Trust but Verify

An Exploration of Community Trust in the Australian Fire Danger Rating System

By

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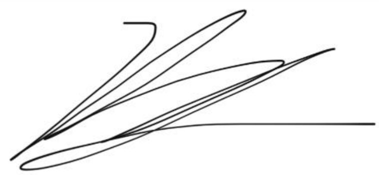
Candidate's Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author’s knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

Author Signed: Kate Jones Date: 07/11/2024



Acknowledgments

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Abstract

Trust is a highly dynamic phenomenon and a vital component of hazard information dissemination, allowing communities to readily accept and act upon hazard information. This study investigates the factors that underlie community trust in the Australian Fire Danger Rating System (AFDRS), determining the psychosocial mechanisms that influence individual perceptions of its accuracy. This study utilizes a mixed method approach, comprising a community survey and a focus group discussion, recruiting those within Canberra's Western Edge community. Through this, it was found that bushfire experience, self-efficacy, and trust in agency affects trust in the AFDRS. Results of this study show that at a community level, trust in the AFDRS is high. Furthermore, both trust in fire agencies and self-efficacy significantly influence trust in the system. Those with bushfire experience were more likely to use self-efficacy to verify their trust in the AFDRS. Conversely, those with less experience relied more heavily on the credibility of fire agencies to ascertain the technological accuracy of the system. Trust in agencies was found to be the primary determinant of community trust in the AFDRS. Therefore, this study demonstrates that trust in risk forecasting systems varies substantially across individuals, comprising an amalgamation of personal perceptions and relationships with institutions. This study concludes by outlining the merit of agency outreach programs in maintaining community trust in the AFDRS.

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List of acronyms and abbreviations

ANU	Australian National University
ACT	Australian Capital Territory
NSW	New South Wales
VIC	Victoria
TAS	Tasmania
WE	Western Edge
AFDRS	Australian Fire Danger Rating System
FDR	Fire Danger Rating
FFDI	Forrest Fire Danger Index
TFS	Tasmanian Fire Service
AFAC	Australasian Fire and Emergency Service Authorities Council
RQ	Research Question
SEA	Sequential Exploratory Approach
ANOVA	Analysis of Variance

Glossary and Terms

Trust	There are many conceptions of *Trust*, as presented in Chapter 2. In the context of this thesis, trust denotes the confidence one has in the accuracy of information portrayed by the AFDRS. This working definition corresponds to the notion of *Competency-based Trust* proposed by Johnson (1999).
Community	Within the present study, the term 'community' is defined as a body of individuals who share a common geographical location, often sharing common cultural, ethnic or social identities. This is consistent with the definition of community in accordance with the Oxfrod Dictionary. Within the context of this research, the community of interest is the Canberra community.
Agency	'Trust in Agency' is frequently referred to throughout this paper. Agency within this context corresponds to trust in the ACT Rural Fire Service (ACTRFS). The AFDRS is a highly technical forecasting system, largely independent of human influence besides cross-referencing system accuracy with local observations (AFAC, 2022; Hollis et al., 2024; Kenny et al., 2024). However, beyond the substantial influence state-based fire agencies had during developmental stages of the AFDRS (Dunston, 2022), subsequent endorsement of the system in the ACT is piloted by ACTRFS.
Self-efficacy	Self-efficacy corresponds to the trust one has in their own judgement and ability to mitigate risk (Weyrich et al., 2019). Within the present study, self-efficacy references 'self-trust' Ter Huurne and Gutteling, 2009).

Chapter 1

Introduction

The Australian Fire Danger Rating System roadside signage located in Western Australia (photo credit: GWA, 2022).

Within Australia, bushfires are inevitable (Ashcroft et al., 2012; Crisp et al., 2011; ; Ellis et al., 2004), serving a practical role in Australia's terrestrial landscape, rejuvenating ecosystems and promoting seasonal variation in biological diversity (Deb et al., 2020; Biddle et al., 2020; Sharples et al., 2016). Increases in atmospheric carbon dioxide have resulted in the intensification of bushfire behaviour, including both increases in fire duration and severity (BOM, 2018; Gergis et al., 2016; Gergis et al., 2020; Lucas et al., 2007). As a result, communities are increasingly exposed to bushfires, seeing loss of both life and property (Lindell and Perry, 2012). Accordingly, the *Royal Commission into the National Natural Disaster Arrangements* (2020) acknowledges that such shifts in bushfire behaviour require pre-emptive approaches to bushfire mitigation (Cooper et al., 2020; Toh et al., 2019). Therefore, the *Australian Fire Danger Rating System* (AFDRS) was developed (AFAC, 2020).

Introduced in September of 2022, the AFDRS is a bushfire forecasting system, utilising a standardised framework to assess and communicate the potential severity of a bushfire if one were to occur (AFAC, 2024). Danger ratings are obtained daily through a combination of ecological, geographical and meteorological approximations (AFAC, 2022; Hollis et al., 2024), estimating prospective bushfire behaviour and the relative effectiveness of existing management approaches (AFAC, 2024). Rating categories are disseminated to communities through a rating scale, ranging from ‘No Rating’ to ‘Catastrophic’, providing specific guidance on the level of risk and corresponding precautions (AFAC, 2024; GWA, 2022) (Table 1). The AFDRS is tasked with in prompting community vigilance, preparedness and general safety (Siegrist, 2021; Whittaker et al., 2019), reliant on community acceptance of the system.

Table 1. The Fire Danger Rating Levels and Corresponding Actions

Danger Rating	Bushfire Behaviour	Recommended Action
No Rating	Absent bushfire	No action necessary
Moderate	Most bushfires are controllable	Plan and prepare
High	Bushfires can be dangerous	Be ready to act
Extreme	Bushfires will spread quickly and be extremely dangerous	Take action now to protect your life and property
Catastrophic	If a fire starts and takes hold, lives are likely to be lost	For your survival, leave bushfire risk areas

(Adapted from: AFAC, 2024)

When individuals are presented with disaster information, the first interaction between the system and that individual is a subconscious assessment of *Trust* (Lindell and Perry, 2012). Conceptually, trust is a social contract, seeing individuals capitalises on the experience or knowledge of another to decrease their vulnerability (Bonfanti et al., 2023; Norris, 2022; Sharp, 2010). Conceptual and theoretical foundations of trust remain embedded in psychological scholarship, although the contemporary shifts to mitigatory approaches to disaster management have seen this topic rendering increased scholarly interest within natural hazard research

(Mayhorn and McLaughlin, 2014). When considering risk information systems, trust denotes one's confidence in the accuracy of the information portrayed (Johnson, 1999; Mackie, 2014; Siegrist, 2000). However, trust in disaster information is not solely determined by a system's technical accuracy, but a complex interplay of psychosocial factors, including disaster expertise and personal expectations (Knee and Knox; 1970; Paton, 2007; 2013). These psychosocial dynamics play a pivotal role in how people engage with, interpret, and ultimately act upon the risk information presented to them (Bonfanti et al., 2023; LeClerc and Joslyn, 2015). In the context of the AFDRS, little research has sought to investigate trust beyond ensuring the system has optimal technological accuracy (Hollis et al., 2024).

1.1 Research Questions and Scope

Therefore, this thesis aims to determine the extent of community trust in the AFDRS, with a focus on identifying the complex and highly variable psychosocial mechanisms that underlie confidence in the system (Johnson, 1999; Lindell and Perry, 2012; Meyer, 1988). The findings of this study not only contribute to the current state of knowledge surrounding trust in the AFDRS, but offers practical insights for improving community engagement with the system (Siegrist, 2021). To achieve this aim, the following research questions (RQ) guided this investigation:

RQ1. *Does the community consider the AFDRS to be trustworthy?*
RQ2. *Do the psychosocial mechanisms underlying the systems trustworthiness vary in accordance with bushfire experience?*

1.2 Thesis Outline

This chapter introduced the present study, outlining its purpose and scope. Subsequently, Chapter 2 presents the relevant literature on trust, including trust in risk information systems and factors influencing this trust. Chapter 3 details the research methodology, data collection and analysis utilised. Chapter 4 presents this study's key findings, consisting of distinct quantitative and qualitative results sections. Chapter 5 integrates these results, drawing on the literature to demonstrate the complexity of trust in the AFDRS, followed by the implications and limitations of the present study. Chapter 6 concludes this research, reiterating the key components of this thesis and how findings are of merit to future AFDRS onboarding and development.

Chapter 2

Literature Review

This literature review comprises of three distinctive components. Sections 2.1 and 2.2 review what is presently understood concerning trust in risk information systems and the psychosocial factors thought to underlie this trust. Section 2.3 presents literature in respect to the AFDRS, outlining the current knowledge surrounding trust in the system presently. Section 2.4 will then outline research hypotheses pertaining to RQs 1 and 2 in the context of the literature reviewed.

2.1 Trust in Risk Information Systems

Traditionally, commentary on trust has been grounded in psychosocial and sociological investigation, considered a binding agent of human community and survival (Govier, 1997; Schilke et al., 2021). Erikson's (1963) *Psychosocial Theory* was among the first to explore trust in this context, defining it as a necessity to human development *(Rotenberg, 2018).* Subsequently, a more pragmatic definition was provided by Kee and Knox (1993) in relation to their *Trust Model, which* defined trust as one's ability to draw on existing knowledge and validate incoming information (Mayer et al., 1995). As climate change emerges as the principal threat to contemporary society, scholarly interest in trust has changed (Li and Hahn, 2022), entering the bounds of disaster risk information research (Cheng et al., 2017; Dietz and Den Hartog, 2006; Li, 2007).

It is unequivocal that public trust in risk information systems influences their effectiveness in conveying risk information (Bonfanti et al., 2023; Mackie, 2014; Norris, 2022). Siegrist (2021), whose research considers the role of trust in motivating hazard preparedness, found that confidence in risk information fosters an individual's capacity to act in complex hazard situations. Similarly, Zong et al (2021) further considered community engagement with risk information, suggesting people are more likely to disengage with warnings that do not harbor their trust (Zhong et al., 2021; Mayhorn and McLaughlin, 2014). In considering forecasting systems, LeClerc and Joslyn's (2015) work concluded that when weather forecasts are perceived as untrustworthy, in which trust is judged in accordance with personal weather observations, the likelihood of an individual displaying preparedness action is reduced (Handmer et al., 2019; Sharp, 2010). Beyond reiterating the importance of trust in risk information systems, LeClerc and Joslyn (2015) work is suggestive of the key underlying mechanism of trust in considering risk information systems, namely an individual's existing experience (Bonfanti et al., 2023; Sharp, 2010). Before commenting directly on how disaster experience is thought to influence trust, *Community Engagement Theory* (CET) will be outlined (Paton, 2008a; 2013).

2.2 Community Engagement Theory

The CET will serve two purposes within this thesis, specifically through (a) providing a framework in which the prevalent psychosocial variables associated with trust in early warnings can be applied to the AFDRS, and (b) to contextualise the findings of this research in respect to a grounding theoretical basis. Based on the theoretical postulations of Knee and Knox (1993), Paton’s (2007) CET seeks identify determinants of community intention to use risk information (Figure 1). Paton’s (2007) work proposes that trust in risk information systems is a complex cognitive phenomenon designed to mitigate human discomfort and simplify decision-making during disaster situations (Earle and Cvetkovich 1995; Luhmann 1979; Mayer et al. 1995; Siegrist and Cvetkovich 2000).

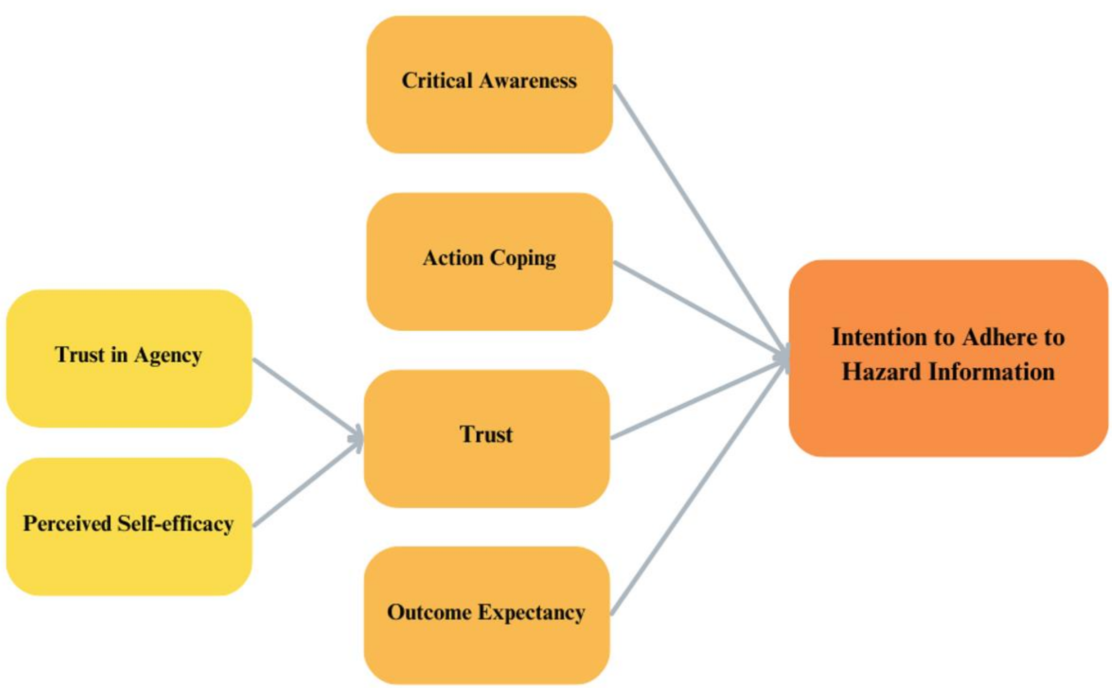


Figure 1. Community Engagement Theory (Figure adapted from Paton, 2007)

Subsequently, Paton (2013) suggests that the mechanisms underlying trust in risk information is a function of hazard experience (Knee and Knox, 1993). Those with greater levels of disaster experience are more likely to determine the credibility of risk information through comparing this information against their existing beliefs. This information is then verified in accordance with one's *Self-efficacy*. Conversely, those with low hazard experience use their social trust in institutions or agencies responsible for generating and disseminating risk information (Paton, 2007; 2013). As mentioned, CET will serve as a conceptual basis within the present study. Although to appreciate whether Paton's (2007; 2008b; 2013) postulations will be retained when considering trust in the AFDRS, literature appreciating the variables of experience, trust in agency and self-efficacy will now be presented.

2.2.1 ***Bushfire Experience***

Under present climate conditions, human exposure to bushfires has increased exponentially (Lindell and Perry, 2012). A self-reported survey conducted by Biddle et al. (2020) proceeding the recent 2019-20 Black Summer Bushfires found that 78.6 percent of Australian’s were impacted directly (forced to take immediate action to protect oneself or one’s possessions) or indirectly (via social interaction with those directly exposed). This saw an estimated 2.9 million Australians reporting direct exposure to bushfire during the event (Biddle et al., 2020).

