	1	1
Not listed	4	6
Prefer not to say	3	4

Table 2: Programs attended

PROGRAM ATTEND	FREQUENCY	PERCENT	VALID PERCENT	CUMULATIVE PERCENT	
Valid	Albion Park	13	18.3	18.3	18.3
	Campbelltown	2	2.8	2.8	21.1
	Carrington	4	5.6	5.6	26.8
	Cowra	5	7.0	7.0	33.8
	East Maitland	4	5.6	5.6	39.4
	Mudgee	5	7.0	7.0	46.5
	Newcastle	5	7.0	7.0	53.5
	Orange	1	1.4	1.4	54.9
	Parkes	7	9.9	9.9	64.8
	Other	25	35.2	35.2	100.0
	Total	**71**	**100.0**	**100.0**	

Measures

The program was developed for young women aged 14-18 years with an interest in fire and emergency services. The primary outcome of the program was to 1) enhance perceptions of individual and community resilience. Secondary outcomes of the program were to: 2) increase knowledge about emergency situations; 3) increase preparedness to take action in emergency situations and; 4) increase interest in emergency services. A literature search revealed two suitable measures were available to assess the primary outcome. No existing suitable measures could be identified for the remaining outcomes and consequently these had to be devised prior to the study commencing. Their psychometric properties were evaluated with data collected in this pilot evaluation. All measures were analysed at baseline to establish their suitability prior to any data analysis.

OUTCOME 1: INDIVIDUAL AND COMMUNITY RESILIENCE

The primary program outcome for evaluation was to enhance individual and community resilience. To measure this we used three scales, *Ten-item Connor-Davidson Resilience Scale (CD-RISC-10)* and two sub-scales taken from the *Thrive-Oriented Community Resilience Scale.*

TEN-ITEM CONNOR-DAVIDSON RESILIENCE SCALE (CD-RISC-10)

The CD-RISC-10 is a widely used measure of individual resilience with extensive use in the literature (http://www.connordavidson-resiliencescale.com/). The measure is designed as a self-rating scale where participants respond to a series of ten statements. Each response is scored on a five-point scale ranging from 1 to 5, with 1 representing that the resilience statement is not at all true and a score of 5 indicating that the statement is true nearly all the time. The total score is obtained by adding up all 10 items for a range from 5 to 50. Higher scores suggest greater resilience and lower scores suggest less resilience, or more difficulty in bouncing back from adversity. The scale primarily addresses hardiness, with items corresponding to flexibility (1 and 5), sense of self-efficacy (2, 4 and 9), ability to regulate emotion (10), optimism (3, 6 and 8) and cognitive focus/maintaining attention under stress (7). Permission to use the scale was sought and received by the scale developers. The scale was administered according to the protocol outlined by the scale developers.

THRIVE-ORIENTED COMMUNITY RESILIENCE SCALE

According to Lindberg & Swearingen (2020) community resilience is best achieved if the contributors to, and the effects of resilience are understood. The Program, if used at scale, has potential to enhance the resilience of communities by improving community cohesiveness. Consequently, it was considered important to capture the extent to which young people felt the program contributed to enhancing their perceptions of community resilience and its capacity to handle emergencies along with improvements to individual resilience.

Two sub-scales were utilised from the *Thrive-Oriented Community Resilience Scale*, one 6-item scale measuring community resilience and another 5-item scale measuring individual resilience. The original scale included examples of emergencies found on the coast of Oregon and included references to tsunamis and earthquakes. The authors note that issues facing communities vary across geographic, economic, and social contexts, and they supported the substitution of specific changes in other contexts, for example, replacing the references to earthquake–tsunami with references to wildfire and other events. Given the Australian setting where earthquakes rarely cause extensive damage, these emergencies were changed to floods and bushfires, both more common experiences for this context.

Community Resilience

The community resilience scale comprised six-items developed by Lindberg & Swearington (2020) from previous scales with author development of items reflecting a focus on thriving across the types of changes faced by their community. Items included: ‘My community is able to “bounce back” when times are tough’; ‘during emergencies, my community will be able to provide key services, such as police and fire protection’ and; ‘If climate does change over time, with effects such as rising sea levels, we’ll be able to adapt and sustain our community’. We adapted items referring to tsunamis and earthquakes replacing with flood and fire as in ‘we'll be able to recover and sustain our community if there’s extensive flooding here’ and; ‘we’ll be able to recover and sustain our community if there’s a significant fire or emergency’. Responses were measured on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Scores were summed for a total range score between 6 and 42 with higher scores indicating greater resilience. The original scale via an exploratory factor analysis indicated a single-factor solution that explained 55% of the variance. The Cronbach’s alpha was 0.83, which showed good internal consistency. Our data also revealed a single-factor solution explaining 67% of the variance, with Cronbach’s alpha = 0.89 (n=68) and positive inter-item correlations between 0.39 and 0.81.

