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Understanding community bushfire safety issues from social psychological perspectives – a discussion paper.

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Nothing is so practical as a good theory

Kurt Lewin

Introduction

As a direct result of bushfires on Saturday 7th February 2009, 173 people lost their lives in what has been described as the worst natural disaster in Australia's recorded history. The Black Saturday fires provided a recent and poignant reminder that many Australian communities are vulnerable to the devastating impacts of bushfire (which impacts can be financial, emotional, and health related; see Whittaker, Haynes, McLennan & Handmer, 2010) and that the protection of human life in extreme fire danger weather cannot be taken for granted. Thus, it is important that we develop a sound understanding of the psychological factors underpinning a range of community safety issues and challenges, including community education, community preparation, alertness and warnings, and 'stay or leave' decision-making. The purpose of this discussion paper is to assess the potential contribution that various social psychological theories and models can make to our understanding of community bushfire safety issues.

The specific discussion questions we present are:

1. **Do any of the theories have noteworthy relevance to current approaches to community bushfire safety?—policies, planning, procedures, practices?**
2. **Are the theories broadly supportive of current agency approaches to community bushfire safety?**
3. **Do any of the theories suggest that aspects of current approaches to community bushfire safety might be faulty?**
4. **Do any of the theories suggest that there may be shortcomings or inadequacies in aspects of current approaches to community bushfire safety?**
5. **Do any of the theories suggest gaps in community bushfire safety knowledge which need to be addressed by targeted research?**
6. **Which of the theories (or combination of the theories), if any, is the most useful for agencies to explore in addressing community bushfire safety?**

Since the ultimate goal of community bushfire safety research is the prevention of potential injuries and deaths it is proposed we consider the utility of theoretical models that have commonly been applied in health promotion (defined broadly). According to Gielen and Sleet (2003), "theories are important not simply because they help us understand causes of problems but because they allow us to identify mechanisms of change, determine why programs succeed or fail, and, perhaps most importantly, guide us to build better prevention programs" (p. 66). Although it appears to be the case that there have been few scholarly applications of the most common behavioural and social sciences theories to research in the area of injury prevention (Trifiletti, Gielen, Sleet and Hopkins, 2005), several authors have noted that the application of such theories is likely to benefit research in areas relevant to bushfire community safety. Gielen and Sleet (2003), for example, suggested that research on the psychology of evacuation and personal protective behaviours would benefit from more explicit attention to relevant theory.

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This discussion paper was written with three 'audiences' in mind: (a) community safety researchers; (b) community policy advisers and safety senior managers in emergency services organisations; and (c) fire and emergency services managers interested in the human social behaviour aspects of community safety. The first section of the paper describes current research on various aspects of community safety, with an emphasis on research conducted in the aftermath of Black Saturday: community education, community preparation, alertness and warnings, and 'stay or leave' decision-making. The second section then describes the social psychological theories and models most commonly applied to health promotion research: the Theory of Planned Behaviour; Extended Protection Motivation Theory; the Extended Parallel Processing Model; and the Terror Management Health Model. The possible applicability of attribution theory is also discussed. Examples of how the constructs/variables identified in each of these approaches may apply in a bushfire community safety context are provided. In the final section, we discuss the possible utility of the theoretical models in a bushfire community safety context.

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Community bushfire safety research

Several issues identified as particularly important to understanding community bushfire safety (including community education, community preparation, alertness and warnings, and 'stay or leave' decision-making) have been discussed following 7 February 2009, most notably in the context of the 2009 Victorian Bushfires Royal Commission (2009 Victorian Bushfires Royal Commission, 2009). Recent research pertaining to these issues is discussed below.

Community Bushfire Education

Traditionally, community bushfire education has involved efforts to raise community members' awareness of bushfire risk and how to manage that risk, by providing them with information. The assumption has been that providing relevant information which raises awareness of risk and describes how to prepare for the risk will motivate people to take the recommended actions. However, recent research suggests that such efforts have been only modestly successful. Based on their interviews with members of communities hardest hit by the Black Saturday fires, Whittaker et al. (2009) concluded that "the overall impression created by the interview data is that uptake of available community bushfire preparation and planning information by residents: (a) varied greatly between individuals and communities; (b) was partial and *ad hoc* and (c) was likely to be out of date." (p. 16). Understanding why community education efforts have not been more successful is therefore an important goal for improving bushfire community safety. Two important aspects of community education efforts to consider are, first, whether people receive the relevant information, and secondly, whether the information provided is sufficiently persuasive.