When considering the implications bushfire exposure has on an individual's risk perception, the literature is contradictory. Sharma and Patt’s (2012) study considering community preparedness conceived those with direct bushfire experience are significantly more likely to evacuate, rather than defend their property (Ambrey et al., 2017). Similarly, interviews conducted with residents of rural Victoria by McGee and Russell (2003) determined that those with direct exposure to bushfire events were more knowledgeable about the necessary actions to take in anticipation of subsequent bushfires (Mackie, 2014). Conversely, Handmer et al.'s (2019) study exploring factors contributing to the 2009 Black Saturday Bushfire mortality rates discerned that there is no evidence that prior experience of bushfires was advantageous to those who survived (Handmer et al. 2019; Mackie, 2014). It can therefore be ascertained that alone, familiarity with bushfire is an inconsistent determinant of one’s ability to discern their personal risk. Although, on drawing on CET, it can be assumed that bushfire experience may play an indirect role, moderating the trust one has in their ability to avoid detriment; namely their self-efficacy.

2.2.2 *Self-efficacy*

In instances of direct bushfire experience, CET (2007) postulates that individuals evaluate the credibility of information in accordance with their own self-efficacy. Conceptually, self-efficacy is based in social psychological investigation, principle to Albert Bandura's (1977) influential *Social Cognitive Theory* (SET) (1987). Simply put, Ter Huurne and Gutteling (2009) denote self-efficacy as 'trust in the self' (p.811), functioning as an individual's perceived capacity to perform when faced with adversity (Paton et al., 2006). Contextually, Pooley et al.'s (2010) bushfire resilience research defines self-efficacy as the confidence one has in their ability to both detect bushfire and subsequently, eliminate personal loss (Weyrich et al., 2019). In consolidating the role of self-efficacy within the present thesis, it is postulated that those with high self-efficacy will draw on their existing beliefs to validate AFDRS information (Beatson and McLennan, 2010). This theorisation is compatible with Bandura's (1977) expectation that self-efficacy sees individuals prioritise information which resounds existing beliefs (Boylan and Lawrence, 2020; Maddux and Rogers, 1983; McIvor et al., 2009).

2.2.3 *Trust in Agency*

In instances of low hazard experience, individuals are theorised to lack sufficient disaster knowledge to evaluate the credibility of risk information conveyed by disaster forecasting or early warning system (Paton, 2007). Subsequently, CET suggests that, in the absence of familiarity, social foundations of trust are leveraged, seeing trust in those responsible for the risk message dissemination be the primary influence of trust in the systems themselves (Aldrich, 2023; Bachmann, 2006; Paton, 2007; Faisal et al., 2021). Early work of Mayer et al. (1995) suggests trust in agency is determined in accordance with the ability of an organisation to mitigate risk, agency integrity and their overall benevolence (Sharp et al., 2013). Research by Dvir et al. (2022) demonstrated that those with greater trust in an institution's ability to negate disaster had reduced anxiety (Choi and Wehde; 2020). Subsequently, Elsworth et al. (2008) emphasised the tendency for communities to dismiss or adapt hazard information at a local level when distrust in agencies is prominent (Paton, 2007; 2013). Section 2.3 will now considerr the AFDS.

2.3 The Australian Fire Danger Rating System

Fire danger rating systems have been in use in Australia since the mid-late 20th century (Hollis et a., 2024). Such systems, which convey the hypothetical extent of bushfire damage within a given region (AFAC, 2024; Hollis et al., 2024), have been described by Whittaker et al. (2020) as a daily reminder of the consequences of improper preparation. Grievances surrounding past iterations of FDRs have seemingly resounded in the domain of technological accuracy (Doogan, 2006; Hollis et al. 2024; McLeod, 2003; Slowikowski, 2017).

2.3.1 *Community Trust in Danger Ratings*

Principally, concerns pertaining to FDRs have been in relation to community confidence in rating accuracy (AFAC, 2019; Callinan and Burt et al., 2023; Reid and Beilin, 2014). Strahan (2010) survey regarding adherence with community evacuation orders associated with catastrophic ratings determined two-thirds of respondents disregarded FDR information, remaining in their homes or property during a deadly fire. A further 73% of those ignorant to the ratings suggesting they would never take pre-emptive action when considering danger ratings (Strahan, 2010). Similarly, recent work by Whittaker et al. (2019) determined only 50–60% of residents surveyed intended to leave on high rating days. Subsequently, research by Reid and Beilin (2014) considered community perspectives on the accuracy of fire danger rating information. Their study comprised of interviews with 13 residents of Halls Gap (VIC), an area which received a catastrophic danger rating on the 11th of January 2010. Their findings suggested that residents perceive a disconnection between Fire Danger Ratings and local reality, with confidence in danger ratings therefore remaining low (Grieder and Garkovich 1994; Alexandra and Riddington, 2007). Following the AFDRS's inception during 2022, the Tasmania Fire Service (TFS) (2023), conducted a state-wide survey in which 84% of total respondents indicated high levels of trust in the system. While concerns pertaining to danger ratings are associated with trust, investigation of trust in the system thus far (i.e. Reid and Beilin, 2014; Strahan, 2010; TFS, 2023; Whittaker et al., 2019) has remained preliminary; hence the aim of the present study (Chapter 1).

2.4 Summary and Research Hypotheses

In considering the literature presented and the RQs proposed (Chapter 1), the following outcomes are hypothesised, represented in Figure 2:

I. *Trustworthiness of the AFDRS will be a prominent concern of the community.*
II. *Trust in the AFDRS will significantly differ across levels of bushfire experience*
III. *An individual's Self-efficacy will have a significant correlation with their trust in the AFDRS.*
    a. *This correlation will be moderated by an individual's level of bushfire experience, with Self-efficacy being more prevalent in those with greater experience*
IV. *An individual's trust (agency) will have a significant correlation with their trust in AFDRS.*
    a. *This correlation will be moderated by an individual's level of bushfire experience, with Trust (Agency) being more prevalent in those with lower bushfire experience*

Therefore, Chapter 3 outlines the methodological approach taken to testing these hypotheses.

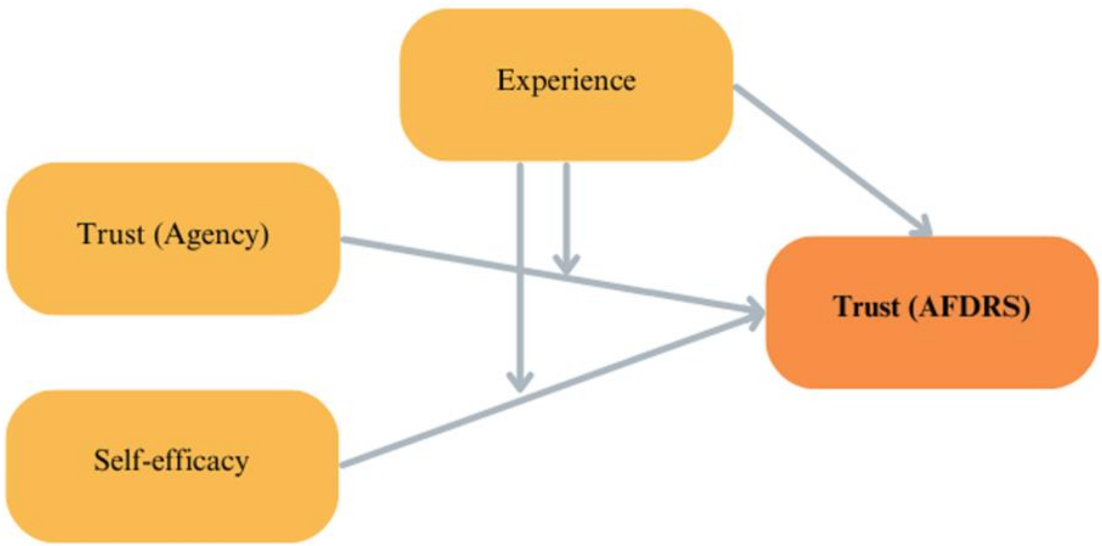


Figure 2. The conceptual framework used within the current study

Chapter 3

Methodology

Chapter 3 addresses the methodological component of the present study. Section 3.1 justifies the mixed methods approach utilised within this study, grounded in the Exploratory Sequential Analysis technique. Section 3.2 outlines the research design, study area, sampling approach, research instruments, participant recruitment, data collection, and analysis. Section 3.3 outlines the ethical considerations pertaining to this research.

3.1 An Exploratory Research Approach

Quantitative approaches to social research are useful for breaking complex human phenomena into elements that can be investigated across a broad population(s) (Creswell and Clark, 2017; Holton and Burnett, 2005; Verhoef and Casebeer, 1997). However, such reductionist approaches in the case of community-based social research are increasingly criticised, considered devoid of individual expression (Caracelli and Green, 1997). Within the present study, it is necessary to investigate wider community perceptions while maintaining individual expression to adequately convey community perspectives, justifying the *Sequential Exploratory Approach* (SEA) undertaken (Ivankova et al., 2006).

3.1.1 *Implementation of a Mixed Method Approach*

The first phase of this research involved qualitative scoping which sought to determine whether trust in the AFDRS was considered a salient issue amongst those who developed the system. Hence, qualitative discussions were undertaken with 10 experts who were involved in the development of the AFDRS. Meetings with these researchers occurred from March - April 2024 and were an hour in duration. These meetings were a scoping exercise, with trust being identified as an important yet understudied component of the AFDRS since its inception. The second phase of SEA comprising a quantitative investigation, instigated via a community survey. The third phase saw qualitative data generated via focus group discussion with the purpose of enriching the quantitative findings (Lieber, 2009; Ivankova et al., 2006; Subedi, 2016). This method of research has allowed for capture of the complexities attributed to individual cognition and community dynamics, whilst exploring trust (AFDRS) with respect to bushfire experience, trust (agency) and self-efficacy (Creswell and Clark, 2017; Subedi, 2016) (Figure 3).

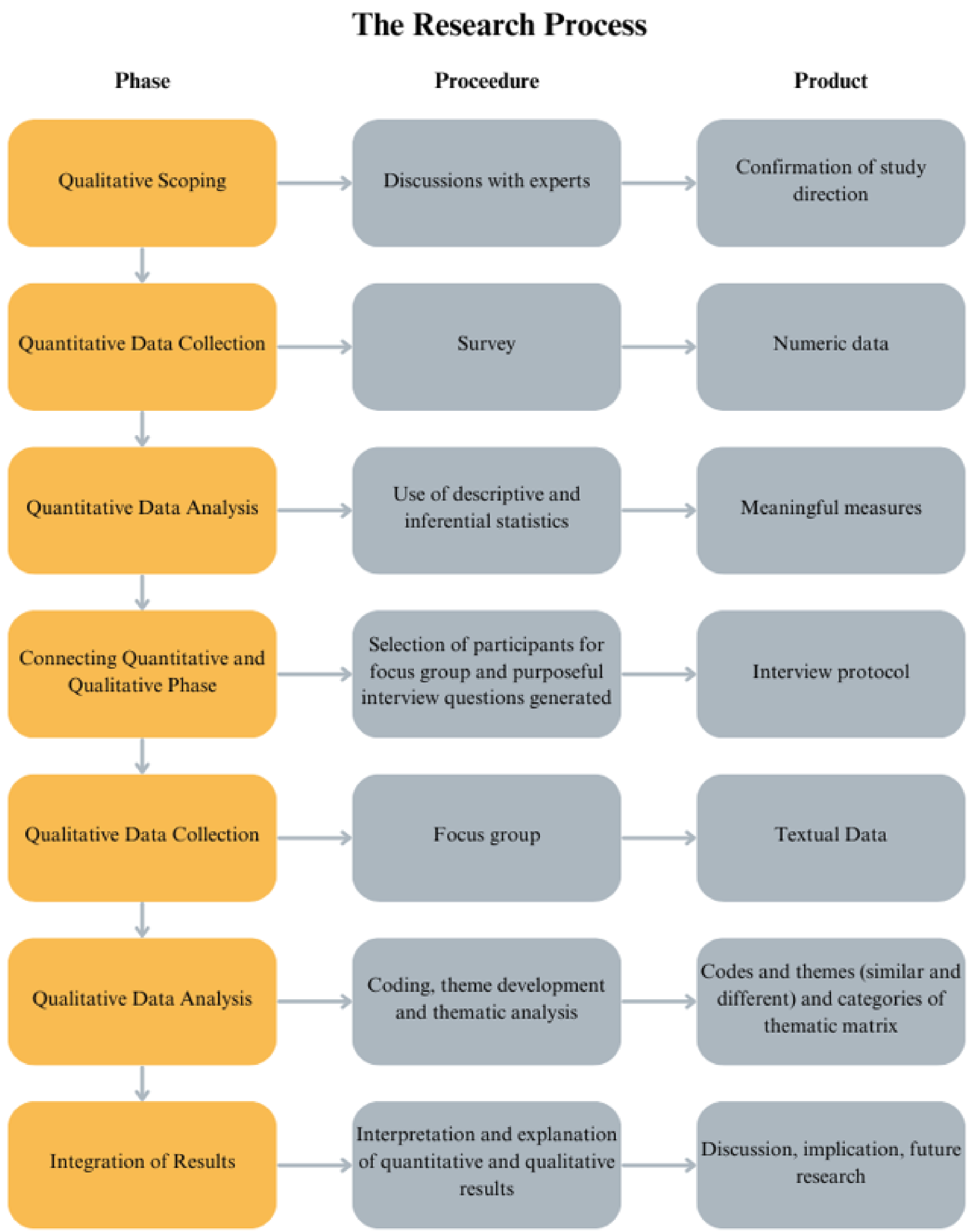


Figure 3. The exploratory approach to the current study (adapted from: Subedi, 2016).

3.2 Methodology

Section 3.2 will present the methods attributed to the quantitative data collection, introducing the study location and participant group, as well as the approaches used to generate statistical data.

3.2.1 *Research Design*

The quantitative component of this investigation comprised a cross-sectional questionnaire utilising cluster sampling among urban and rural populations. This questionnaire was designed to measure the extent of community trust in the AFDRS, as well as bushfire experience, trust in agency, and self-efficacy. Scales used to quantify these variables were derived from the literature review. Prior to distribution, the questionnaire was piloted by 16 Individuals who either resided within the WE region, or were experienced in quantitative data collection, seeing the minor alteration of scales to enhance the user experience (i.e. alteration of wording, clarifying terms, and removing duplication of questions).

3.2.2 *Study Area*

The study location comprises the Western Edge (WE) of Canberra, ACT, an area inclusive of the suburbs of Kambah, Molonglo Valley, Weston Creek, Woden Valley and Uriarra Village regions. According to ACT Governments *District Planning Profiles* (Davidson, 2023; ACT Government, 2024). This region was selected because it was, (a) accessible to the researcher, and (b) was the location most impacted by past bushfires (Sharples, 2017). In appreciating participant exposure to previous bushfire, the bushfire history of the ACT and surrounds must be disclosed.