Individual Resilience

The individual resilience sub-scale of Lindberg & Swearington’s (2020) *Thrive-Oriented Community Resilience Scale*, comprising five items measured on a 7-point scale ranging from 1 (strongly disagree) to 7

(strongly agree). Scores were summed for a total range score between 6 and 42 with higher scores indicating greater resilience. Items included statements like: 'I can deal with any emergencies that might occur'; 'I could cope with a fire or flood in my community' and; my belief in myself gets me through hard times'. In our measure, we included a seventh item from Lindberg & Swearington's (2020), that whilst moving away from individual resilience went some way to locating the individuals' capacity to work with their community. That item read 'people in our community work together even when they disagree'. The original scale produced a one-factor solution that explained 60% of the variance; the scale Cronbach's alpha was 0.82. Our data produced a single factor scale that explained 60.58% of the variance with Cronbach's alpha of 0.86.

Secondary outcomes of the program targeted 'increasing knowledge about emergency situations', 'improving participant preparedness to take action in emergency situations' and 'increasing interest in emergency services' tied to future volunteer or career roles in emergency services. No measures existed and so these were developed in consultation with GOF to evaluate these aspects.

OUTCOME 2: KNOWLEDGE ABOUT EMERGENCY SITUATIONS

The Program aimed to provide content knowledge relating to emergency situations. This was evaluated by asking participants to rate their agreement with eight statements aimed at their perceived knowledge about various aspects tied to emergency situations. Statements comprised the following:

- I can clearly explain all the different emergency services in my area
- I know exactly which service to contact in an emergency
- I feel confident to use emergency equipment
- I know how to extinguish different types of fires
- I can explain what needs to happen when managing an emergency at home
- I can explain principles of personal safety in emergency situations
- I could easily explain the link between climate change and things like bushfires and floods (natural disasters)
- I know a lot about traditional Indigenous fire making.

Participants were asked to rate their level of agreement with these statements on a four-point Likert scale that comprised: 1 = do not agree, 2 = slightly agree, = moderately agree and 4 = strongly agree. Scores were totaled to generate a range from 8–32. A baseline exploratory factor analysis generated a two-factor solution with the first factor explaining 52.8% of the variance and the second explaining 13.6% and a Cronbach's alpha of 0.87. A review of inter-item correlations indicated that the question tied to climate change had the smallest correlations, although these remained positive. With this item removed, a single factor solution explained 54.2% of the variance with a Cronbach's alpha of 0.87. For the purpose of this pilot, it was decided to retain the item.

OUTCOME 3: PREPAREDNESS TO TAKE ACTION FOR EMERGENCY SITUATIONS

The Program aimed to enhance participant understandings of emergency situations and their capacity to operate effectively within them. A nine-item measure of this knowledge was developed with the following statements:

- In an emergency situation, I could confidently provide the right information to an operator
- I feel well prepared to support others in emergency situations
- I can work with others in my community to decrease the risks of hazards/disasters
- In an emergency situation, I know how to remain calm
- I would act effectively in an emergency situation
- I would respond quickly in an emergency situation
- I could be a leader in an emergency situation
- I am able to prepare myself for future hazards or disasters
- I could help my family in a natural disaster.

Participants were asked to rate their level of agreement with these statements on a 4-point Likert scale from 1 = do not agree, 2 = slightly agree, 3 = moderately agree and 4 = strongly agree. Scores were totalled to generate a range from 9–36.

A baseline exploratory factor analysis revealed a single-factor solution that explained 61% of the variance. The Kaiser-Meyer-Oklin measure was adequate at 0.86 and Bartlett's Test of Sphericity was significant ($p<.001$, $df=36$). Inter-item correlations were all positive and ranged from 0.33–0.78.

OUTCOME 4: INTEREST IN EMERGENCY SERVICES

The final outcome to be evaluated was tied to the program's capacity to attract females to emergency services roles. A broad range of occupational activities are provided by the Program. These activities introduce the participants to the FES and increase familiarity to the requirements of the job thus influencing future involvement in FES activities e.g., recruitment or volunteering.

There were no existing measures that we could find to evaluate the impact of the program on participants' potential to see themselves as emergency services volunteers or employees. Given these young people had signed up to undertake this camp, it is likely that many may have already envisioned themselves in such a role. However, if the program is to scale up, then it may have an impact on a wider audience.

To measure this, a four-item self-rating measure was developed using the following statements:

- I think working in the fire and emergency services would be a great job to have
- In the next 1–2 years I could see myself being involved in firefighting or emergency services (e.g., volunteer or paid)
- In the long term, I could see myself being involved in firefighting or emergency services (e.g., volunteer or paid)
- I am really interested in firefighting or emergency services.

Statements targeted both short and long-term interest as well as the extent to which young people were interested in the emergency services, particularly as a career. Participants rated their level of agreement with the statements on a four-point scale that consisted of: 1 = do not agree, 2 = slightly agree, 3 = moderately agree and 4 = strongly agree. Scores were totalled and ranged from 4–16.