Recent research sheds some light on whether community members get information about how to prepare for bushfires and what to do during bushfires. Whitaker et al. (2010) conducted a mail survey of residents in communities affected by the Black Saturday fires and reported that 12% of the respondents had received no information about how to prepare in the twelve months prior to the February 7th bushfires[1]. Additionally, 16% said they did not get information about what to do during a bushfire. This research also provides information about the sources from which information was derived. For example, the researchers found that almost one in three people obtained information from CFA community meetings and the CFA Living in the Bush workbook. However, little is known about what factors (a) motivate community members to actively seek or avoid the available information; (b) encourage close attention and critical evaluation of this information; and (c) lead people to take the recommended actions. Some factors may relate to individual personality and circumstances, while other factors may relate to the content of the material. As will be described later, social psychological theories applied in other health and safety-relevant domains identify several factors that may prove useful for understanding the effectiveness, or otherwise, of community bushfire education efforts.

[1] Although "only" 12% claimed to have no information about preparation, the number is still concerning. In the survey sample , it reflects at least 138 lives at greater risk and translates to 1 in 8 lives in comparable communities.

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Community planning and preparation

Planning and preparing for bushfires can involve quite a broad spectrum of behaviours that variy along several dimensions. Preparations may vary in terms of temporal proximity to fire, task difficulty, type of action (single or multiple, once-off or repeated), interaction with and dependence on others, etc. Some planning and preparatory behaviours relate to decisions made potentially many years before the impact of a fire. For example, when building/buying a home, factors relevant to bushfire safety include not only the materials used (e.g. brick versus weatherboard) but also the site of the building (on the flat or slope) and landscaping options (to reduce fire risks). Other preparations may occur at the beginning of each fire season, during periods of high fire danger, or on the day/hour fire threatens and/or reaches the community at risk. Ideally, preparations such as managing fuel loads (e.g. cleaning roof gutters and removing combustible materials from the yard) and packing fire-ready kits (including clothes, gloves, goggles, breathing masks, batteries, buckets and mops etc.) will be completed before periods of high fire danger commence.

In addition to bushfire safety preparations varying in terms of temporal proximity to fire, they also vary in terms of task difficulty. Some preparations can be easily completed by most individuals without help from others (e.g. organising safe storage of insurance documents and photographs), whereas other preparations require sustained cooperation between individuals (e.g. organising equipment and tradespeople to remove trees; or to install sprinkler systems, gutter guards, radiant heat shields, dedicated water sources such as tanks or dams, pumps and piping, alternative power sources like generators; or construct shelters/bunkers). Some plans and preparations occur at individual and family levels (e.g. organising a family bushfire plan), others at community and local government levels (e.g. designating and disseminating information about neighbourhood refuges or places of last resort shelter, and exit routes).

Some preparations involve once-off actions (e.g., installing a water tank) whereas others involve repeated actions (e.g., at the beginning of each fire season: cutting-back vegetation growth, checking that batteries in portable radios work).

To date, the available research suggests serious shortfalls in the quality of plans and preparations made by members of at-risk communities. In a survey completed by members of 1350 households in the areas directly affected by the February 7th bushfires, Whittaker et al. (2010) found a significant portion of the public had not taken action with regard to several important preparations, either before February 7 or on the day. For example, more than one third of respondents had not obtained a battery powered radio. Interviews with survivors of these fires (Whitaker et al., 2009) also suggest that last-minute planning and property preparation was not uncommon, with many people engaging in these activities on the day of the fire, sometimes not initiated until smoke was visible.

Paton, Burgelt and Prior (2008) recently proposed a model of bushfire preparedness, based on several variables identified in qualitative analyses of in-depth semi-structured interviews with residents of Hobart. According to this model, peoples' decisions to prepare commence with an evaluation of whether or not their personal actions can influence their safety. Paton et al. refer to these evaluations as positive and negative outcome expectancy beliefs. The model proposed by Paton et al. suggests that there is a negative relationship between low levels of

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outcome expectancy beliefs and intentions to prepare, and that this relationship is mediated by a 'preparation inhibitors' component. This component comprises (a) social conflict (reluctance to work with others) and (b) resource constraints (such as limited time and finances). The model also proposes a positive relationship between high levels of outcome expectancies and intentions to prepare that is mediated by *sense of community* and *community problem-solving*. Sense of community includes (i) a sense of belonging to a place and (ii) a sense of belonging with the people in that place. The community problem-solving component concerns the ability for people to articulate common problems. According to Paton et al.'s model, the sense of belonging to place predicts the sense of belonging with the people in this place, which in turn predicts community problem-solving. This model was tested using the responses from 482 Hobart residents surveyed in 2006, and found to predict a moderate amount of bushfire safety preparations (39% of the variance accounted for). Although impressive from a research point of view, a substantial amount of observed variation in residents' amount of preparation remained unexplained. Factors identified in other social psychological theories and models that have been applied to health- and safety-relevant behaviours may prove useful for predicting even more of the variance in residents' bushfire preparation behaviours.