Canberra's WE was directly impacted by bushfire during the 2003, namely the *Canberra Bushfires* (Slowikowski, 2017), during which 70% of the ACT was burned, 510 homes destroyed, with 435 injured and four killed (NMA, 2024). In proceeding decades, less severe bushfires have impacted the ACT region. For instance, in November 2018, a bushfire located in Southwestern ACT saw emergency services advise residents of suburban Canberra that fire may impact their homes (Kanowski et al., 2005). Subsequently, smoke associated with the Black Summer Bushfires (2019-20) engulfed the ACT, with many residents visiting the NSW East Coast at the time the bushfires occurred (NMA, 2024). Therefore, it is anticipated that bushfire experience observed within the WE population will be highly variable, advantageous in determining the influence of experience on AFDRS trust.

3.2.3 *Sampling Approach*

The sampling approach undertaken to this survey was purposive. Individual households within suburbs of interest were the primary sampling unit, with multiple residents in a single household allowed to participate in this study. Local residential maps were developed to identify area boundaries and assist household questionnaire distribution (Figure 4). Uninhabited houses, institutional households, commercial establishments and homes with ‘No Junk Mail’ marked were excluded from survey distribution. Approximately 3,000 flyers were manually distributed across the study region over a 2-month period (June-August).

Across each suburb, a household was selected at random, with those distributing the questionnaire (individuals known to the primary investigator) arriving at this home and estimating a 1km radius surrounding it. Distributers letterboxed flyers containing a link to the questionnaire within this 1km radius (Appendix 1). To further optimise responses, the survey link was posted to online community noticeboards, regional social media groups and newsletters alongside manual survey distribution (Appendix 2).

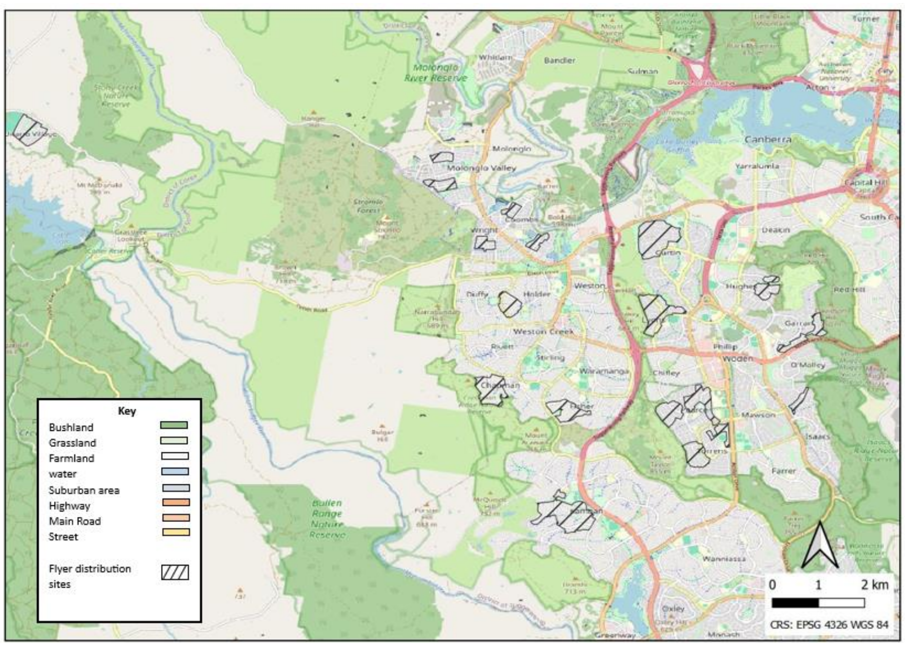


Figure 4. Map of the study regions in which flyers were distributed

3.2.4 *Survey Research Instruments*

The quantitative component of this study comprised a 12-minute online questionnaire, generated through use of the Qualtrics XM ANU program. The Questionnaire was accessible via mobile and desktop devices through either QR code or web link. Initially, survey questions comprised demographic information scoping (e.g. “Which gender do you identify with?”) allowing for study group appreciation during results interpretation. Subsequently, AFDRS awareness/perceived purpose was investigated (e.g. “What is the purpose of the Australian Fire Danger Rating System?”), ensuring respondents are familiar with the information they provide. The proceeding section assessed individuals' levels of bushfire experience (“Have you personally experienced a bushfire?” and “Have you ever had to respond to a bushfire emergency at a property?”), followed by trust in the AFDRS, measured on a 10-point numerical scale (e.g. “How trustworthy do you feel the information provided by the Australian Fire Danger Rating System is?”). trust in Agency (e.g. “How confident are you that the ACT Fire Service will provide effective assistance to you and your community if you were to experience a bushfire?”) and self-efficacy (e.g. “How well do you feel you could protect yourself and your home during a bushfire event?”), which were measured on 5-point Likert scales, were both converted to numerical values following the exportation of survey data (Appendix 6*a*).

Scales used to construct the variables of interest (e.g. Trust (AFDRS), Experience, Trust (Agency) and Self-efficacy) were derived from existing questionnaires identified within Chapter 2. Internal reliability of the scales was gauged through Cronbach Alpha (a>.05). The trust (AFDRS) scale (n=2, α=.811), trust (agency) (n=2, α=.538) and self-efficacy (n=2, α=.638) scale items were sufficiently related (Pallant, 2020) (Appendix 6*b*). It should be noted that data generated was exported into Microsoft Excel before being analysed with the SPSS program. In SPSS, descriptive statistics, normality testing, ANOVAs, Pearsons's correlation (linear regression) and observational analysis were performed (Appendix 4).

3.2.5 ***Participant Recruitment***

While participants within the survey did not undergo any active recruitment besides household survey distribution, focus group participants were approached purposefully through email. Of the 32 survey participants that provided emails prior to survey submission all were contacted, 11 of those individuals responded, while 6 ultimately attended the focus group. The non-experimental nature of this research saw participants recruited based on their availability to attend the study. Participant survey responses were not indicative of participant inclusion in the focus group, nor were the questions that ended up guiding the group discussion derived from any single survey response. Participants were asked to remain anonymous for the duration of data collection, although personal information could be provided on a voluntary basis to enrich the information one shares.

3.2.6 *Focus Group Data Collection*

The focus group ran for 60 minutes, conducted in the *Denman Prospect Community Centre* on the 14th of August 2024 (6-7pm). After written consent was obtained, three open-ended questions were proposed, designed to explore the themes emerging from a preliminary scan of the quantitative results within undertaken the Qualtrics Software, primarily in respect to RQ1. Three guided the focus group discussion. These were;

(I) *What are your primary concerns with the AFDRS?*

(II) *What influences your trust in the AFDRS?*

(III) *Do you feel that the AFDRS captures your bushfire danger level appropriately?*

The focus group was audio recorded, utilising two separate handheld SONY recording devices. The discussion itself was moderated by the principal investigator (Kate Jones) and project supervisor (Prof. Sarah Clement).

3.3.3 *Data Analysis*

The focus group recording was transcribed using an online AI transcription software before the principal investigator manually rectified transcription errors in correspondence with the original audio file. Participants were provided the opportunity to edit their spoken information prior to transcription, although no participants opted to do so. The transcript was analysed using reflexive thematic analysis (Braun and Clarke 2012) outlined in *Figure 5*. Following the identification of themes, the project supervisor reviewed this qualitative data to ensuring results were exhaustive prior to interpretation. Final themes and supporting quotes were compiled and used to foster the qualitative narrative emergent within the qualitative component of this study (Lochmiller, 2021) (Appendix 7).

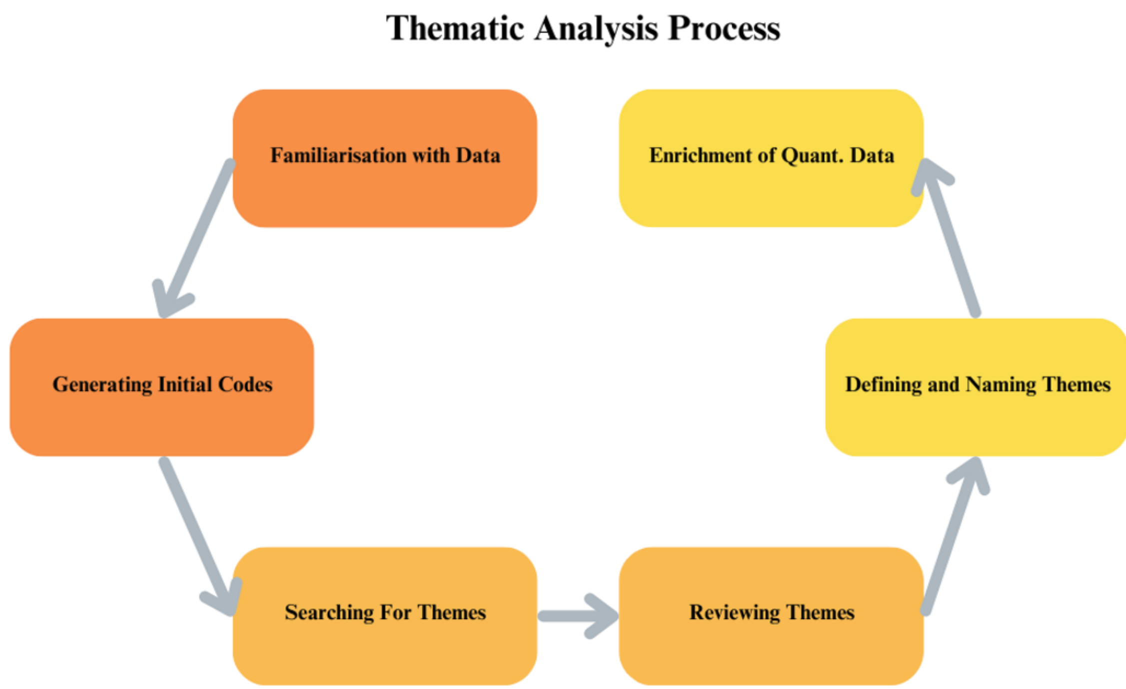


Figure 5. The approach to thematic analysis utilised within the present study (adapted from: Braun and Clarke, 2012).

3.4 Ethical Considerations

This research followed the principles outlined in the *Australian National University's Responsible Conduct of Research* policy (document No. ANUP_007402). Ethical approval for this research was received on the 24th of March 2024. Before commencing the questionnaire and focus group, all participants were required to read a participant outline sheet and give consent. For the focus group, only those participants who consented to participate in the survey were invited to participate, but additional consent was sought prior to focus group participation.

Chapter 4

Results

Chapter 4 presents the results of this study, divided into two distinct sections based on the mixed methods approach undertaken. Section 4.1 considers the quantitative findings of the present study, while Section 4.2 presents the qualitative findings.

4.1 Quantitative Results

Section 4.1 considers the survey findings through presenting participant information, the variables considered, the effect of key variables on trust in the AFDRS.

4.1.1 *Respondents*

The survey group comprised 136 respondents, following the removal of 9 responses inconsistent with the study region, the sole selection criteria. Of those responses, 55.9% of participants identified as female, 41.9% identified as male, with 2.2% participants identifying with neither gender. Age of participants ranges from 18 to +65 years, with majority aged between 36–45yo (33%). Of the suburbs surveyed, response counts were fairly uniform across all metropolitan regions of the WE (Appendix 4). It was determined that majority of participants (85%) were aware of the AFDRSs operation in the ACT prior to the survey.

Most participants correctly identified the system as a tool to determine potential bushfire danger prior to ignition (62%), while one-third incorrectly perceived the system as a bushfire likelihood scale (33%), remaining participants were unsure of the system's purpose (4%) (See Appendix 4). Although, to generate a sample size adequate for a 5% margin of error on a 95% confidence interval, for a population *n*. I aimed to acquire at least 383 legitimate survey responses with an estimated population of 91,405 (Table 2), with 136 responses ultimately generated (Qualtrics, 2024).

Table 2. Canberra's western edge population across suburban region

Region	Pop. Stats (2021)		Questionnaire Respondents	
	n	**%**	**n**	**%**
Kambah	15,702	17.27	24	1.5
Molonglo Valley	11,382	12.45	21	1.8

Weston Creek	24,522	26.82	40	1.6
Woden Valley	39,178	42.86	42	0.1
Uriarra Village	621	6.79	9	1.4
Total	*91,405*	*100*	*136*	*6.4*

Baseline population values were derived from the ACT Government's *Population Projections 2022 to 2060* derived from the 2021 National Census. The present study surveyed 6.4% of the total WE population (ABS, 2021).

4.1.2 *High Community Trust in the AFDRS*

To answer RQ1 and its corresponding hypothesis (*I*) it was necessary to ascertain the baseline level of trust pertaining to those involved in the survey. The descriptive statistics examined showed community members have high trust in the AFDRS, with an average trust rating of 7.74 out of 10 (SD=1.62, SE=.14), and a median score of 8.0 (*n*=47). Most participants (61%) rated their trust as 8 or higher, indicating confidence in the system. Only two participants reported very low trust (ratings of 1-2). Trust (AFDRS) was measured using a discrete numeric scale ranging from 1 (*n*=2) to 10 (*n*=12) (Appendix 4).

While not of specific importance to investigation of RQ1, in considering the predictor variables within the present study, the following observations were made. In respect to bushfire experience, it was found participants were distributed uniformly across levels of experience, with 30% reporting no experience (30%), 32% with indirect experience (32%) and 36% reporting having had direct experience with bushfire. Subsequently, trust in agency was fairly high within the participant group, with an average trust (agency) score of 5.43 out of 7 (SE=.10, SD=1.13), with a median score of 5.50 (n=46). Conversely, participants self-efficacy scores were moderate, with an average score of 4.98 out of 7 (SE=.10, SD=1.20), with a median score of 5/7 (n=51). While outside the bounds of the present research, serval demographic factors and variables associated with AFDRS awareness were significantly associated with trust (AFDRS), experience, self-efficacy and trust (agency), these are shown within Appendix 4.

4.1.3 *Self-efficacy and Trust (Agency) Correlate with Trust (AFDRS)*

RQ2 concerns the dynamics of psychosocial mechanism related to trust in the AFDRS. Although, before determining whether a relationship exists between bushfire experience and the other variables examined, it was necessary to ascertain whether a relationship exists between trust (AFDRS), trust (agency) and self-efficacy. The multiple regression performed demonstrated that together, trust in agency and self-efficacy explained 36.4% of trust in the AFDRS (Adjr^2

<.40). Subsequently, trust in fire agencies emerged as the strongest predictor of AFDRS trust (β=.808, p<.001), followed by individual self-efficacy (β=.235, p=.013) (Table 3).