A baseline exploratory factor analysis revealed a single-item solution that explained 80% of the variance. Inter-item correlations were somewhat high ranging from 0.58 to 0.84 suggesting potential for item redundancy. A Cronbach's alpha of 0.92 was obtained and as expected scores were on the high side suggesting participants may have been predisposed to viewing emergency services positively, given they had signed up for the program. Scores ranged from a minimum of 2.95 – a maximum of 3.36 out of four with higher scores suggesting more positive interest.

Analysis

In order to understand the impact of the program on primary and secondary outcome measures, data were screened and assumptions for parametric testing were evaluated. There was skewness in the data however this was less than 1.5 and visual inspection of plots revealed no concerning anomalies. The homogeneity of variance assumption was met ($Fmax < 10$; Tabachnick and Fidell, 2013). Consequently, a repeated measures analysis of variance was conducted with a Bonferroni adjustment using SPSS version Xx.

RESULTS

Primary Outcomes

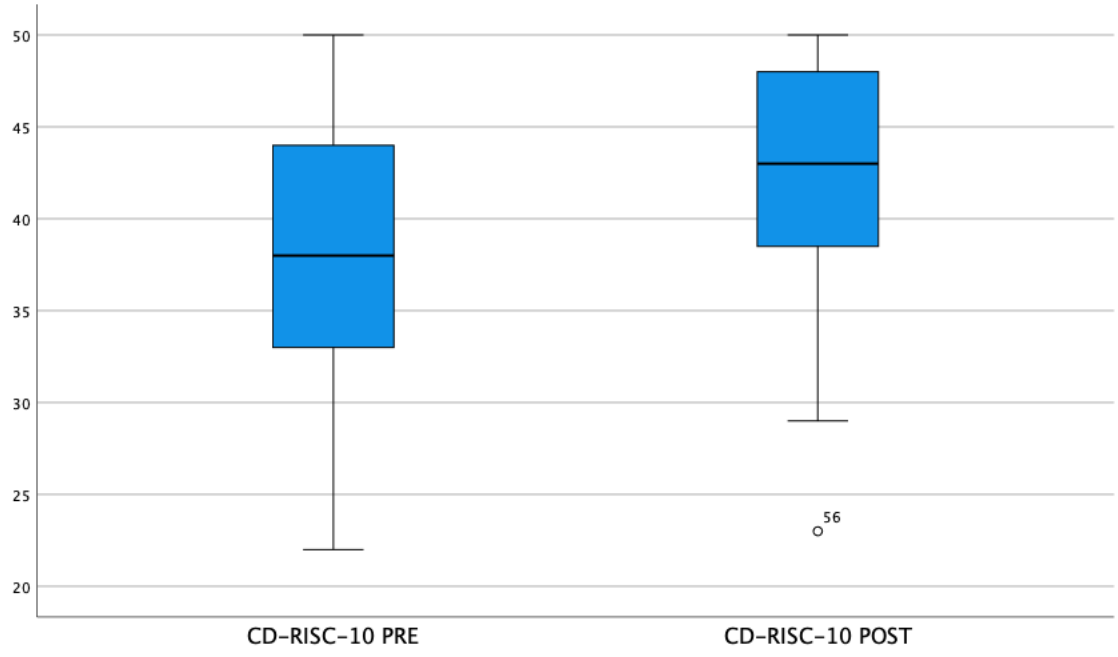
Results revealed a significant improvement across all measures (p<.001) with moderate effect sizes. For the primary outcome tied to 'individual resilience', the CD-RISC-10 and two sub-scales of the *Thrive-Oriented Community Resilience Scale* were utilised. CD-RISC-10 data revealed an effective 9% improvement on mean difference F (1, 61) = 39.64, p < .001 with a modest effect size determined by partial eta squared (η_p^2) = .394 (see Figure 1). For the second measure of the primary outcome, 'individual resilience' based on the Lindberg and Swearingen's (2020) *Thrive-Oriented Community Resilience Scale,* a significant 9.7% improvement on mean difference was noted F (1, 61) = 26.58, p <.001, η_p^2 = .303 (see Figure 2). For the third measure of the primary outcome, 'community resilience' based on the Lindberg and Swearingen's (2020) *Thrive-Oriented Community Resilience Scale*, a significant 8.3% improvement on mean difference was noted F (1, 61) = 19.59, p <.001, η_p^2 = .243 (see Figure 3).

Secondary Outcomes

All secondary outcomes showed improvement across time, including scores for 'knowledge about emergency situations'. Mean difference scores significantly improved by around 25% (F (1, 61) = 103.56, p < .001, η_p^2 = .629) from pre- to post-program (see Figure 4). The measure that looked at 'preparedness to act in emergency situations' demonstrated significant improvement with mean difference scores increasing by around 19% (F (1, 61) = 67.22, p < .001, η_p^2 = .524) (see Figure 5). Finally, the secondary measure exploring participants 'interest in emergency services' showed an increase of 11.2% on mean difference (F (1, 61) = 28.43, p < .001, η_p^2 = .318) (see Figure 6).