Alertness and Warnings

As the risk of bushfire increases so too does the importance of having effective warning systems. According to Mileti and Sorensen (1990) warning systems can be defined as "a means of getting information about an impending emergency, communicating that information to those who need it, and facilitating good decisions and timely response by people in danger" (p. 2-1). These authors suggest that "the goals of any public warning system are (1) to have everyone who should hear a warning message hear it, (2) to have all members of the public understand what is being said, (3) to have the public believe what is being said, (4) to have people at risk personalize the warning information and those not at risk not do so, (5) to have people come to make good decisions about what they should and should not do, and (6) to have people act or respond on the basis of those decisions in a timely fashion" (p. 2-10).

In the case of Black Saturday, the available evidence suggests that on the day many people did 'hear' the warning information (albeit from unofficial sources, in many instances), and believed it, but failed to: (a) appreciate the implications of the messages delivered; (b) personalize the information; and (c) respond in a timely fashion (see Whitaker et al., 2009). A mail survey of residents living in the areas affected by the February 7th fires yielded similar findings. Whitaker et al. (2010) found that 63% of respondents reported that they did not receive an official warning even though 72% had been expecting to receive an official warning in the event of a fire threatening their town or suburb. This survey also found that of those who left either before or when the fire arrived in their town/suburb, 51% felt that they had left leaving "late" or "very late" and 36% estimated having left less than 20 minutes before the fire arrived.

Research is clearly needed to better understand: (a) why community members do not receive expected official warnings which are provided; (b) how to improve the likelihood that people will correctly interpret the information in warning messages; (c) what factors increase personalization of warning messages; (d) what factors trigger survival-enhancing actions; and

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(e) whether various aspects of warnings can be made more salient so as to improve the timeliness of public responses.

'Stay or Leave' Decision-making

Whether people decide to stay or leave in the event of a bushfire clearly has serious implications for their health and safety. In the post-Black Saturday survey of residents living in fire affected areas, Whittaker et al. (2010) asked about the decisions people had made at the beginning of the previous summer and found that approximately one in four respondents were effectively undecided about their most likely course of action in the event of a bushfire threatening their community. Indeed, 17% said they had planned to stay and defend but then leave if threatened by the fire; and a further 9% indicated that they were going to wait and see what the fire was like before deciding on whether to stay or leave. Research is needed to develop a clear understanding of why so many people adopt a "wait and see" approach, and to test how community safety messages (provided in both community education and warning phases) can more effectively persuade people to make sound decisions reflecting the reality of their personal circumstances in the face of bushfire threat, and take decisive survival-enhancing actions.

Research conducted to date suggests that decisions to **leave** were linked to perceptions that the fire was too dangerous to fight (47%), and also to advice from others about threat (particularly from family, relatives, friends and neighbours), and to feelings of responsibility for the safety of other household members—especially dependent family members such as children, and those with disabilities. Decisions to **stay** were reportedly motivated by a desire to protect one's house, property, and/or pets and livestock. The perceived impracticality of leaving on every high fire danger day was also associated with a decision to stay (see Whitaker et al., 2009). Understanding how each of these variables 'fit' in terms of social psychological theories may prove useful for designing community safety messages aimed at increasing the number of people adequately preparing to implement an appropriate course of action.

Summary

Research conducted in the aftermath of Black Saturday suggests serious shortfalls in: (a) the receipt of and effectiveness of community education; (b) levels of planning and preparation by households; (c) the interpretation of warning information; and (d) 'stay and defend or leave' decision making (or lack thereof). With regard to community bushfire education, it appears to be the case that: (i) a significant portion of the population at risk lacks knowledge that is critical for adequate preparation; and (ii) among those who do have (at least some) knowledge about how to prepare for bushfires, that information is not always put to best use. It would therefore be useful to direct research efforts toward an examination of the factors that encourage people to take appropriate actions as recommended in community bushfire safety messages. In terms of planning and preparation, the post-Black Saturday research suggests problems with both the adequacy and timeliness of planning and preparation. Our understanding of the factors involved in bushfire preparedness has been advanced by work conducted by Paton et al. (2008); however, a more comprehensive understanding of these issues would obviously contribute to the development of ways to

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improve the level of planning and preparation actions by members of at-risk communities. The post-Black Saturday research on alertness and warnings suggests that in many cases the implications of warning messages are neither fully understood, nor personalized, nor acted upon. An understanding of how to enhance the likelihood that people will personalise and act upon warnings would be very useful for the development of effective programs to improve bushfire community safety. Finally, the research on 'stay or leave' decision making suggests many people remain undecided about the course of action they are most likely to take in the event of a bushfire threatening their town, suburb, or area. Research that identifies the factors most likely to encourage more people to make firm and realistic decisions (and undertake the preparations to act upon those decisions) would therefore be valuable.