Table 3. The relationship between trust (AFDRS), self-efficacy and trust (agency)

Model (IVs)	β	R^2	Adjusted R^2	SE of estimate	R^2 Change	F Change	df1	df2	p	Durban Watson	SE of Estimate
Trust (Agency) Self-efficacy	.604[a]	365	355	1.2996	.365	38.15	2	33	<.001**	2.210	1.2996

*Note. *= significant at p<.05. **= significant at p<.001.*

4.1.4 *The Effects of Bushfire Experience*

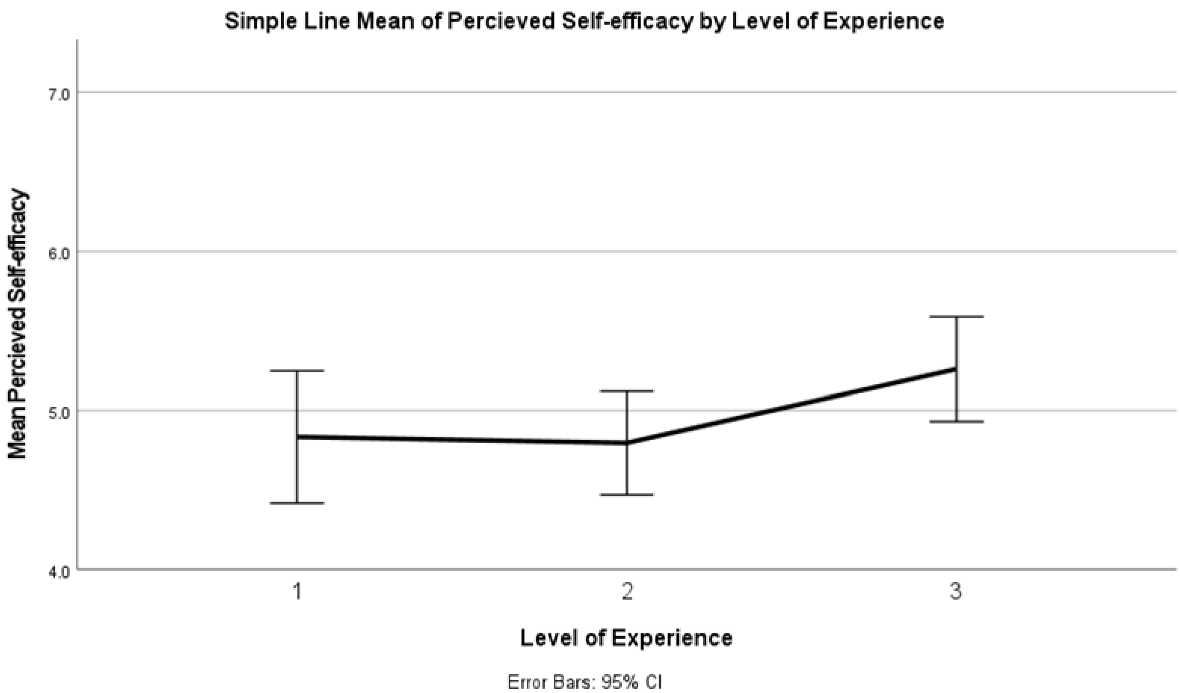
In directly addressing RQ2 and corresponding hypotheses, a series of One-way and Univariate ANOVAs were undertaken to determine in what ways disaster experience influences trust in the AFDRS. In summary, it was determined that bushfire experience alone does not directly affect AFDRS trust levels, it moderates how people develop trust in the system. Those with direct bushfire experience show less reliance on agency trust and greater emphasis on personal responsibility (Table 4). Regarding trust (AFDRS), it was found that trust in the system does not differ significantly across levels of bushfire experience (F (2,136) =1.13, p=.328, p<.05) (Table 4). However, the graph generated in correspondence with the ANOVA, and observational analysis undertaken, suggest the presence of a numerical variation in trust across levels of bushfire experience. Specifically, those with no experience reported the highest Trust in the AFDRS ($\bar{x}$=7.91, SD=1.37) followed by indirect experience ($\bar{x}$=7.90, SD=1.34) and direct experience ($\bar{x}$=7.47, SD=1.99) which showed the lowest trust levels (Figure 6).

(1) No experience, (2) Indirect experience, (3) Direct experience

Figure 6. Trust in the AFDRS across levels of bushfire experience

As an additional component of the enquiry surrounding trust in the AFDRS and bushfire experience, a subsequent multiple linear regression was performed to ascertain whether the addition of bushfire experience within the regression model displayed in Section 4.1.3, would improve the predictability of trust in the AFDRS. As anticipated, this model account for 35.1% of variances in Trust in the AFDRS (r^2=.36.50, Adj r^2 = .35.1, p=<.001), demonstrating a .40 reduction in fit compared to the previous. Subsequently, bushfire experience level had no significant influence over ($p<.05$) the model (**=**.058**,** p=.692) (Appendix 4).

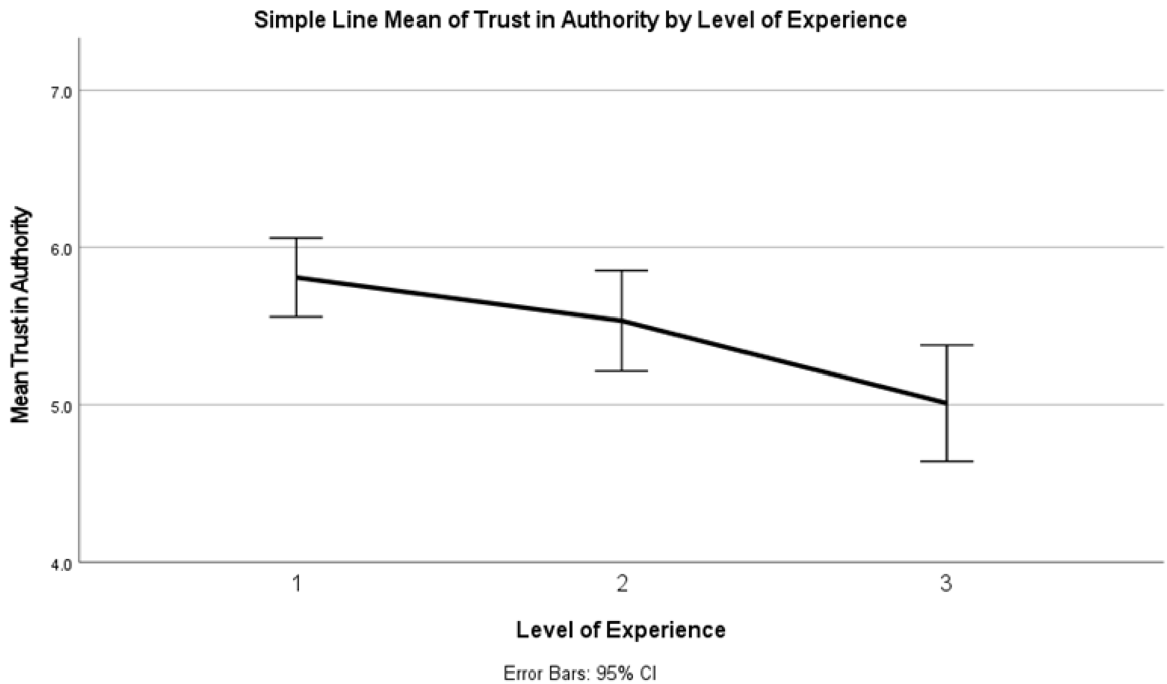
In considering whether Self-efficacy differs significantly across levels of experience, the ANOVA performed determined that Self-efficacy did not significantly differ across levels of experience (F (2,136) =2.24, p=.111) (Table 4). Although at a numerical level, based on the graphical representation of these results and observational analysis, those with direct experience had the highest level of Self-efficacy ($\bar{x}$=5.26, SD=1.16), followed by those with indirect experience ($\bar{x}$=4.80, SD=1.07), and no experience ($\bar{x}$=4.83, SD=1.33) (Figure 7).



(1) No experience, (2) Indirect experience, (3) Direct experience

Figure 7. Self-efficacy across levels of bushfire experience

Unlike the previous findings, it was determined that trust in agency did differ significantly ($p<.05$) across levels of bushfire experience ($F(1,136)=7.67$, $p=.002$) (Table 4). Those participants with No Experience ($\bar{x}=5.81$, $SD=.80$) had higher levels of Trust (Agency) followed sequentially by those with indirect ($\bar{x}5.53$, $SD=1.05$) and direct experience ($\bar{x}=5.00$, $SD=1.30$). Post-hoc analysis was conducted to interrogate this significant effect. It was determined that this significant variation ($p<.05$) exists most prevalently between those with no experience and direct Experience ($\bar{x}=.80$, $SE=.23$, $p=<.001$) as well as those with indirect and direct experience levels ($\bar{x}=.53$, $SE=.22$, $p=0.21$) (Figure.8). There was no statistically significant variation between the mean trust (agency) of those with no experience and indirect experience ($\bar{x}= .28$, $SE=.23$, $p=.242$), seeing them examined cohesively for the remained of this thesis.



(1) No experience, (2) Indirect experience, (3) Direct experience

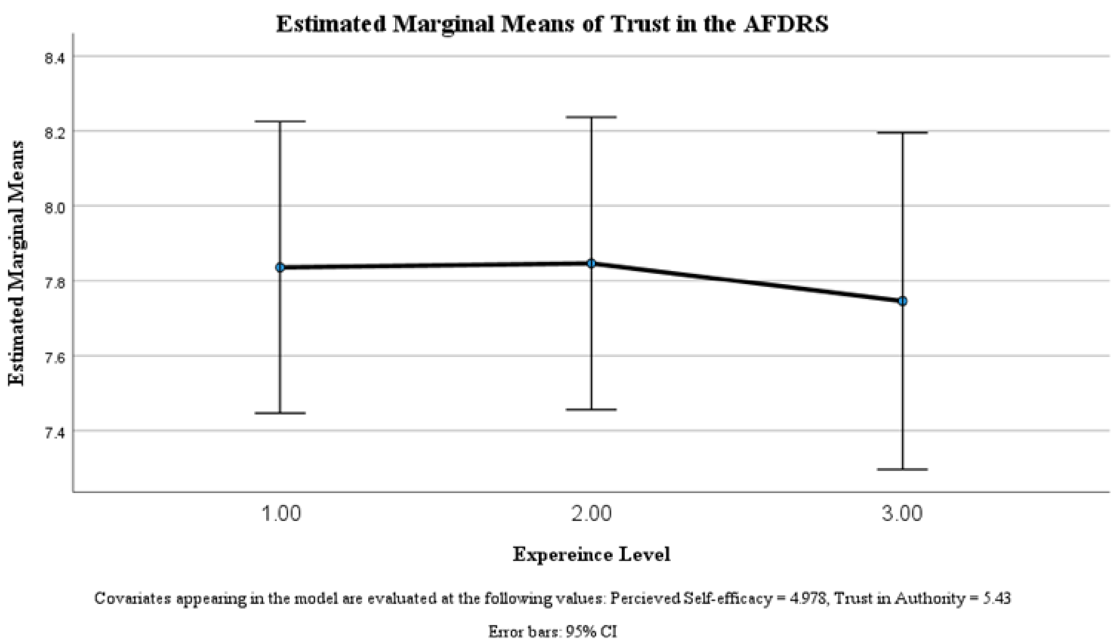
Figure 8. Trust in agency across levels of bushfire experience

Table 4. Trust (AFDRS), trust (agency) and self-efficacy across bushfire experience

Measure	Level of Bushfire Experience						Sum of Squares	F (2, 136)	Mean Square	p.
	No Experience		Indirect Experience		Direct Experience					
	M.	***SD.***	***M.***	***SD.***	***M.***	***SD.***				
Trust (AFDRS)	7.91	1.37	7.90	1.34	7.470	1.99	5.88	1.13	2.94	.328
Trust (Agency)	5.81	.80	5.53	1.05	5.01	1.30	15.35	6.50	7.67	*.002
Self-efficacy	4.83	1.33	4.795	1.07	5.26	1.16	6.32	2.24	3.16	.111

Note. *= significant at p<.05. **= significant at p<.001.

As an additional univariate ANOVA was performed to shed further light on the way bushfire influences the other key variables within this analysis. It was again found that the interaction between bushfire experience and self-efficacy is insignificant (p=.269). However, the parameter estimates associated with this model suggest for those with direct experience compared to those with no experience (Table 6), there is a small decrease in trust (ADFRS) for each unit increase in self-efficacy (β=-.165, p=<.465). Similarly, for indirect experience compared to direct experience, there is a slightly larger decrease in Trust (AFDRS) for each increase in Self-efficacy (β=-.396, p=<.106). Given average Trust (AFDRS) is β=2.58, for every unit of self-efficacy, trust (AFDRS) goes up by β=.414. Therefore, if an individual's experience of bushfire is direct, trust (AFDRS) decreases by 1.66, with a further .165 decrease for every additional unit of self-efficacy (-1.65). Therefore, the more self-efficacy an individual has because of their experience, the more trust is lost in the AFDRS (Figure 9).



(1) No experience, (2) Indirect experience, (3) Direct experience

Figure 9. Effect of experience on trust (AFDRS) when self-efficacy and trust are controlled for

Again, this model reiterates that the interaction between experience and trust (agency) is significant (p=.049), although this is to a low extent. The parameter estimates show that for no experience compared to direct experience (Table 6), Trust (ADFRS) increases for each unit increase in Trust (Agency) (β=.474, p=.117). However, for indirect experience when compared to direct experience, there is a slight decrease in trust (AFDRS) as for every unit of trust (agency) (β=-0.062).

Therefore, when an individual has no experience there is an average increase in trust (AFDRS) by β=2.41. For every additional unit of trust (Agency), trust (AFDRS) increases by an average of β=.57. Therefore, the more trust (agency) an individual has in association with a lack of experience, the more trust they automatically ascribe to the AFDRS. It can be said that while trust (AFDRS) increases with both indirect experience and trust (Agency), there is a dampening effect of the combination (of indirect experience and trust (AFDRS)) opposed to a synergistic effect of the combination of no experience and trust (Agency).

Table 6. Univariate ANOVA between subject effects

Variable	Sum of Squares	df	Mean Squared	F	Sig. (p<.05)
Corrected Model	144.25[a]	8	18.03	10.94	<.001**
Intercept	23.22	1	23.22	14.09	<.001**
Self-efficacy	9.12	1	9.12	5.53	.020*
Trust (Agency)	59.89	1	59.89	36.35	<.001**
Experience	9.462	2	4.731	2.87	.060
Experience * Self-efficacy	4.38	2	2.20	1.33	.269
Experience * Trust (Agency)	10.20	2	5.10	3.10	.049*
Error	209.24	127	1.65	-	-
Total	8506.50	136	-	-	-
Corrected Total	353.49	135	-	-	-

Dependant Variable is Trust (AFDRS). Within 'Sig. (<.05)' column, *= significant at p<.05. **= significant at p<.001. a= R^2 =.408, (Adj. R^2 = .371).

4.2 Qualitative Results

Section 4.2 denotes the findings attributed to the focus group discussion, illustrating that while trustworthiness of the AFDRS is not among the most prevalent concerns surrounding the system, perceived credibility was not infallible.

4.2.1 *Participants*

While focus group participants were not permitted to provide personal information which may risk result reidentification as denoted by the ethics protocol adhered to (Section 3.4). Demographic information was surmised via researcher observation. Of the six participants in attendance, four individuals were male and two were female presenting. All six participants were long-time residents of the ACT, four of which had direct bushfire experience, one individual had indirect experience, and one has no previous experience. Although no questions were asked about participant experience with fire, all participants voluntarily recounted their experiences frequently in response to questions with detail.