Interpretation of these results needs to be tempered by the study limitations.

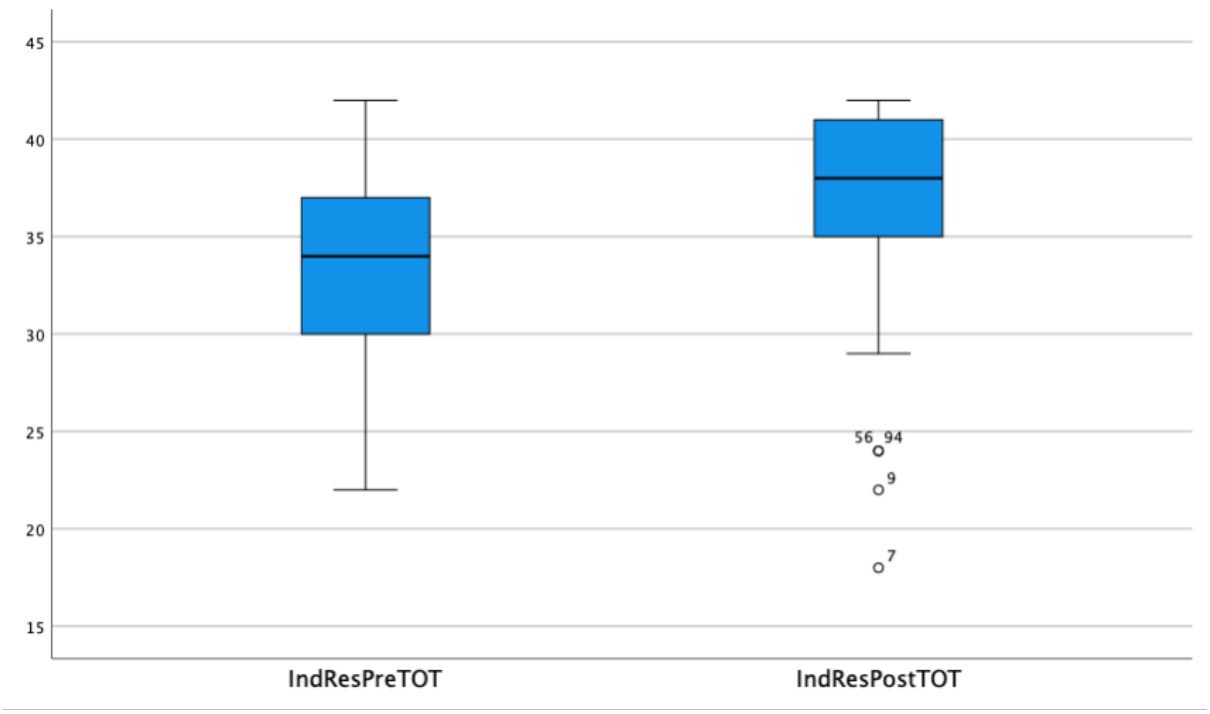
Figure 1: CD-RISC-10 individual resilience



CD-RISC-10 pre- M=38.62, SD=6.71

CD-RISC-10 post- M=42.67, SD=6.41

Figure 2: Lindberg and Swearingen's (2020) *Thrive-Oriented Community Resilience Scale*, individual resilience