In short, the research conducted in the aftermath of Black Saturday has identified several aspects of human behaviour and decision making that jeopardise community members' safety, and raised questions for community bushfire safety policy makers and practitioners about how best to remedy these shortcomings. Current approaches to community bushfire safety have been developed largely on the pragmatic basis of hard-won learnings from previous bushfire disasters—notably the Hobart fires of 7 February 1967 and the Ash Wednesday fires of 16 February 1983 (Haynes, Tibbits, Coates, Ganewatta, Handmer, & McAneney, 2008).
In light of findings from residents of communities affected by the 7 February 2009 Victorian fires, perhaps there is value in going beyond the pragmatic and considering possible contributions to community bushfire safety from the realm of theory. The social psychological theories discussed in the following section may prove useful for guiding research to answer some of the questions raised about how community bushfire education and safety endeavours can be made more effective.

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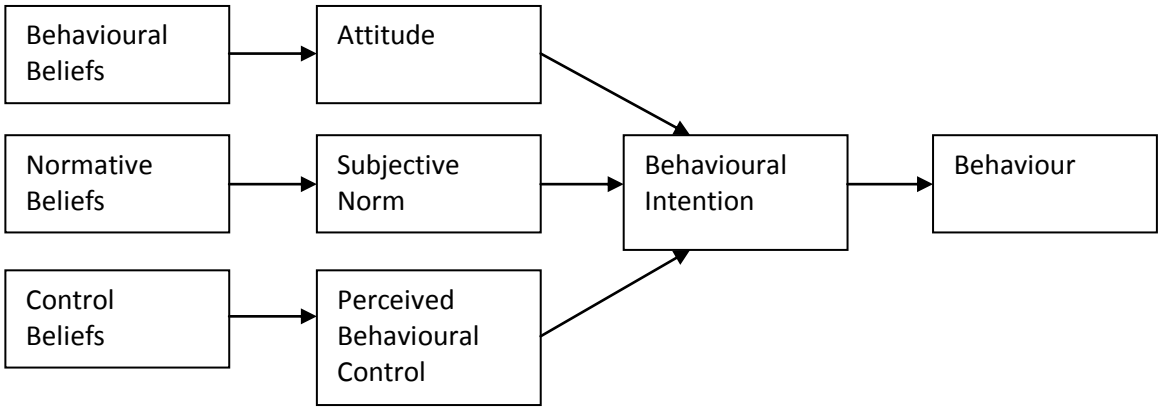
Theoretical approaches to health promotion and injury prevention

In this section we describe several social psychological approaches previously identified as useful in the broad domains of health promotion and injury prevention. These theoretical frameworks are: the Theory of Planned Behaviour; Extended Protection Motivation Theory; the Extended Parallel Processing Model; and the Terror Management Health Model. Attribution theory is also discussed.

Theory of Planned Behaviour (TPB)

In the field of health psychology, the Theory of Planned Behavior (TPB; Azjen, 1991) is considered the dominant model. It builds upon an earlier theory, the Theory of Reasoned Action (TRA; Fishbein & Azjen, 1975), which recognized the important role of intentions in the attitude-behaviour relationship and the influence of social pressures on intentions. The TPB extends upon TRA by including perceived behavioural control in the model. While the older TRA was considered effective for the prediction of relatively simple behaviours, the role of perceived behavioural control was necessary for the prediction of behaviours involving only *limited* control by individuals over outcomes. According to Azjen (1991), "performance of a behavior is a joint function of intentions and perceived behavioural control" (p. 185). Perceived behavioural control predicts both behavioural intentions and actual behaviour. Azjen argues that perceived behavioural control acts as a proxy measure of actual control and also a measure of confidence in one's ability to perform a given behaviour. A diagrammatic representation of the theory is presented below.



According to the TPB, there are three main determinants of behavioural intentions: attitudes, subjective norms and perceived behavioural control. These constructs are in turn determined by a person's salient underlying beliefs.

Behavioural beliefs are conceptualized as the product of outcome beliefs and outcome evaluations. Outcome beliefs concern the perceived likelihood of a given outcome occurring, and outcome evaluations concern the personal desirability of that outcome. A common example of an outcome belief in the health literature is the belief that dieting will lead to

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weight loss. In the context of community bushfire safety, salient outcome beliefs may include the ideas that timely evacuation will ensure safety, and that adequate preparation can prevent property damage.