4.2.2 *Primary Areas of Concern Surrounding the AFDRS*

When participants were asked, ‘What are your primary concerns with the AFDRS?’, the system's credibility was not discussed. Instead, participants interrogated the systems (a) understandability, (b) accessibility and (c) location specificity. In respect to understandability, participants expressed they felt they were unable to completely comprehend what the system communicated, a perceived barrier to community acceptance (Box 1).

Box 1. Participant concerns pertaining to understandability

> “I'm not trying to call ourselves stupid. I'm just saying we're time poor. We're driving along. We see something on the side of the road, but we don't know if that means X or Y.”
>
> “I don't think it's a matter of stupidity, though. It's a matter of, we've never been told what it means. When we're driving along, we just say, “Oh, yeah, it's a high fire risk.”

Additionally, there was a perceived need for increased accessibility to rating information. While participants were very familiar the roadside signage, they requested greater access to AFDRS ratings in mobile format. Specifically, participants were concerned that they cannot continuously access the AFDRS when needed, with mobile alerts having the potential to mitigate this concern (Box 2).

Box 2. Concerns pertaining to AFDRS accessibility

> “I think it's about where this information is imparted, where people have got it in their hands. You know that event [2003 bushfire] for us was on a Saturday and our son was at the skate park and out with friends and everyone was around getting on with their normal day. So where would you have the information to say that there was a danger? How dangerous it was? And what to do about it?”
>
> “There need to be phone alerts as to what the rating is on a particular day, during particularly the fire season.”

The final key concern communicated by participants was the system's lack of location specificity, suggesting a need for local reality to be reflected within the ratings. In the absence of location specificity, participants felt more compelled to use alternative forms of bushfire information, such as the *Fires Near Me App*, bypassing predictive information systems (Box 3).

Box 3. Participant concerns pertaining to AFDRS local specificity

> "[Fires Near Me] really gives me more localized information, where I can go 'Okay, there's a valley between us and that fire' or 'that one's going to come roaring through'. It's much more geographically astute. Whereas, you know, literally every fire danger rating system sign in the ACT is set to the same thing."

4.2.3 *Factors Influencing Trust in Danger Ratings*

While participants did not independently suggest they have concerns regarding their confidence in the accuracy of AFDRS ratings, when asked 'What influences your trust in the AFDRS?' participants identified several salient influences of trust (a) the technical capabilities of the system, (b) the degree to which ratings correspond with person observations, and (c) the degree of agency is involved with the rating generation. Specifically, in relation to technical capabilities, it wase was recognized by participants that while technological accuracy of model influencing ratings increase trust. However, the capacity for highly technical systems to predict increasingly variant bushfire conditions was an area for concern (Box 4).

Box 4. Technological accuracies as an influence of AFDRS trust

> "There's lots of information going behind each one of those ratings and that gives me lots of confidence."
>
> "I acknowledge is that fires can be unpredictable. And so for all the science and all the best intent in the world, the wind will change or something will speed up or something will happen that wasn't expected. So, you know, there's no 100% guarantee of prediction of [bushfires] moving and stuff."

Subsequently, participant flagged that trust was a function of consistency between ratings and individual expectations of bushfire conditions. It was evident that focus group participants saw the system as credible, yet expressed they would never rely on the system alone, stating they would use their own bushfire perceptions as the primary source of predictive information in cohesion with the AFDRS (Box 5).

Box 5. Consistency with personal observations as an influence of AFDRS trust

> "I'll use a term that is sometimes thrown around in my space, which is trust but verify. I think, again there's a bit of personal responsibility here. I've got much better faith and trust in the system now that we have it. When I

say ‘the system’, it is a combination of things. I actually like combinations of things that will lead me to some intelligent information.”

“I do [use the AFDRS], but I would go to more than one source of information as well as kind of sniffing the wind around my place.”

Additionally, agency engagement with the AFDRS was an influence of confidence in the system, it was acknowledged that the AFDRS is a tool developed by agency to assist public preparedness. However, agency involvement in the generation of daily danger ratings may introduce human error (Box 6).

Box 6. Agency involvement as an influence of AFDRS trust

“I trust it and I think the thing is a tool to assist me if I happen to see that [a fire] if I'm out and about. You know, to go and check other sources. But I don't trust the clerks that may be putting the information into things... They are human beings. They might not hear things properly and might not be specific enough. Yeah. So that's the only part I don't trust anymore after that instance [past warning experience].”

“I don't trust all those people in decision making because from what I could see, I'm sorry, they could have warned people in Canberra earlier.”

4.2.4 *Inhibitors of Rating Credibility*

Section 4.2.4 concerns the third question posed, ‘Do you feel that the AFDRS captures your bushfire danger level appropriately?’. Answers to this question fell into two divergent themes, (a) the system itself, and (b) human response to the system. In considering the system itself, participants were concerned about the AFDRS's ability to adequately capturing bushfire risk was the communicative design of the system. While it was acknowledged the new system was simpler, the rating categories remain difficult for some participants to comprehend at a functionable level (Box 7).

Box 7. Trust is hindered by the public-facing components of the AFDRS

“Semantically there is a lot between ‘low’ and ‘high [in referring to the rating levels]”

“I had to think back really slowly in my head, ‘now what did it mean?’ Because even now, having been through it and now coming back later, I still really stop and think [about] what the indicators actually really indicate”

Finally, participants identified receiver motivation as a causal preventing adequate risk representation. Besides the communicative components, the individual motivation and personal engagement with the system was a major barrier to the system adequately representing community risk levels (Box 9)

Box 8. Trust is hindered by individual motivation to engage with the AFDRS

> "There's also personal responsibility. Now, you can have any signage you like. If no one chooses to read it or investigate it, it's useless."
>
> "I think the signage is adequate. It does the job. As long as people read it."
>
> "You have to show interest in your own survival."

Overall, it can be determined that while not at the forefront of participants minds, trust is a complex and highly regarded component of community acceptance of the AFDRS.

Chapter 5

Discussion

Chapter 5 describes and interprets the results of this study. This examination of the results obtained is structured in accordance with the RQs outlined in Chapter 1:

RQ1. *Does the community consider the AFDRS to be trustworthy?*

RQ2. *Do the psychosocial mechanisms underlying the systems trustworthiness vary in accordance with bushfire experience?*

Section 5.1 will discuss the findings pertaining to RQ1, outlining the current state of community trust in the AFDRS, drawing together quantitative and qualitative results. Section 5.2 considers RQ2, presenting quantitative findings to demonstrate that bushfire experience plays a role in moderating psychosocial factors underlying trust in the AFDRS.

Table 8. Hypotheses and research outcomes

Number	Hypothesis	Outcome
I	Trustworthiness of the AFDRS will be a prominent concern of the community.	Rejected
II	Trust in the AFDRS will significantly differ across levels of bushfire experience.	Rejected
III	An individual's Self-efficacy will have a significant correlation with their trust in the AFDRS.	Retained
III(a)	This correlation will be moderated by an individual's level of bushfire experience, with Self-efficacy being more prevalent in those with greater experience.	Retained
IV	An individual's trust (agency) will have a significant correlation with their trust in AFDRS.	Retained
IV(a)	This correlation will be moderated by an individual's level of bushfire experience, with Trust (Agency) being more prevalent in those with lower bushfire experience.	Retained

5.1 Community Trust in the Australian Fire Danger Rating System

Considering RQ1, it was determined that the AFDRS's credibility or trustworthiness was not of pertinent concern to survey participants, and consequently, hypothesis *I* outlined in Chapter 2 was rejected (Table 8). Survey responses overall demonstrated that trust in the system is high through a mean trust score of 7.74 out of 10 (Appendix 4). Enrichment of this finding was undertaken through focus group discussion in accordance with SEA. The results of this were complementary with survey findings, as when participants were asked to present their primary concerns pertaining to the system, credibility was omitted. When prompted to consider the system's credibility, participants identified both technological and social factors they felt were most indicative of their trust in the AFDRS. This comprised social factors such as agency error, personal motivation and their own observations pertaining to bushfire experience.

As discussed throughout this thesis, the AFDRS was developed to instil community trust through maintaining a high standard of technological accuracy (Hollis et al., 2024; Reid and Beilin, 2014; Whittaker et al, 2019). However, these findings suggest trust in the AFDRS is a multifaceted phenomenon, being influenced by factors beyond simply technological functionality (Erikson, 1963; Paton, 2008a). This notion is consistent with Paton's commentary regarding trust in risk information system, acknowledging that trust is an oxymoron; serving to decomplexify one's social environment, yet trust itself is inherently complex (Paton, 2007; 2013). This complexity should be acknowledged by those developing systems such as the AFDRS (TFS, 2023).

5.2 Psychosocial Mechanisms underlying Trust in Danger Ratings

As outlined in Section 5.1, the findings pertaining to RQ2 illustrated that psychosocial factors underlying trust in the AFDRS are incredibly variable. To decomplexify the findings reported, this section will be presented results in accordance with the hypotheses proposed (Table 8). Section 5.2.1 considers hypothesis *II*, explaining bushfire experience as it pertains to AFDRS trust. Section 5.2.2 will consider self- efficacy and trust in agency, when considering trust in the AFDRS, consistent with hypotheses *III* and *IV*. Section 5.2.3 will examine the conceptual model proposed, commentary on hypotheses *IIIa* and *IVa* (Table 8).

5.2.1 *Bushfire experience did not influence trust in the AFDRS*

To investigate RQ2, bushfire experience in relation to trust in the AFDRS was explored. Results demonstrated that trust in the AFDRS does not significantly differ in accordance with the level of bushfire experience one has ($F(2,136) = 1.13$, $p = .328$, $p < .05$). Hypothesis II was therefore rejected (Table 8). This finding suggests that trust in the system is not contingent on personal exposure to bushfire risk, as was initially anticipated (McGee and Russell, 2003; Sharma and Patt, 2012). Such postulations were based on the theoretical premise of CET (Paton, 2007), which iterated that trust and familiarity share an inverse relationship. It is worth noting while outside the direct scope of hypothesis II, numerical values obtained do suggest that those with no experience ($\bar{x} = 7.91$, $SD = 1.37$) and indirect experience, ($\bar{x} = 7.90$, $SD = 1.34$) have the highest trust in the AFDRS compared to those with direct experience ($\bar{x} = 7.47$, $SD = 1.99$).

In diagnosing this result, Harris et al. (2012), suggests that it is not bushfire experience, but rather bushfire impact or loss, that appears most influential to future preparedness mindsets. In considering the overarching AFDRS trust score of 7.74 (Section 4.1.2), the more likely diagnosis is that survey participants are generally content with the AFDRS's credibility regardless of level of experience one has. These results are important in considering the increasing exposure of communities to bushfire (Biddle, 2020; Lindell and Perry , 2012), in that experience alone should not significantly alter trust in the AFDRS.

5.2.2 Self-efficacy and trust in agency significantly correlated with trust in the AFDRS

In further considering RQ2, it was determined that both trust in agency and self-efficacy had positive linear relationships with trust in the AFDRS. Hence, hypotheses III and IV were retained (Table 8). The regression analysis undertaken outlined that trust in agency ($\beta = .808$, $p < .001$) demonstrates a stronger influence on trust in the AFDRS compared to self-efficacy ($\beta = .235$, $p = .013$) in predicting trust in the AFDRS. These findings underscore the importance of institutional trust in shaping the public's confidence in technological systems designed for risk communication. The strong relationship observed between trust in the AFDRS and trust in agency is consistent with the work of Elsworth et al. (2008), who denoted similar findings in their study. When individuals have trust in fire agencies, they are more likely to extend that trust to the AFDRS. Conversely, the significant yet weaker relationship regarding trust (AFDRS) and self-efficacy suggests those with less bushfire experience draw upon their social trust to determine the credibility of the system. Although the most profound determinant of trust in the AFDRS is social trust in agencies. To date, no research has directly considered trust in agency and self-efficacy in evaluating the credibility of incoming risk information. However, Dvir et al., (2022) comments on the tendency for trust in agency to reduce anxiety pertaining to a hazard. Perhaps in the presence of high agency trust, the Canberra community are less concerned for their need to make their own judgements surrounding their bushfire danger. As later denoted in Section 5.3, if agencies wish to optimise community on-boarding and trust retain in the AFDRS, community outreach is vital.

5.2.3 Domains of trust in the AFDRS vary across levels of bushfire experience

To conclude the exploration pertaining to RQ2, it was found that bushfire experience did influence the psychosocial foundations of an individual's trust in the AFDRS. Hypothesis *IIIa* and *IVa* are consequently retained. Foundational to this investigation was this study's conceptual framework, adapted from CET (Paton, 2008a), which suggests the basis of trust in the AFDRS is a function of individual familiarity with bushfire (Ter Huurne and Gutteling, 2009) (Figure 2).

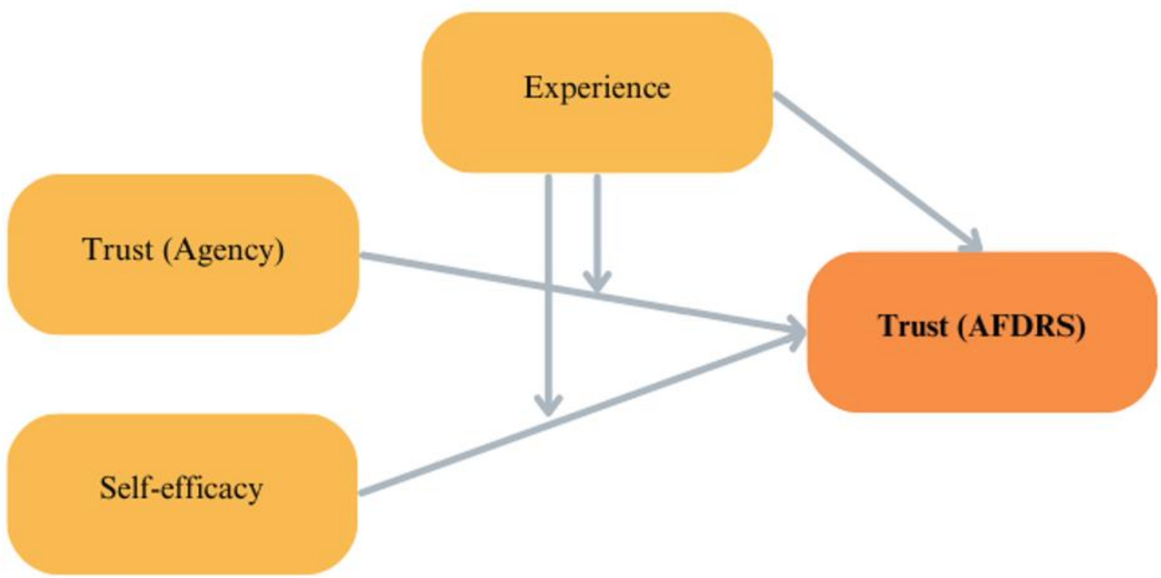


Figure 2 Displayed here for reader convenience

It was found that those with direct experience had the highest level of self-efficacy ($\bar{x}$=5.26, SD=1.16) (Figure 7), and those with high trust having the lowest levels of bushfire experience ($\bar{x}$=5.81, SD=.80). It should be noted however, that while the variation between trust (agency) across experience was significant (F (1,136) =7.67, p=.002), this was not the case for self-efficacy (F (2,136) =2.24, p=.111), consistent with information relayed in Section 5.2.3. Hence, the following conceptual model, Figure 10, depicts the significant relationships between variables within this study. This illustrates that while both trust in fire agencies and self-efficacy are influences of trust in the AFDRS, trust in agency is a foremost influence, dictated by an individual's level of bushfire experience.