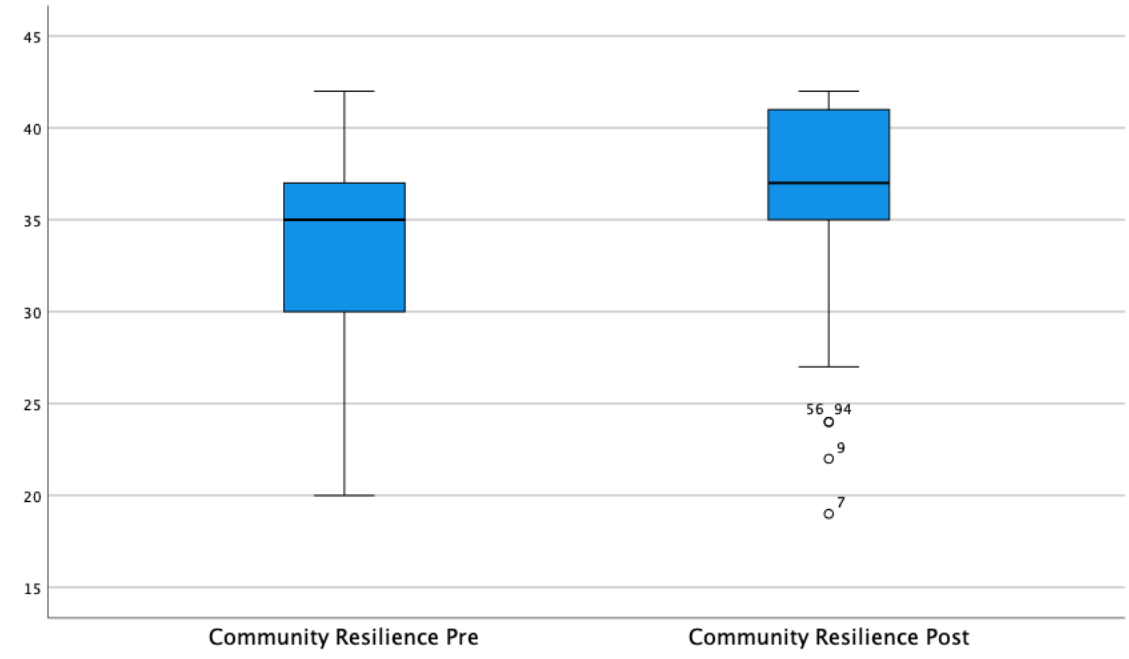


Lindberg & Swearingen (2020)

Individual resilience pre- M=33.51, SD=5.43

Individual resilience post- M=36.91, SD=5.19

Figure 3: Lindberg and Swearingen's (2020) *Thrive-Oriented Community Resilience Scale*, community resilience

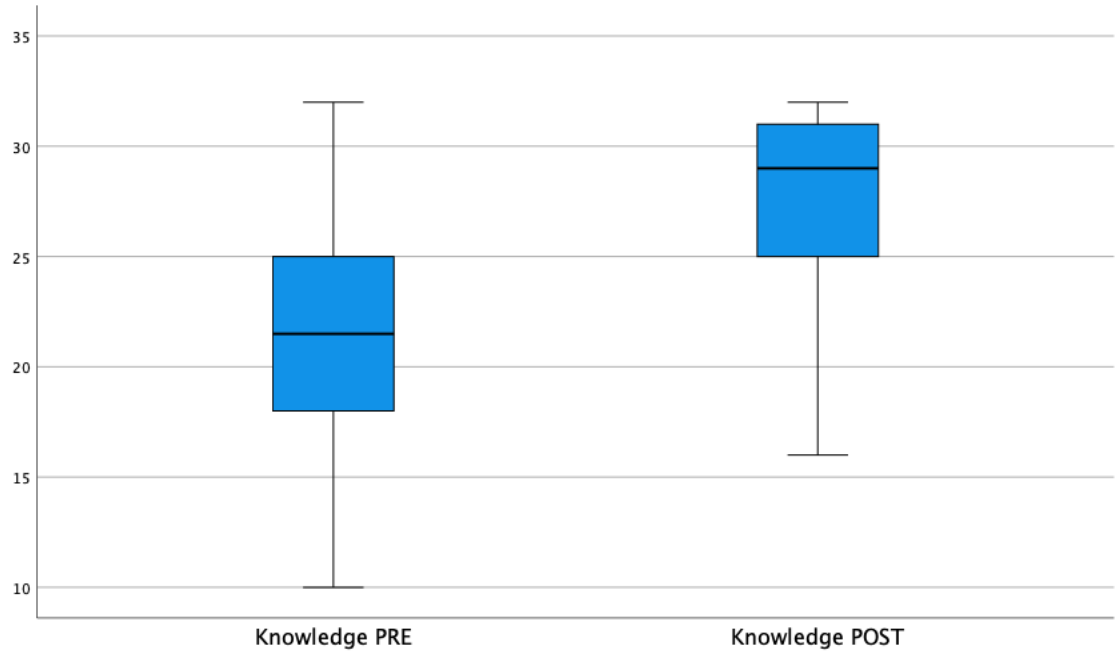


Lindberg & Swearingen (2020)