Normative beliefs are conceptualized as the product of referent beliefs and one's motivation to comply. In the context of community bushfire safety, social pressures to engage in various preparatory behaviours can come from a variety of sources; examples include family members and notional authorities (e.g., fire service personnel, state government agencies and spokespersons). The opinions of sources may be consistent or inconsistent with one another. For example, a love of living in the natural environment may lead some family members to disapprove of clearing trees. Yet the fear of fire may lead other members to approve of this. Even if one believes that both groups of family members approve of clearing combustible materials from around one's home, the motivation to comply or not with the wishes of different family members is likely to vary for many reasons. Indeed, previous research suggests that people can be particularly reluctant to cut trees on their property when others tell them to do so (Cohn, William, & Carroll, 2008).

Control beliefs are conceptualized as the product of the perceived frequency of facilitating or inhibiting factors and their capacity to aid or impede the relevant behaviour. In a bushfire community safety context, perceptions about the financial expense of purchasing firefighting equipment and the time required to install it are examples of control beliefs.

Recent research provides support for the usefulness of the TPB as an explanation for what people do or do not do across a broad range of circumstances, particularly those concerning health-related behaviours. According to one meta-analysis, the theory was shown to account overall for 39% of variance in intentions and 27% in behaviours (Armitage & Conner, 2001). Most studies included in that analysis concerned health-related behaviours such as dieting, exercise, safe sex practices, and smoking cessation. Although the theory has also been applied in injury prevention contexts (Gielen & Sleet, 2003; Trifiletti et al., 2005), its usefulness to understanding injury prevention in the specific context of fire safety is yet to be tested.

The broad applicability of the TPB to research questions in a variety of disciplines has been noted as one of its major strengths (Armitage & Christian, 2003). According to Azjen (1991), application of the theory can provide extremely useful information for understanding a particular behaviour and for implementing effective behavioural change interventions: "Intention, perception of behavioral control, attitude toward the behavior, and subjective norm each reveals a different aspect of the behavior, and each can serve as a point of attack in attempts to change it" (p. 206). The applicability of the theory to injury prevention research (particularly motor vehicle accident research) has also been noted with several researchers in the field using it to guide design of safety campaigns (see Trifiletti et al. 2005). However, several practical and theoretical limitations should be considered.

Critics have found the conceptualization and the predictive power of some constructs to be problematic. The subjective norm component, for example, has been identified as a relatively weak predictor of intentions. There is some evidence to suggest that the poor performance of the subjective norm component in many research studies is attributable, at least in part, to

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issues of measurement: commonplace practice involves using a single-item measure of the construct--see Armitage and Conner (2001).

However, the theory has also been criticized for the relatively narrow conceptualization of the subjective norm construct. The subjective norm component has been conceptualized in terms of the perceived pressure, from important others, to perform (or not perform) the relevant behaviour. That is, the subjective norm component concerns beliefs about what *others* think the individual ought to do. Thus, the theory neglects the importance of beliefs about what others themselves actually *do* (i.e. descriptive norms). Yet, there is evidence to suggest that descriptive norms are moderately correlated with intentions and improve the predictive validity of the theory. Indeed, in their recent meta-analysis, Rivas and Sheeran (2003), found that descriptive norms added a further 5% in explained variance in intention over and above the contribution of attitudes, subjective norms and perceived behavioural control.

How individuals view *themselves*, and not just others, is also important. There is evidence that including identity related variables (such as self-identity and group norms) in the model leads to significant increments in explained variance in intentions, over and above the contribution of the variables originally included in the TPB. Terry, Hogg and White (1999), for example, found that self identity (i.e. beliefs about the extent to which the relevant behaviour reflects an important part of the individuals self concept) significantly predicted behavioural intentions to recycle domestic waste. They also found that group norms significantly predicted intentions (to recycle) among participants for whom membership in the relevant reference group was an important component of the self concept. Group norms and identification have also been shown to improve the prediction of intentions and behaviours in other domains (e.g. Christian, Armitage, & Abrams, 2003). Group norms may also be important in the context of bushfire safety. Certainly, there is anecdotal evidence to support this contention, including how membership of a community fireguard group, or similar, is associated with changed bushfire safety behaviour.

Another aspect of the way people view themselves concerns personal feelings of responsibility to perform certain behaviours (i.e. moral norms). Although Azjen (1991) conceded that moral norms would be relevant in some domains (for example, in the prediction of self-harm behaviours; see O'Conner & Armitage, 2003) these beliefs were not included in the general TPB model. Moral norms may be relevant to bushfire safety activities, particularly among those responsible for others, such as dependent children, pets, and livestock.