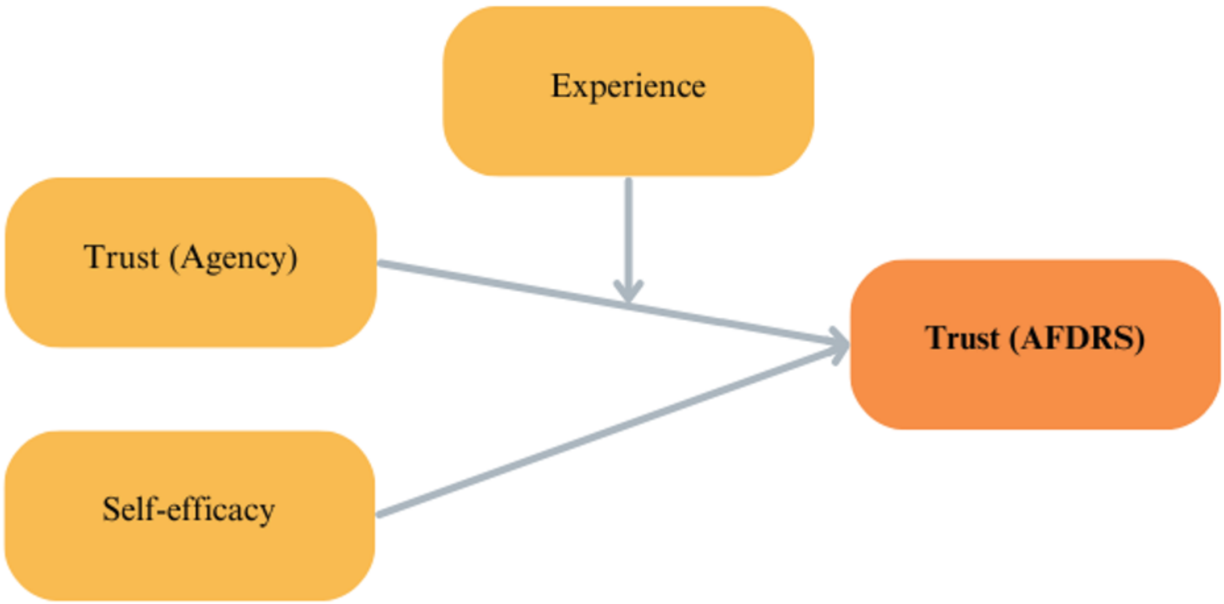


Figure. 10 The significant relationships between variables within the present study

5.3 Implications of Research Findings

Section 5.3 outlines the broader implications of the results presented. Most prevalently, Chapter 5 shows the broader implications for how agencies might need to tailor their communication approaches for different community segments (Cooper et al., 2020). It is acknowledged by research of Garrels-Bates (2018) that while fire services are often capable of facilitating community engagement, this is not utilised enough. In the context of the ACT, volunteering opportunities facilitated by the *ACT Emergency Service Agency* (ESA, 2024) seek to educated and connect with members of the Canberra community. Outreach programs within schools and workplaces, alongside agency presence at community events are components of the ESA outreach program (ESA, 2024). The findings of this research endorse the continuation of such programs given the profound impact community engagement has on trust in the AFDRS.

Hence, increasing trust in authority emerges as a primary approach to increasing trust in the AFDRS, particularly in those with less bushfire experience (Humann et al., 2022). Although, given the relative significance of self-efficacy in influencing AFDRS, it is of importance that the technological accuracy be retained to prevent losses in trust.

An implication that was not inherently related to the research questions discussion includes the inability for numeric values to adequately represent the nuance of trust in the AFDRS. Given the SEA was used for data collection, further expansion of focus group findings would extort the original approach to data collection. However, it is worth noting that deductive approaches to data collection, such as that used by the TSF (2023) are likely a poor indication of the trust communities have in the AFDRS. While not central to the current investigation, this methodological finding justifies the utility of mixed method approaches (Creswell and Clark 2017; Plano Clark, 2011). Therefore, it is advantageous for agencies to utilise such approaches when further considering community acceptance of the AFDRS. In continuing this discourse surrounding the unearthing of mechanisms instilling trust in the AFDRS, Section 5.4 will now consider whether a trust dynamic vary across in individuals' level of bushfire experience.

5.4 Limitations and future recommendations

Section 5.4 briefly outlines the limitations and opportunities for future research regarding this study. Firstly, this research project occurred in the absence of danger ratings exceeding ratings exceeding ‘Moderate’ (i.e. ‘High’, ‘Extreme’ or ‘Catastrophic’). This means that unlike communities, such as halls gap (Reid and Beilin, 2014), which have an opportunity to experience high rating days at a local level, this study can only gauge baseline levels of trust in the system at low rating levels (i.e. ’No Rating’, ‘Moderate’). Given the system’s tendency to overestimate bushfire danger (Kenny et al., 2024), it is likely instances of distrust could occur in the future however, meaning this research can still serve as a baseline for ever growing research into forecasting systems such as the AFDRS as well as campaigns for on-boarding of warning systems. It should also be reinstated that the present research is firmly bound to research surrounding infrequent hazard occurrence.

The Canberra community has predominantly experienced bushfire disaster either indirectly, or infrequently. This demonstrates that the research undertaken in coherence with CET, only considers when practice effects are low, with extent of experience rather than practice effects considered. While this means the project may not be applicable scenarios in which bushfire exposure to communities increases, this research may serve as a baseline on which subsequent research can build.

In appreciating the validity of the study, it is worth mentioning that due to the low number of participants within this study (n=136), it is possible that the result may vary if replicated. Specifically, there is a possibility the lack of significance in relation to bushfire experience may be a symptom of low statistical power.

Chapter 6

Conclusion

This study sought to determine the extent of community trust in the AFDRS, with a focus on identifying the complex and highly variable psychosocial mechanisms that underlie confidence in the system's forecasts. To do so, this thesis investigated whether trust in the AFDRS was of concern to the Canberra community, and what psychosocial mechanisms underlie this trust. Results obtained through the quantitative and qualitative investigations were obesified. Findings illustrate that while the community perceptions of AFDRS are generally high, this trust is influenced by various unique psychosocial factors. For individuals with bushfire experience, trust in the AFDRS is mediated by their self-efficacy, verifying their existing beliefs regarding risk, and by their previous experiences with bushfire. Conversely, those with less bushfire experience draw upon their social trust to determine the credibility of the system. However, it was overall determined that trusting relationships with bushfire agencies prodominantly facilitates trust in the AFDRS. Such findings have profound implications for the ways in which agencies can leverage mechanisms underlying trust to optimize community acceptance of early warning systems, vital for human survival under future climate change scenarios.

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Acknowledgement of AI Software Usage

I acknowledge the use of ChatGPT was used on the 10th of September 2024 as a brainstorming prompt to guide me towards areas of research pertaining to trust theory. This was conducted to the knowledge of my supervisor, and AI usage adhered to the ANU's academic integrity requirements. The prompt used was ‘What theories related to social trust are applicable to natural disaster research?’. The outputs generated from these prompts were used to guide my web searches and ensure all known theories pertaining to trust in natural hazard research were assessed before Community Engagement Theory was used.

Appendix 1.

The Survey Flyer Design

Appendix 2.

Online Invitation for Survey Participants

Hi Canberra Westsiders!
My name is Kate and I am an Honours student at the ANU. This year I am developing a project to help understand what the residents of Canberra's Western Edge (i.e. Molonglo Valley, Woden Valley, Kambah and Weston Creek) think of the new Australian Fire Danger Rating System, and whether you feel it is assisting your bushfire preparedness. It is hoped my research will help inform future development of this system! If you are interested in helping me collect data for my project, follow the QR code below. Otherwise follow this link: https://anu.au1.qualtrics.com/jfe/form/SV_6fI37YNuEdQuuy2
This will take you to a 10-15min anonymous survey. Feel free to share the survey with anyone you think would be interested in taking part! Thank you in advance! ☺️

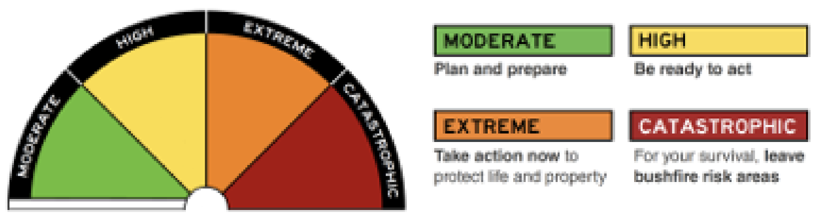
Appendix 3.

Focus Group Discussion Run-sheet

Focus Group Run Sheet

14/08/24

- Start recording
- Introduce yourself (and my project) and Sarah (have Sarah discuss her background)
- My project is an Honours research project
    - I am aiming to help to determine what the community thinks of AFDRS and how important some aspects of individuals psychosocial processes lead to more satisfaction (positive perceptions) of the system (trust).
    - This project is aimed at presenting the community feedback to those who produced the AFDRS and helping the agencies understand what factors allow for lesser and more trust in the system.



- Give some venue information:
    - In case of an emergency – leave all belongings and go through the upstairs fire door
    - The kitchen is available for use
    - The food is for eating – so please do so.
- Run through the information sheet briefly
    - You are here voluntarily – you can leave at any time
    - This is also on a question-by-question basis (you can choose to pass or leave for a single question if it makes you uncomfortable).
    - Their voices will be recorded, so we ask you allow everyone to finish speaking so we can distinguish the voices. This will be transcribed using automatic transcription software.
    - You can opt to receive a copy of the transcribed focus group if you like.
    - You are also welcome to have anything you say and later regret scrapped from the record prior to transcription, this should happen before the recording is anonymized.
    - Your request to be here is not linked to your survey responses as these are anonymous, but your email nomination.
    - Is everyone comfortable providing an initial or name today - if so, introduce yourself if you would like (this will not be used in the results)
- **Consent Form Signing and Answering Any Preliminary Questions**
- **Questions to ask:**
    - *What are your primary concerns with the AFDRS?*
    - *What influences your trust in AFDRS?*
    - *What prevents you from feeling that the AFDRS appropriately captures your bushfire danger level?*
- Thank participants – offer them more food
- Stop recording machine

Appendix 4.

Residual Statistical Tables

(a) Sociodemographic characteristics of survey responses and the key variables

Characteristic	Frequency (*n*)	%	Level of Experience: No Experience		Indirect Experience		Direct Experience		Trust (AFDRS)		Trust (Authority)		Self-efficacy	
			n	***%***	***n***	***%***	***n***	***%***	**M**	**SD**	**M**	**SD**	**M**	**SD**
Gender									t(131)=-.652, p=.540		t(131)=--.673, p=.619		t(131)=.174, p=.678	
Female	76	55.90	18	42.9	18	40.9	21	42.0	7.81	1.58	5.47	1.17	4.84	1.18
Male	57	41.90	22	52.4	25	56.8	29	42.0	7.62	1.70	5.34	1.04	5.18	1.67
Other	3	2.20	2	4.8	1	2.3	0	0	8.75	1.06	7.00	.00	5.75	.35
Age (years)									F(4,131)=1.007, p=.407		F(4,131)=.437, p=.782		F(4,131)=.585., p=.674)	
18-25	14	10.30	4	9.5	6	13.6	4	8.0	7.50	1.49	5.50	.90	5.00	1.31
26-35	13	9.60	3	7.1	7	15.9	3	6.0	8.08	1.21	5.60	1.00	4.65	1.26
36 – 50	45	33.10	18	42.9	15	34.1	12	24.0	7.41	1.92	5.40	1.25	4.87	1.39
51 – 65	39	28.70	11	26.2	9	20.5	19	38.0	7.55	1.43	5.53	1.17	5.17	.89
Over 65	25	18.40	6	14.3	7	15.9	12	24.0	7.88	1.53	5.20	1.06	5.04	1.20
Suburb of residency									F(4,131)=2.249, p=.067		**F(4,131)=2.870, p=.026***		F(4,131)=.730, p=.573)	
Molonglo Valley	21	15.40	4	9.5	8	18.2	12	24	7.79	1.25`	5.43	1.06	4.95	1.16
Kambah	24	17.60	8	19.0	10	22.7	3	6	6.96	2.19	4.77	1.54	5.20	1.04
Weston Creek	40	29.40	8	19.0	11	25.0	21	42	8.04	1.15	5.50	.99	5.18	1.28
Woden Valley	42	30.90	18	42.9	12	27.3	12	24	7.74	1.80	5.70	.96	4.74	1.27
Uriarra Village	9	5.80	4	9.5	3	6.8	2	4	8.50	0.91	5.79	0.81	5.21	1.07
Duration of Residency (years)									F(5,130)=.125, p=.987		F(5,130)=1.275., p=.279		F(5,130)=.281., p=.923	
Less than 1	13	9.60	7	16.7	3	6.8	4	8.0	7.81	1.28	5.27	1.15	4.58	1.12
Between 1-5	43	31.60	13	31.0	18	40.9	11	22.0	7.70	1.80	5.57	1.03	5.02	1.20
Between 6-10	24	17.60	12	28.0	7	15.9	5	10.0	7.94	1.12	5.73	.85	4.92	1.36
Between 11-15	9	6.60	4	9.5	1	2.3	4	8.0	7.67	1.52	5.56	.92	4.94	1.59
Between 16-25	22	16.20	4	9.5	6	13.6	12	24.0	6.62	2.12	5.27	1.31	5.02	.99
More than 26	25	18.40	2	4.8	9	20.5	14	28.0	7.78	1.50	5.06	1.37	5.14	1.16
Distance of residency from bushland (km)									**F(2,133)=6.297, p=.002****		F(2,133)=.1.272, p=.284).		F(2,133)=.2.26. , p=.109	
Less than 1	99	72.80	29	69.0	32	72.7	38	76.0	7.87	1.53	5.36	1.16	4.98	1.20
Between 1-5	35	25.70	13	31.0	12	27.3	10	20.0	7.59	1.50	5.66	1.03	5.09	1.17
More than 6	2	1.5	0	0	0	0	2	4.0	4.00	4.24	4.7	1.06	3.25	1.06

*Note. N=136. Estimates for Trust (AFDRS), Trust (Agency) and Self-efficacy generated via descriptive statistics function in SPSS. ANOVAS were performed to generate frequency estimates for each level of experience. Scores with **significant to the <.01degree, scores with * have a significance to the <.05 degree*