Community Resilience pre- M=33.52, SD=5.39

Community Resilience post- M=36.55, SD=5.26

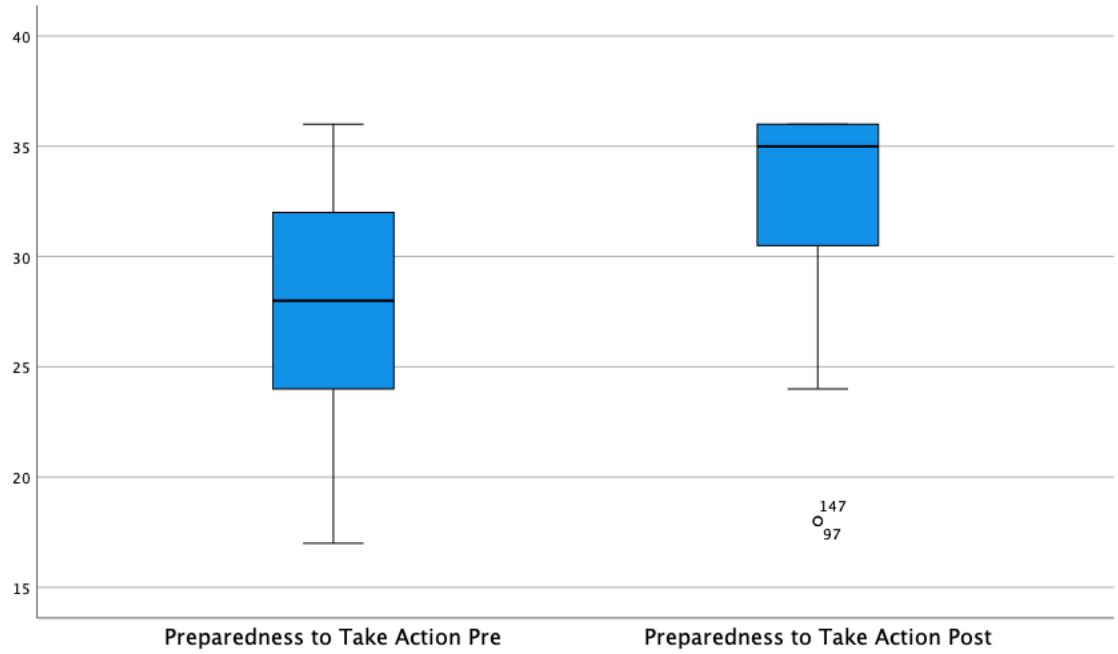
Figure 4: Knowledge about emergency situations



Knowledge about emergency situations pre- m=21.01, SD=4.83

Knowledge about emergency situations post- m=27.71, SD=3.98

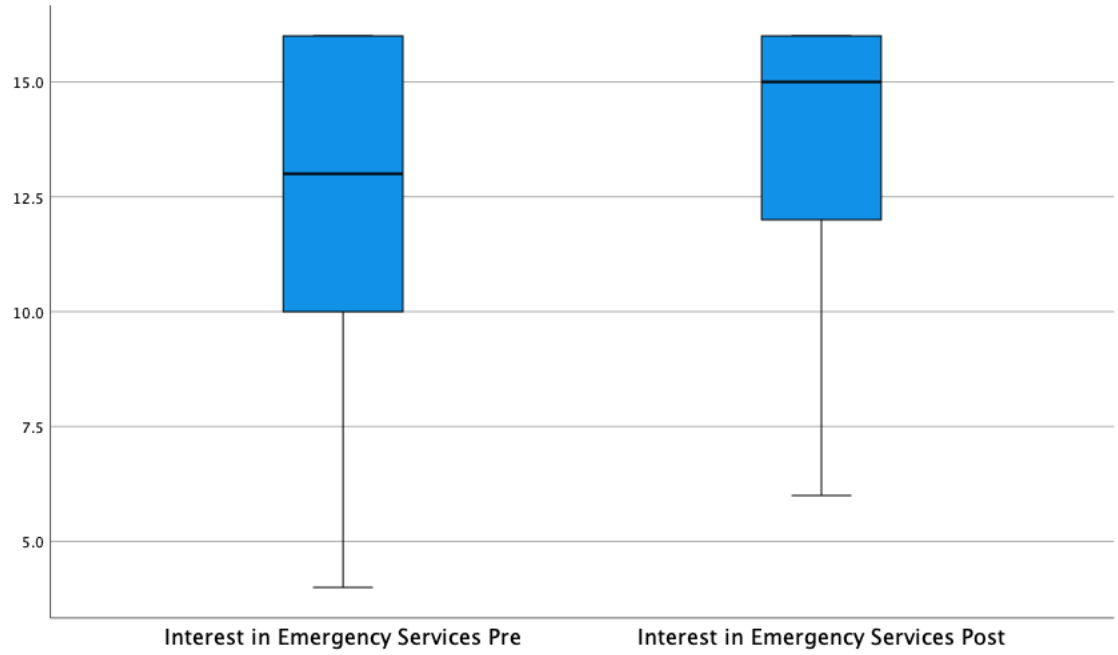
Figure 5: Preparedness to act in emergency situations



Preparedness to take action pre- M=27.43, SD=5.51

Preparedness to take action post- M=32.68, SD=4.44

Figure 6: Interest in emergency services



Interest in emergency services pre- M=12.37, SD=3.28

Interest in emergency services post- M=13.69, SD=2.72

DISCUSSION

All countries of the world are affected by the changing climate (UN, n.d.a) and effects are set to worsen (Rice et al., 2022). Climate change is directly linked to severe weather events associated with flooding and bushfires (Cook et al., 2021). The costs of climate inaction are high in financial, social, environmental, personal and health terms (Binskin et al., 2020; Daley et al., 2020). Climate disasters in Australia from 2019–2022 exemplify the need for climate action at all levels of government to prevent and recover from unprecedented bushfires and flooding (Dibley et al., 2019; UNDRR, 2022). Understanding ways to build the capacity of individuals and communities to respond to, recover from and prepare for future disasters remains an important consideration (Gibbs et al., 2021; Norris et al., 2008; Taylor and Goodman, 2015). The current study demonstrated positive impacts may be obtained from a targeted disaster resilience program aimed at enhancing individual and community resilience of participants.