To summarise, according to the TPB, intentions (along with perceived behavioural control) are the most immediate determinants of behaviours. Intentions are, in turn, determined by attitudes, subjective norms and perceived behavioural control. However, the theory is also open to the inclusion of other predictors. Indeed, Azjen (1991) stated: "The theory of planned behavior is, in principle, open to the inclusion of additional predictors if it can be shown that they capture a significant proportion of the variance in intention or behavior after the theory's current variables have been taken into account" (p. 199). In some domains, moral norms are important determinants of intentions. Group norms have also been shown to increase the explained variance in intentions, in some domains. Although these predictors were not included in the original formulation of the theory, they fit Azjen's inclusion criteria

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and should therefore be incorporated in community bushfire safety research endeavours guided by the TPB.

Extended Protection Motivation Theory (EPMT)

Bushfires are generally considered to be particularly frightening events. Thus, theories concerned with fear appeals are likely to be relevant and perhaps useful to our understanding of human behaviour in the service of enhancing community bushfire safety. The dominant theoretical perspective in fear appeals research has been Rogers' (1983) Extended Protection Motivation Theory (EPMT). This approach follows Leventhal's (1970) distinction between attempts to control a potential threat (danger control) and attempts aimed at controlling the *emotions* elicited by a threat (fear control), and emphasizes the importance of cognitive processes in response to threats. It combines three components (vulnerability, severity, and response efficacy) from the (older) Health Belief Model[2] (HBM: Becker, 1974; Rosenstock, 1974) and one (self efficacy) from social learning theory (Bandura, 1977). According to the EPMT perspective, adaptive and maladaptive responses to health threat messages are the result of two appraisal processes: *threat* appraisal and *coping* appraisal.

The threat appraisal process involves an evaluation of the threat and rewards of maladaptive responses. The threat evaluation is based on perceived severity and susceptibility information. Perceived severity concerns beliefs about the seriousness of a health threat, while perceived susceptibility concerns beliefs about one's vulnerability to the health threat. In a community bushfire safety context, beliefs about severity include the ideas that people can be seriously or fatally injured in the course of evacuation, defending, or passively sheltering. Examples of susceptibility beliefs include the idea that bushfires could occur where one lives and that one could become trapped if a bushfire were to threaten one's house. Perceived severity and susceptibility are predicted to enhance the probability of engaging in adaptive responses. However, advantages of maladaptive responses enhance the probability of engaging in maladaptive responses. In the case of bushfires, advantages of maladaptive responses (e.g., not installing a pump, or not packing valuables ready for an evacuation) may relate to having more time/money to pursue more pressing concerns or rewarding interests. The likelihood of engaging in maladaptive responses can be described in terms of an equation where severity and susceptibility are subtracted from rewards. The motivation to engage in protective action is affected by fear to the extent that fear heightens perceptions of severity and susceptibility (see the diagram below).

The coping appraisal process involves evaluation of response costs and two efficacy components: response efficacy and self-efficacy. According to Rogers (1983), costs can include any of the following: "inconvenience, expense, unpleasantness, difficulty, complexity, side-effects, disruption to daily life, and overcoming habit strength" (p. 169). Side-effects and overcoming habit strength relate more to health threats like smoking and alcohol consumption but the remaining types of costs are all applicable to community bushfire safety issues. For example, attending community safety meetings can be inconvenient, installing tanks and pumps can be expensive, personalizing warnings can be unpleasant, enlisting the co-operation of others to create family plans or take preparations like removing garden shrubs can be difficult, building (and getting permission to build) a fire

[2] Rogers(1983) outlined six critical differences between the HBM and EPMT, beyond the addition of the efficacy components.