(b) *AFDRS awareness information across the key variables*

Characteristic	Frequency (*n*)	%	Level of Experience						Trust (AFDRS)		Trust (Agency)		Self-efficacy	
			No Experience		Indirect Experience		Direct Experience							
			n	***%***	***n***	***%***	***n***	***%***	**M**	**SD**	**M**	**SD**	**M**	**SD**
Aware of AFDRS introduction to the ACT prior to survey completion									t(116)=-.1.43, p=.233),		t(116)=.330, p=.566		t(116)=.267, p=.606	
Yes	116	85.30	35	83.3	38	86.4	43	86.0	7.84	1.58	5.47	1.12	5.14	1.15
No	20	14.70	7	16.7	6	13.6	7	14.0	7.10	1.72	5.17	1.21	4.15	1.08
Year that AFDRS was first noticed									F(4,130)=1.189, p=.323		F(4,130)=.466., p=.761		**F(4,130)=.3.490, p=.010***	
Before 2022	19	14.00	5	11.9	4	9.1	10	20.0	7.92	2.02	5.45	1.48	5.82	.93
During 2022	47	34.60	10	23.8	19	43.2	18	36.0	7.92	1.21	5.43	1.03	5.01	1.16
During 2023	32	23.50	12	28.6	11	25.0	9	18.0	7.67	1.83	5.36	1.16	4.78	1.31
During 2024	8	5.90	3	7.1	2	4.5	3	6.0	8.19	1.81	5.94	1.05	5.13	1.19
Never noticed	29	21.30	12	28.6	8	18.2	9	18.0	7.21	1.57	5.35	1.07	4.62	1.05
How often AFDRS is noticed									**(F(4,131)=4.238, p=.003****		F(5,131)=1.481., p=.211		**F(4,131)=.2.974, p=.022***	
More than once a week	30	22.10	11	26.2	8	18.2	11	22.0	8.43	1.26	5.72	1.10	5.42	.98
About once a week	36	26.50	12	28.6	11	25.0	13	26.0	7.90	1.71	5.50	1.24	4.89	1.52
About once a month	20	14.70	5	11.9	9	20.5	6	12.0	7.13	1.98	5.20	1.21	4.80	1.06
A few times a year	42	30.90	12	28.6	13	29.5	17	34.0	7.63	1.31	5.39	.98	5.07	.91
Never	8	5.90	2	4.8	3	6.8	3	6.0	6.31	1.60	4.75	1.22	3.94	1.37
Perceived Purpose of the AFDRS									**(F(2,133)=3.216, p=.043***		F(2,133)=.780, p=.460).		F(2,133)=.1.482, p=.231).	
To identify the likelihood of a bushfire starting	45	33.10	17	40.5	13	29.5	15	30.0	7.26	2.00	5.26	1.31	4.73	1.36
To identify the level of danger a community could face if a bushfire were to start	85	62.50	24	57.1	29	65.9	32	64.0	7.98	1.26	5.51	1.03	5.14	1.09
Unsure	6	4.40	1	2.4	2	4.5	3	6.0	7.75	2.23	5.58	1.11	4.92	1.07

*Note. N=136. Estimates for Trust (AFDRS), Trust (Agency) and Self-efficacy generated via descriptive statistics function in SPSS. ANOVAS were performed to generate frequency estimates for each level of experience. Scores with **significant to the <.001 degree, scores with * have a significance to the <.05 degree.*

(c) *Frequency scores pertaining to Trust (AFDRS), Trust (Agency) and Self-efficacy,*

Trust (AFDRS) (scale 1-10)	Frequency (*n*)	%
1	2	1.50
2	0	0.00
3	1	0.70
4	3	2.20
5	9	6.60
6	10	7.30
7	28	20.60
8	47	34.60
9	24	17.70
10	12	8.80
Total	*136*	*100.00*
Trust (Authority) (scale 1-7)	**Frequency (*n*)**	**%**
1	1	0.70
2	2	7.30
3	9	13.90
4	18	36.80
5	46	33.80
6	46	33.80
7	14	10.3
Total	*136*	*100.00*
Self-efficacy (scale1-7)	**Frequency (*n*)**	**%**
1	2	1.40
2	6	4.40
3	9	5.60
4	32	23.60
5	51	37.50
6	30	22.10
7	6	4.40

(d) *descriptive statistics pertaining to Trust (AFDRS), Trust (Agency) and Self-efficacy*

Variable	Range		Average (%)	Mean			Median
	Min.	Max.		Stat.	SE.	SD.	
Trust (AFDRS)	1.00	10.00	77.40	7.74	.14	1.62	8.00
Trust (Agency)	1.00	7.00	77.57	5.43	.10	1.13	5.50
Self-efficacy	1.00	7.00	71.14	4.98	.10	1.20	5.00

Note. Scores were rounded to the nearest decimal (2 decimal places). SE refers to (Standard Error of Mean) & SD (standard deviation). Trust (Agency) tested on 10-point scale. Trust (Agency) and Self-efficacy were measured on 7-point Likert scales.

(e) *Descriptive statistics pertaining to Level of Experience,*

Level of Experience	Frequency (*n*)	%
No Experience	42	30.90
Indirect Experience	44	32.40
Direct Experience	50	36.80
Total	*136*	*100.00*

(f) Sociodemographic characteristics of survey responses and the key variables

Characteristic	Frequency (*n*)	%	Level of Experience						Trust (AFDRS)		Trust (Authority)		Self-efficacy	
			No Experience		Indirect Experience		Direct Experience							
			n	*%*	*n*	*%*	*n*	*%*	M	SD	M	SD	M	SD
Gender									t(131)=-.652, p=.540		t(131)=--.673, p=.619		t(131)=.174, p=.678	
Female	76	55.90	18	42.9	18	40.9	21	42.0	7.81	1.58	5.47	1.17	4.84	1.18
Male	57	41.90	22	52.4	25	56.8	29	42.0	7.62	1.70	5.34	1.04	5.18	1.67
Other	3	2.20	2	4.8	1	2.3	0	0	8.75	1.06	7.00	.00	5.75	.35
Age (years)									F(4,131)=1.007, p=.407		F(4,131)=.437, p=.782		F(4,131)=.585., p=.674)	
18-25	14	10.30	4	9.5	6	13.6	4	8.0	7.50	1.49	5.50	.90	5.00	1.31
26-35	13	9.60	3	7.1	7	15.9	3	6.0	8.08	1.21	5.60	1.00	4.65	1.26
36 – 50	45	33.10	18	42.9	15	34.1	12	24.0	7.41	1.92	5.40	1.25	4.87	1.39
51 – 65	39	28.70	11	26.2	9	20.5	19	38.0	7.55	1.43	5.53	1.17	5.17	.89
Over 65	25	18.40	6	14.3	7	15.9	12	24.0	7.88	1.53	5.20	1.06	5.04	1.20
Suburb of residency									F(4,131)=2.249, p=.067		**F(4,131)=2.870, p=.026***		F(4,131)=.730, p=.573)	
Molonglo Valley	21	15.40	4	9.5	8	18.2	12	24	7.79	1.25`	5.43	1.06	4.95	1.16
Kambah	24	17.60	8	19.0	10	22.7	3	6	6.96	2.19	4.77	1.54	5.20	1.04
Weston Creek	40	29.40	8	19.0	11	25.0	21	42	8.04	1.15	5.50	.99	5.18	1.28
Woden Valley	42	30.90	18	42.9	12	27.3	12	24	7.74	1.80	5.70	.96	4.74	1.27
Uriarra Village	9	5.80	4	9.5	3	6.8	2	4	8.50	0.91	5.79	0.81	5.21	1.07
Duration of Residency (years)									F(5,130)=.125, p=.987		F(5,130)=1.275., p=.279		F(5,130)=.281., p=.923	
Less than 1	13	9.60	7	16.7	3	6.8	4	8.0	7.81	1.28	5.27	1.15	4.58	1.12
Between 1-5	43	31.60	13	31.0	18	40.9	11	22.0	7.70	1.80	5.57	1.03	5.02	1.20
Between 6-10	24	17.60	12	28.0	7	15.9	5	10.0	7.94	1.12	5.73	.85	4.92	1.36
Between 11-15	9	6.60	4	9.5	1	2.3	4	8.0	7.67	1.52	5.56	.92	4.94	1.59
Between 16-25	22	16.20	4	9.5	6	13.6	12	24.0	6.62	2.12	5.27	1.31	5.02	.99
More than 26	25	18.40	2	4.8	9	20.5	14	28.0	7.78	1.50	5.06	1.37	5.14	1.16
Distance of residency from bushland (km)									**F(2,133)=6.297, p=.002****		F(2,133)=.1.272, p=.284).		F(2,133)=.2.26., p=.109	
Less than 1	99	72.80	29	69.0	32	72.7	38	76.0	7.87	1.53	5.36	1.16	4.98	1.20
Between 1-5	35	25.70	13	31.0	12	27.3	10	20.0	7.59	1.50	5.66	1.03	5.09	1.17
More than 6	2	1.5	0	0	0	0	2	4.0	4.00	4.24	4.7	1.06	3.25	1.06

*Note. N=136. Estimates for Trust (AFDRS), Trust (Agency) and Self-efficacy generated via descriptive statistics function in SPSS. ANOVAS were performed to generate frequency estimates for each level of experience. Scores with **significant to the <.01degree, scores with * have a significance to the <.05 degree*

(g) Correlations for Study Variables

Variable	1	2
1. Trust (Agency)	.578	1.000
2. Self-efficacy	.219	0.79

(h) Multiple Regression Analysis

Variable	Beta Coefficient (β)	Std. Beta Coefficient	SE	*t*	*p*	LLCI	ULCI
Constant	2.185	-	.693	3.155	.002**	.815	3.555
Trust (Agency)	.808	.564	.099	8.138	<.001**	.612	1.005
Self-efficacy	.235	.174	.093	2.516	.013*	.050	.420

Note. *= significant at p<.05. **= significant at p<.001.

(i) Analysis of Variance (ANOVA) for Linear Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	128.86	2	64.430	38.147	<.001[b]
Residual	224.36	133	1.689		
Total	353.49	135			

a. Dependent Variable: Trust in the AFDRS
b. Predictors: (constant), Self-efficacy, Trust (Agency)

(j) Post-Hoc Analysis suggesting for Trust (Agency) and Level of Experience

Level of Experience	Comparison	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	*Upper Bound*
No Experience	Indirect Experience	.2754	.2343	.245	-.188	.739
	Direct Experience	.7995*	.2274	<.001	.350	1.249
Indirect Experience	Direct Experience	.5241*	.2245	.021	.080	.968

**. mean difference is significant at the .05 level.*

(k) Means, Standard Deviations, and One-Way Analyses of Variance in Trust (AFDRS), Trust (Agency) and Self-efficacy

Measure	Level of Bushfire Experience						Sum of Squares	F (1, 136)	Mean Square	p.
	No Experience		Indirect Experience		Direct Experience					
	M.	*SD.*	*M.*	*SD.*	*M.*	*SD.*				
Trust (AFDRS)	7.91	1.37	7.90	1.34	7.47	1.99	5.88	1.13	2.94	.328
Trust (Authority)	5.81	.80	5.53	1.05	5.00	1.30	15.35	6.50	7.67	*.002
Self-efficacy	4.83	1.33	4.80	1.07	5.26	1.16	6.32	2.24	3.16	.111

Note. *= significant at p<.05. **= significant at p<.001. Scales for Trust (AFDRS) go from 1-10 numerical scale. Scales for Trust (Agency) and Self-efficacy go from 1-5 in the Likert scale format.

(l) Correlations for study Variables

Variable	1	2
1. Trust (Agency)	.58	1.000
2. Self-efficacy	.22	.79
3. Experience	-.29	.15

A pairwise comparison was undertaken to determine whether there is multicollinearity between variables. Pearson's correlation was selected for this, which measures the strength of two variables of a scale of +1.00 to –1.00, with 0 suggesting no correlation. The typical cutoff is 0.80 (Vatcheva et al., 2016). The table below shows that none of the values exceeded the 0.8 cut off, suggesting independence of IVs (r=.079). However, it is further assumed that the IVs will all correlate with the DV. The minimum value suggesting this is 0.3. As seen below, only Trust in Agency meets this assumption (.578) and self-efficacy (.219), suggesting preliminary low correlation with trust in the system and self-efficacy. This will be confirmed later in the actual regression.

(m) *Regression Analysis for Linear Regression Considering Trust (AFDRS) inclusive of Experience*

Model (IVs)	R	R^2	Adjusted R^2	SE of estimate	R^2 Change	F Change	df1	df2	p	Durban Watson	SE of Estimate
Trust (Agency), Self-efficacy, Experience	.604[a]	.365	.351	1.3037	.365	25.323	3	132	<.001**	2.203	1.3037

*Note. Durbin-Watson score used to test independence of errors, range of 1.50-2.50 based on work of Azami et al. (2020). *= significant at p<.05. **= significant at p<.001*

(n) *Multiple Regression Analysis*

Variable	Beta Coefficient (β)	Std. Beta Coefficient	SE	*t*	*p*	LLCI	ULCI
Constant	2.031	-	.796	2.552	.012*	.815	3.555
Trust (Agency)	.821	.573	.105	7.835	<.001**	.612	1.005
Self-efficacy	.228	.169	.095	2.392	.018*	.050	.420
Experience	.058	.029	.145	.397	.692	-.229	.344

Note. *= significant at p<.05. **= significant at p<.001.