Participation in either a 1- or 2-day program delivered by GOF has the potential to generate positive outcomes for participants. Specifically, participants showed enhanced individual and community resilience, increased knowledge about emergency situations, increased preparedness to take action in emergency situations, and increased interest in emergency services. The extent to which this was a direct result of the Program could not be established as there was no suitable control, however changes were observed indicating the Program influenced the participants in some way.

The key focus for GOF was to support the development of participants' disaster resiliency. Similar to Lambert (2018, 2020), this research suggests that targeted FES programs have the potential to impact the health and wellbeing, sociality, and career interest of young women. Aligning with calls from AIDR (2022a) to build a 'more disaster resilient Australia' (para. 3), the Program provided opportunities for young women to come together, learn about FES, develop skills to prepare for and respond to disasters, and in so doing to build disaster resilience. Data suggests that a program targeting young women has potential to impact the individual and community resiliency of participants. Substantial research supports a focus on specific groups in the community, especially those already disadvantaged and most vulnerable populations, for example First Nations peoples (Perry & Hayman-Reber, 2020), women (Enarson, 2012; GAD, n.d.; Parkinson, 2011, 2022) and LGBTIQA+ people (Tusker Haworth, 2022). As these groups will continue to suffer disproportionately from the adverse effects of future intense and disastrous climatic events in Australia (Islam & Winkell, 2017) a diversity lens is required (Morgan & Woolford, 2022).

Others have argued that community-led approaches to disaster recovery are a sustainable disaster recovery mechanism as they foster self-reliance and self-determination within affected communities (Dibley et al., 2019; Taylor and Goodman, 2015) and social connection (Hilbrink, 2022). The current research found that the Program may enhance both individual and community resilience in the participants. This finding is promising for the future because disaster resiliency, both individual and community is a key focus of many stakeholders in Australia (AIDR, 2022a; NHRA, 2022) with governments rethinking approaches to community disaster recovery support (Dibley et al., 2019) and climate related health and wellbeing (Australian Institute of Health and Welfare [AIHW], 2021). While concerted multi-level disaster resilience continues to be a key and important government policy strategy and agenda item in Australia programs like the *Girls Fire and Resilience Program* will likely be increasingly in demand.

At both Australian government level, for example the report of the NSW Flood Inquiry (NSW Government, 2022a) and personal level, for example the Lismore tinnie army (Vahanvati & Kuligowski, 2022) or the Sikh volunteers who pop up in car parks around the country to provide food and hope (Canetti, 2022), there is evidence that communities are responding in disaster situations. In fact, Pope and Harms (2022) suggest 'that when communities are able to contribute to their recovery in a way that is meaningful to them, there is significant potential for improved outcomes' (p. 101.

Education remains a key piece of the puzzle in order to prevent further risks in unknown and unpredictable conditions. This is especially the case if community members are first responders. Whilst the NSW government inquiry (2022a) acknowledged the efforts of the tinnie army they also made clear the inherent risks associated with untrained community members performing rescues. As a result, recommendation 6 proposed that the government create a 'community first-responders program', including community equipment and training to support community led disaster responses, as well as offer mental health first aid and support evacuation centres (NSW government, 2022a). Findings from the current research suggest that an initiative like the *Girls Fire and Resilience program* may offer an option for community first-responder training.

According to the NSW Government (2022b), 'targeted public and school education is required to build intergenerational knowledge and enable whole families to engage in disaster readiness' (p. 2). Resultantly, recommendation 14 in the report (2022a, p. 235) calls on the Department of Education to 'design, implement

and deliver an evidence-based, targeted education campaign (like sun exposure) in schools (new disaster curriculum)'.

Additional support for education that specifically targets increasing knowledge about emergency situations and preparedness to take action in emergency situations, as well as enhancing disaster resilience can be found in the AIDR 'Education for Young People program' (AIDR, 2022a). This program,

> *promotes disaster resilience education for all young Australians, in schools and other educational settings… supports initiatives which enable young people to participate in resilient communities… endorses a collaborative approach to disaster resilience education, with young people and educators working in partnership with experts from emergency services' (AIDR, 2022b, para. 1).*

Arguably, the Program aligns with this remit and could fulfil requests both inside and outside the school environment and/or provide support to education institutions to enact recommendation 14.

There is a fundamental need for FES to reorient their workforce towards both the needs and socio-cultural realities of people's lives (GAD, n.d.) as well as to create safe, inclusive workspaces (O'Byrne, 2016; Parkinson, 2022; Parkinson et al., 2019). This reorientation of the FES to better reflect their communities, and hence respond sensitively in disasters also includes serious consideration of the cultural barriers that inhibit FES change (Goward, 2005; O'Bryne, 2016; Parkinson et al., 2019). Targeting women and girls for recruitment to paid or volunteer FES roles is one way to reorient the FES. The research found increased interest in emergency services signalling it may be a suitable pathway for young women to take into FES. Research by Lambert (2019), Parkinson and colleagues (2019) and GAD (n.d.) suggests that changes at systematic and institutional level should occur in tandem with recruitment, leadership and retention strategies. These in turn could improve long term disaster resilience and well as health and wellbeing (GAD, n.d.). Thus the Program responds to an immediate whole of organisation gap with the additional potential of impacting hierarchical social structures in Australian society that tend to discriminate upon the basis of gender, race, Indigeneity, sexuality, religion, geographical location, and ability. Quite simply, a more diverse FES workforce could support disaster resiliency in more diverse and sustainable ways.