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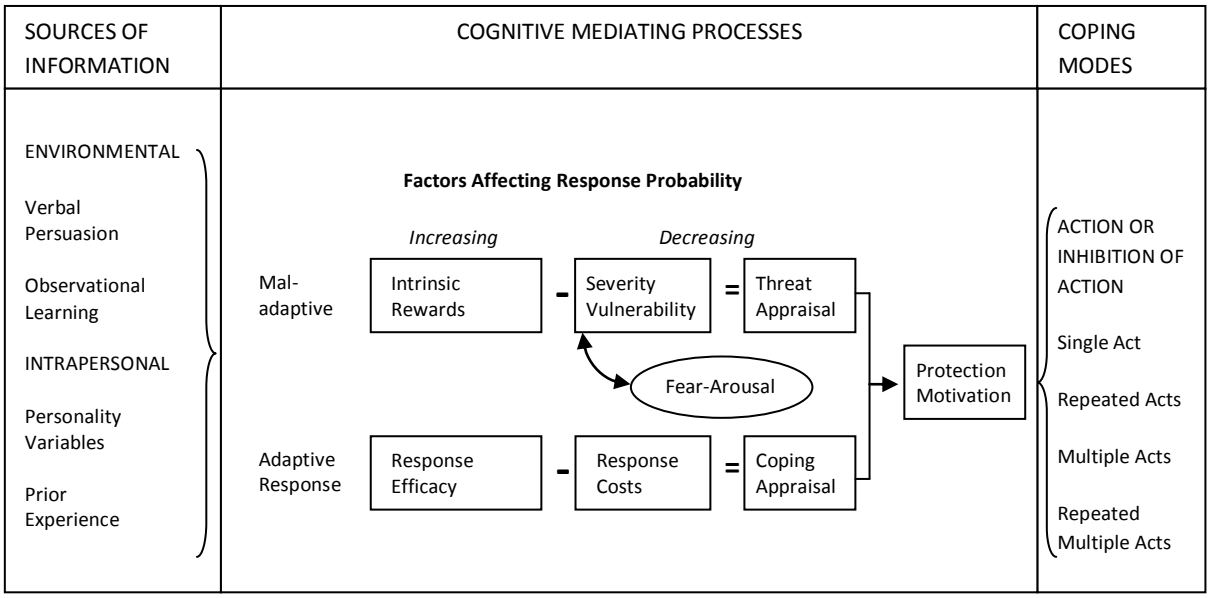
bunker can be complex, and leaving the house/work on all days of extreme fire danger can disrupt daily life. Response efficacy is defined in terms of one's expectations that the recommended behaviour(s) will effectively reduce the threat. Self-efficacy concerns one's belief that one has the ability to successfully perform the recommended actions. In the context of community bushfire safety, examples of response efficacy beliefs include the ideas that evacuation could save one's life or that having a water source and pump will improve the chances of successfully defending one's house. Corresponding examples of self-efficacy beliefs would be that one has the ability to evacuate safely (e.g. "I can leave because there is more than one road out, and I have the necessary transport for the horse") and the belief that one has the skills necessary to operate a pump. According to EPMT, self efficacy and response efficacy improve the likelihood that one will adopt an adaptive (or recommended) behaviour, while the costs of performing the behaviour reduce the likelihood of behaving safely. Thus, the coping appraisal process is denoted as 'efficacy minus costs'.

Like the TPB, the EPMT assumes that behavioural intentions precede actual behaviour. In EPMT, protection motivation is operationalised in terms of these intentions, which are in turn determined by the coping and threat appraisal processes. According to Rogers (1983) the assumptions of EPMT "yield six sufficient conditions that are prerequisite to eliciting protection motivation and coping behaviour: An individual must believe that (1) the threat is severe, (2) he or she is vulnerable, (3) he or she can perform the coping response, (4) the coping response is effective, (5) the rewards associated with the maladaptive response are outweighed by the factors decreasing the probability of making the maladaptive response, and (6) the costs of the adaptive response are outweighed by the factors increasing the probability of making the adaptive response" (p. 171).

To summarize, the protection motivation perspective emphasizes the cognitive processes of appraisal as mediators in the relationship between communication and protective motivation (i.e. intentions) leading to behavioural change. According to EPMT, when both threat appraisal and coping appraisal are high, adaptive behaviours should increase and maladaptive behaviours decrease. A diagrammatic representation of the theory is presented below.



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Reproduced from Rogers, R.W. (1983). Cognitive and physiological processes in fear-based attitude change: A revised theory of protection motivation. In Cacioppo, J. and Petty, R. (Eds.), *Social psychophysiology: A sourcebook* (pp. 153-176). New York: Guilford Press.

Although this model emphasizes cognitive, or thinking, processes of appraisal, it does not assume that the decision maker is necessarily rational, despite the claims of some critics (e.g. Airhihenbuwa & Obregon, 2000). Rogers (1983) stated this explicitly: "This model does not assume that the decision maker is rational" (p.171). He suggested that the appraisal processes could be de-railed by biased judgements and also the persuasiveness of sources of wrong information. Additionally, Rogers stated that if efficacy judgements were low, increasing perceptions of severity and/or vulnerability would lead to either no effect or a "boomerang" effect (i.e. reduced intentions to comply with the recommended action). .

Extended Parallel Process Model (EPPM)

The major contribution of EPMT to fear appeal research has been to identify variables involved in the process of changing attitudes, intentions and ultimately behaviours so as to protect oneself from danger. That is, the protection motivation theory (PMT) perspective has provided useful insights into the process of *danger control*. As Witte (1992) has observed, however, the protection motivation perspective fails to define and explain the processes involved in *fear control* processes, such as denial and defensive avoidance of threat and negative reactance rejecting behaviour change messages. Witte has also pointed out that there are empirical inconsistencies with the predictions derived from the theory and logical flaws in proposed relationships among the variables.