(o) *Relationship between variables*

Variable	Beta Coefficient (β)	Std. Beta Coefficient	SE	*t*	*p*	LLCI	ULCI
Constant	2.185	-	.693	3.155	.002**	.815	3.555
Trust (Agency)	.808	.564	.099	8.138	<.001**	.612	1.005
Self-efficacy	.235	.174	.093	2.516	.013*	.050	.420

*Note. *= significant at p<.05. **= significant at p<.001.*

(p) *Analysis of Variance (ANOVA) for Linear Regression*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	129.127	3	43.042	25.323	<.001[b]
Residual	224.36	132	1.700		

Total	353.49	135			

c. Dependent Variable: Trust in the AFDRS
d. Predictors: (constant), Self-efficacy, Trust (Agency), Level of Experience

(q) *Parameter Estimates for Univariate ANOVA Interaction Effects*

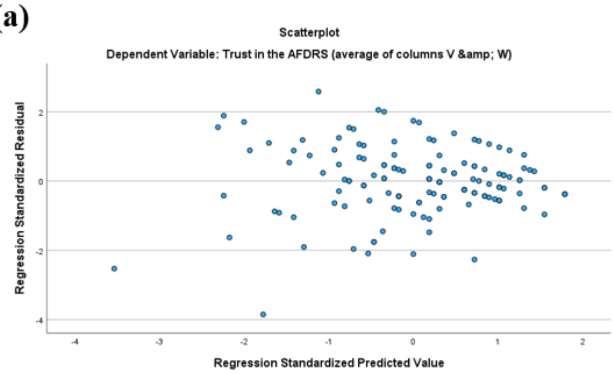
Parameter	β	Std. Error	t	Sig. (p<.05)	LLCI	ULCI
Intercept	2.58	1.49	1.73	.085	-364	5.514
Self-efficacy	.41	.16	2.60	.011*	.099	.730
Trust (Agency)	.57	.27	2.16	.032*	.049	1.096
No Experience	-1.66	1.83	-.91	.365	-5.282	1.957
Indirect Experience	2.41	1.99	1.21	.228	-1.525	6.347
Direct Experience	0[a]	-	-	-	-	-
No Experience * Self-efficacy	-.165	.23	-.73	.465	-.610	.280
Indirect Experience * Self-efficacy	-.396	.24	-1.63	.106	-.878	.085
Direct Experience * Self-efficacy	0[a]	-	-	-	-	-
No Experience * Trust (Agency)	.474	.30	1.58	.117	-.120	1.068
Indirect Experience * Trust (Agency)	-.062	.32	-.19	.848	.703	.578
Direct Experience * Trust (Agency)	0[a]	-	-	-	-	-

*Dependant Variable is Trust (AFDRS). Within 'Sig. (<.05)' column, *= significant at p<.05. **= significant at p<.001. a= parameter is set to 0 because it is redundant.*

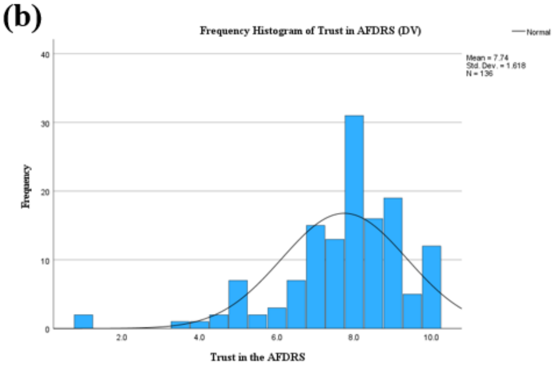
Appendix 5.

Regression Assumption Checks

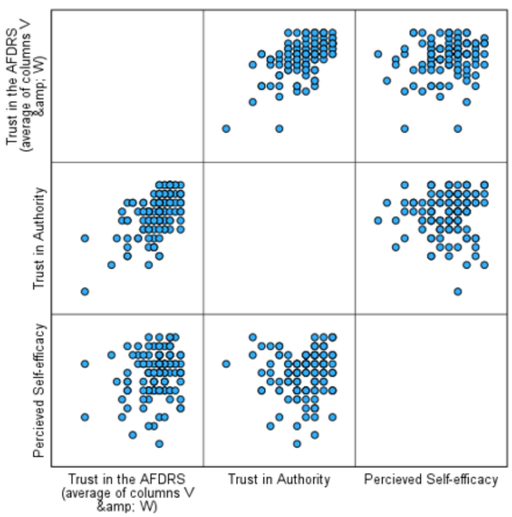
(a)



(b)



(c)



(d)

Model (IVs)	R	R^2	Adjusted R^2	SE of estimate	R^2 Change	F Change	df1	df2	p	Durban Watson	SE of Estimate
Trust (Agency), Self-efficacy	.604[a]	.365	.355	1.2996	.365	38.15	2	133	<.001**	2.210	1.2996

(a) Homoscedasticity Assumption Check

The scatterplot generated within the multiple regression analysis reveals the assumption of Homoskedasticity was not met. Therefore, OSL regression was used. Based on the scatterplot generated, the assumption of homoskedasticity was questionable. Outliers which were retained fell outside the optimal range of –3 to 2. However, given only 4 variables (2.9%), it can be deduced that the assumption of homoskedasticity is satisfied.

(b) *Normality distribution used to assume the presence of normality within the linear regression performed*

Note. This normality check was conducted through observing the distribution curve associated with the distribution observed. This curve has a slight negative skewness. Before commencing analysis, the normality of the dependent variable was tested. This was found to have a negative skew and was lacking standard normal distribution. Visual interpretation of both a histogram and boxplot suggest that outliers are generating this skewness. Box-plots suggested that three outliers (n=3) were present in the DV, specifically scores pertaining to scores of 1/7 (n=2) and 3/7 (n=1). Given rejection of outliers warrants extensive rationale, it was determined these scores were valid, with all responses retained. This decision is validated by observing the figure below, which shows a reasonably good fit of the residuals to a numeric denominator.

(c) *Linearity testing for variables in the regression:*

Note. All variables are visually assessed through considering the line of best fit. It was determined all showed linear relationships. Linearity. A diagnostic plot was used to discern whether the assumption of linearity was met. This was achieved through considering scatter plot analysis with lines of best fit applied. It was found that positive linearity was evident across each variable, therefore confirming linearity exists.

(d) *Durban Watson Test*

Durbin-Watson score used to test independence of errors, range of 1.50-2.50 based on work of Azami et al. (2020). While the results of the Durbin-Watson test were undertaken to discern the independence of errors score, which was 2.210. The acceptable range is within 1.50 - 2.50, showing that the assumption of independence of errors in this dataset was confirmed (Azami et al., 2020). This suggests the analysis at hand is sound meets the assumption of independence of errors and is therefore statistically sound

Appendix 6.

Information pertaining to the Questionnaire

(a) Questions presented within the survey

Scaled Variable	Questions	Scale Questions	Reference Scale
Basic/ demographic Information	1. Which gender do you identify with? 2. What is your age in years? 3. Which suburb are you currently a resident of? 4. How long have you lived in your current place of residency? 5. How far is your place of residency from fire-prone areas (i.e. bushland, grassland, nature reserve, etc.)?	Measured using discrete categories observable in Appendix 5	Adapted from TFS (2023) and Beringer (2000)
AFDRS Awareness	6. Are you aware of the new Australian Fire Danger Rating System that has been introduced across Australia (shown above), including the Australian Capital Territory? 7. When did you first notice that the original ACT Fire Danger Rating System (shown above on left) had been replaced by the Australian Fire Danger Rating System (shown above on right)? 8. How often did you notice the Australian Fire Danger Rating System during last summer? 9. In your opinion, what is the purpose of the Australian Fire Danger Rating System?	Measured using discrete categories observable in Appendix. 5	Adapted from TFS (2023)
Bushfire Experience	10. Have you personally experienced a bushfire? 11. Have you ever had to respond to a bushfire emergency at a property (i.e. flee from fire or stay and defend)?	If ‘yes’ to Q10 and Q11= Direct Ex. If ‘yes to Q10 and ‘no’ to Q11 = Indirect Ex. If ‘no’ to Q10 and Q11 = No Ex.	Adapted from TFS (2023)
Trust (AFDRS)	12. On a scale of 1 (completely inaccurate) to 10 (completely accurate), how accurate do you feel the information provided by the Australian Fire Danger Rating System is? (competence) 13. On a scale of 1 (completely untrustworthy) to 10 (completely trustworthy), how trustworthy do you feel the information provided by the Australian Fire Danger Rating System is?	Both Qs measured on 10-point numeric scales.	Adapted from TFS (2023) and Tan et al. (2023)
Trust (Agency)	14. To what extent do you feel that the Australian/ACT Fire Service had community needs in mind when developing the Australian Fire Danger Rating System? (benevolence) 15. How confident are you that the ACT Fire Service will provide effective assistance to you and your community if you were to experience a bushfire?	(Q14) 7-point Likert scale (V*ery likely, Likely, Somewhat likely, Neither likely nor unlikely, Somewhat unlikely, Unlikely, Very unlikely*). (Q15) 7-point Likert scale (V*ery confident, Confident, Somewhat confident, Neither*	Adapted from Choi and Wehde (2020)

		confident nor unconfident, Somewhat unconfident, Unconfident, Very unconfident).	
Self-efficacy	16. How confident are you in making decisions that will protect yourself and your home during a bushfire event? 17. How well do you feel you could protect yourself and your home during a bushfire event?	(Q16) 7-point Likert Scale *(Very confident, Confident, Somewhat confident, Neither confident nor unconfident, Somewhat unconfident, Unconfident, Very unconfiden*t). (Q17) 7-point Likert scale (*Extremely, Well, Somewhat well, Nether well nor poorly, Somewhat poorly, Poorly, Extremely poorly*).	Adapted from Boylan and Lawrence (2020)

(b) Reliability testing of scale items

Variable Scale	Items/ Questions (N)	Cronbach's Alpha	Item Means	Standard Deviations	Inter-item Correlation Coefficient	Combined Item Mean
AFDRS Trust	How accurate do you feel the information provided by the Australian Fire Danger Rating System is?	.811	7.52	1.725	.682	7.743
	How trustworthy do you feel the information provided by the Australian Fire Danger Rating System is?		7.96	1.803		
Self-efficacy	How confident are you in making decisions that will protect yourself and your home during a bushfire event?	.638	5.35	1.291	.474	4.978
	How well do you feel you could protect yourself and your home during a bushfire event?		4.60	1.502		
Agency Trust	To what extent do you feel that the Australian/ACT Fire Service had community needs in mind when developing the Australian Fire Danger Rating System?	.538	5.53	1.154	.384	5.426
	How confident are you that the ACT Fire Service will provide effective assistance to you and your community if you were to experience a bushfire?		5.32	1.549		
Level of Experience	Have you personally experienced a bushfire?	na	-	-	-	-
	Have you ever had to respond to a bushfire emergency at a property (i.e. flee from fire or stay and defend)?		-	-	-	-

Sample size n=136. While ideally a Cronbach's Alpha of >0.7 is ideal, it is suggested by Pallant (2020) that scales have less than 10 items will very rarely achieve this level of CA. Therefore, the recommended level is >0.5 in such instances. All scales exceeded the >0.5 minimum rule. Level of Experience was measured through combination of scores. Specifically, if an individual indicated they had experienced a bushfire, but had not had to respond, this was considered indirect experience, if a participant indicated yes to both components, then they were considered to have direct experience. If a participant indicated no to both options, then they were considered to have no direct experience.

Appendix 7.

Thematic Analysis of the Focus Group Discussion

Theme	Initial Code(s)	Illustrative quotes
Q1. What are your primary concerns with the AFDRS?		
Understandability Understandability of the system prevents community acceptance	Language Use Comprehensibility Education	‘I kind of struggled myself, and I'm fairly articulate guy, to really articulate what the rating does. So, for me, it really simply is that the further up [the rating], the more alert you're going to be. That really kind of gets down to it. It's visceral... But it is not clear because I think people aren't used to talking about probability or potential risk. Not that they haven't put a lot of work into it [the AFDRS], you know.’ ‘If you see a dial on a cross like this, the first thing we do is know where it is and where the 100% is. And that's the only thing we're going to pick up from it. And I'm not trying to call ourselves stupid. I'm just saying we're time poor. We're driving along. We see something on the side of the road, but we don't know if that means X or Y. We just simply say, ‘okay, well, that's close to the danger point’, or ‘it's in the red zone’. That's when we focus for sure.’ ‘I don't think it's a matter of stupidity, though. It's a matter of, we've never been told what it means. When we're driving along, we just say, “Oh, yeah, it's a high fire risk.”’
Accessibility The need for increased accessibility to rating information	Information Deficit Dissemination	‘[The AFDRS] shouldn't be just by the side of the road. It's about where you get that information. I rarely listen to the radio and it's going to be a particular program I've tapped into, which is probably talking about fire danger.’ ‘I think it's about where this information is imparted, where people have got it in their hands. You know that event [2003 bushfire] for us was on a Saturday and our son was at the skate park and out with friends and everyone was around getting on with their normal day. So where would you have the information to say that there was a danger? How dangerous it was? And what to do about it?’ ‘There need to be phone alerts as to what the rating is on a particular day, during particularly the fire season."
Specificity A lack of location specificity. The AFDRS is too broad to be allied to an entire region	Local Reality	‘I would actually personally be more likely to look at the Fires Near Me app. It tells me where all the different fires are and has the different colour ratings of the fires. [It says if it's] under control. It's out of control. It's a danger. If they're [fire] out. ‘[Fires Near Me] really gives me more localized information, where I can go ‘Okay, there's a valley between us and that fire’ or ‘that one's going to come roaring through'. It's much more geographically astute. Whereas, you know, literally every fire danger rating system sign in the ACT is set to the same thing.’
Q2. What influences your trust in the AFDRS?		
Technical components Technical components are sound, yet predictive capacity is low	Development Predictive Capacity	‘‘Nothing's perfect.’ ‘I acknowledge is that fires can be unpredictable. And so for all the science and all the best intent in the world, the wind will change or something will speed up or something will happen that wasn't expected. So, you know, there's no 100% guarantee of prediction of [bushfires] moving and stuff.’
Consistent with observations Consistency of Ratings with Individual expectations of bushfire conditions	Expectations	'll use a term that is sometimes thrown around in my space, which is trust but verify. I think, again there's a bit of personal responsibility here. I've got much better faith and trust in the system now that we have it. When I say ‘the system’, it is a combination of things. I actually like combinations of things that will lead me to some intelligent information.’

		'I do [use the AFDRS], but I would go to more than one source of information as well as kind of sniffing the wind around my place.' 'it's great having the signs, but sometimes you just need to open the door up and have a bit of a sniff and see it's a hot day.' 'I have enormous respect for people working in that industry, and they do want to save lives and property. I trust them. Absolutely. But that system, the fire rating system, is also a tool that is there to tell me what to do. I trust the science behind it. I like to think that I'm informed about what to do and when. For me, it's important for my tracking of the situation around me, wherever I am and how that information gets to me. And that's my responsibility.'
Agency Intervention Agency interference with the technical outputs of the system	Human Error	'I mean, it put us into a panic mode really. I raced home with this person [friend], packed up more stuff, put it into the car. My husband had seen it and he left work and came racing home. All these people in the area had seen it. So, you're then not very trusting. You think, 'oh my God, they can't get the things [warnings] right'. I mean, they then went around in the afternoon. The Firies all came round. They dropped us off those packs again about being prepared.' 'I trust it and I think the thing is a tool to assist me if I happen to see that [a fire] if I'm out and about. You know, to go and check other sources. But I don't trust the clerks that may be putting the information into things... They are human beings. They might not hear things properly and might not be specific enough. Yeah. So that's the only part I don't trust anymore after that instance [past warning experience].' 'I don't trust all those people in decision making because from what I could see, I'm sorry, they could have warned people in Canberra earlier.'
Q2. What prevents you from feeling that the AFDRS appropriately captures your bushfire danger level?		
Dissemination Characteristics The public-facing communicative components of the System representation	Rating Categories	'Semantically that there is a lot between 'low' and 'high' 'I had to think back really slowly in my head, 'now what did it mean?' Because even now, having been through it and now coming back later, I still really stop and think [about] what the indicators actually really indicate'
Receiver Characteristics Receiver Characteristics preventing adequate risk representation	Personal Engagement Motivation	'There's also personal responsibility. Now, you can have any signage you like. If no one chooses to read it or investigate it, it's useless.' 'I think the signage is adequate. It does the job. As long as people read it.' 'I'm personally pretty slack about this, I won't be super alert unless it's really up there toward the danger end.' 'You have to show interest in your own survival.'