LIMITATIONS

The study had several limitations. Given the lack of a suitable control group, it cannot be assumed that any changes were a direct result of the Program itself. Future research will require a control comparison group. There was also a substantive participant drop-out from pre-post testing. This introduces the potential for bias, i.e. that those young women most interested in GOF, managed to get through all aspects of the evaluation. Sample sizes could also be increased to verify findings still further. Despite these limitations, findings indicate the potential of the Program to produce change across a range of participant measures.

Future research should explore the impact of the Program on a wider range of participants, including young women attending and recruited from other contexts (e.g., community clubs, sporting groups, Guides/Scouts, potentially even juvenile justice), and the volunteers who supported the Program delivery. Research could also explore the extent to which 1-day or 2-day programs (or longer) contributed independently to the outcomes. Interview data with participants could give further insights into potential impact. Longitudinal research could further support program outcomes. For example, future research could evaluate the impact on recruitment and retention as well as on culture change in the FES sector. Potential also exists to draw upon the participants to co-design an inclusive emergency service. Consideration could be given to exploring the efficacy of the Program for young men.

Overall, the findings of this study indicate support to continue exploring the impact of the *Girls Fire and Resilience program* in supporting the development of individual and community resiliency strategies to mitigate the impact of disastrous climatic events in Australia. Further high quality quantitative and qualitative research will support these claims.

CONCLUSION

This pilot study begins to respond to the need for climate action and education in response to disasters. It was driven by literature that suggested that an individual and community resiliency approach targeting women and girls could be a strategy that effectively responds to future intense and disastrous climatic events in Australia. Accordingly, it evaluated the capacity of the *Girls Fire and Resilience program* delivered by the not-for-profit organisation GOF to become part of such a strategy.

The research aimed to measure the impact of the *Girls Fire and Resilience Program* against its stated objectives. Findings indicate that the program has the potential to produce change across a range of participant measures including 'enhancing individual and community resilience', and 'increasing knowledge about emergency situations', 'preparedness to take action in emergency situations', and 'interest in emergency services'. However, due to limitations discussed above it cannot be assumed that these changes were a direct result of the Program itself, thus further high quality quantitative and qualitative research is required. Such research would require that GOF undertake a review of their systems and processes in order to make the data gathering part of operating systems and as robust as possible. We offer the following suggestions in this regard.

- Identification of clear program aims and objectives/outcomes to funders and in advance of research – *can a clear vision, mission, aim and set of objectives/outcomes be articulated and adhered to?*
- Define key concepts and notions in order to target accurate measures – *how does GOF define and deploy resiliency? Is this similar/different to others? What about similar terms and associated claims?*
- Process evaluation of systems and processes – *what is working, what isn't, and what could be changed? What are the direct and indirect costs?*
- Establish efficient systems and processes for recruitment and registration of program attendees and communication with them – *what systems and processes will allow for ease of program bookings/registrations (e.g., sites, participants) and for these to occur well in advance of program start dates and/or research?*
- Carefully consider the breadth of commitments to program delivery in contrast to depth i.e., in 2022 many program types, across many sites, in a short period of time were delivered – *is this model delivering a quality product or service as well as supporting the wellbeing and growth of GOF? Is this model sustainable for GOF and how will burnout be avoided as the Program expands?*
- Advance planning of program details including dates, sites, and enrolments – *can program dates be set annually with associated timeframes for recruitment (advertising, promotion), registration and program delivery established across a year?*
- Collection of qualitative data e.g., interviewing program attendees, onsite participant observation, volunteers – *can additional data collection to inform program impact be embedded in annual planning for the Program delivery? Can GOF align strategically with national research agendas and global health and wellbeing challenges?*
- Measuring the impact of the Program on others – *what impact is the Program having on volunteers, FES personnel, parents/carers, community groups and members?*
- Measuring the impact of the Program on organisational change – *what impact is the Program having on the ways in which associated organisations are operating? e.g., partners in the field, government.*
- Resource development for further impact – *what resources could GOF create to disseminate their work and impact more broadly? What plans exist for expanding offerings and how will the current model evolve to support?*

The above recommendations could be used to guide future planning and funding needs in order to further justify a case for the Program and to ensure its future sustainability.

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Faculty of Education
edu-development@monash.edu
+61 (0)3 9905 5598
monash.edu/education
monash.edu/dershowcase

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