With regard to empirical inconsistencies, Witte (1992) noted that while PMT predicts a decrease in maladaptive responses with increases in perceived threat, several studies have found the opposite. That is, increases in perceived threat have actually led to increases in maladaptive behaviours, when efficacy has been low. With regard to logical flaws, Witte argues that PMT fails to adequately explain how coping and threat appraisals interact to influence protection motivation. Specifically, when coping appraisal is high adaptive behaviours should increase, and when threat appraisal is low there should be no changes to maladaptive behaviours. Using smoking as an illustrative example, however, Witte showed that an increase in threat appraisal is sometimes logically inconsistent with no change to maladaptive behaviour (e.g., continuing to smoke).

In contrast to the protection motivation perspective, the Extended Parallel Process Model (EPPM; Witte, 1992) explains how the threat appraisal and coping appraisal processes interact to influence protection motivation. Witte proposes an *ordered* protection motivation model whereby threat appraisal takes place *prior to* coping appraisal. When threat is perceived to be high, this elicits fear and subsequently motivates an efficacy evaluation. In contrast, if the threat is perceived to be low then there is no motivation to engage in an efficacy evaluation. If perceived threat and efficacy are both high then danger control processes are initiated. When perceived efficacy is low, however, high perceived threat exacerbates fear which subsequently increases defensive motivation and fear control processes are initiated. According to the EPPM, "perceived threat determines the degree or intensity of the reaction to the message, while perceived efficacy determines the nature of the reaction" (p. 338). The EPPM also specifies a critical point where fear control processes are

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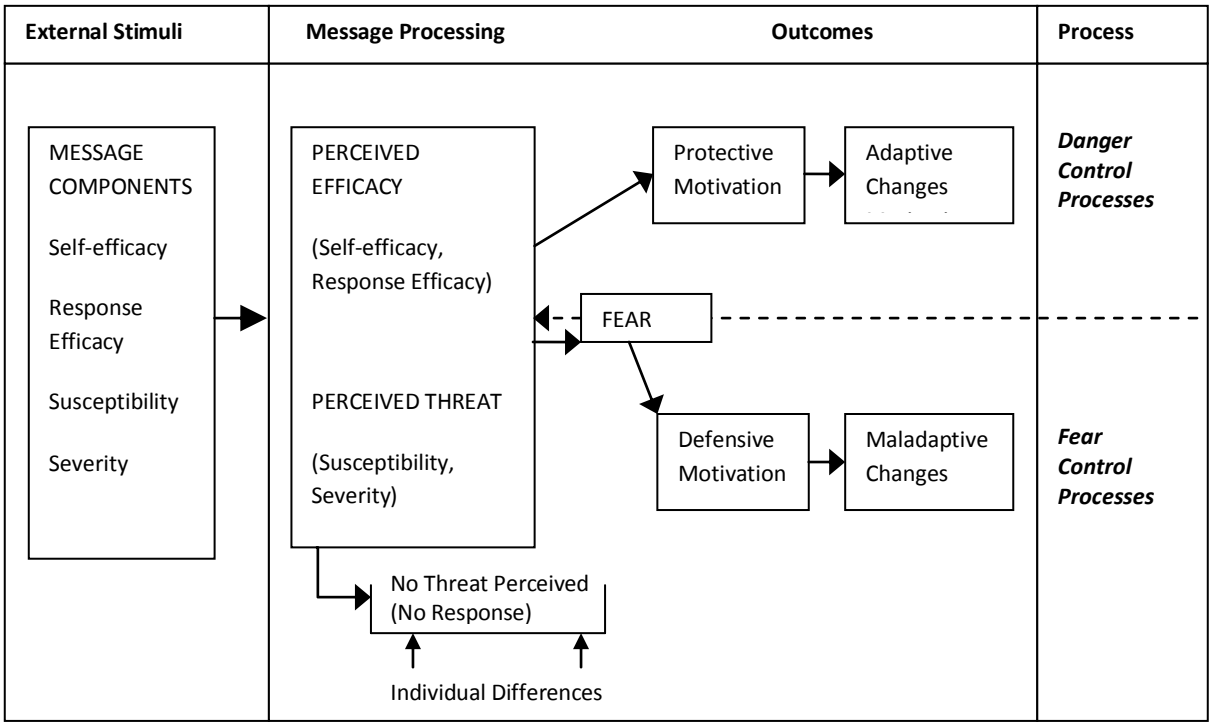
expected to dominate danger control processes. This critical point is hypothesized to occur when perceived threat exceeds perceived efficacy.

In summary, the EPPM "adopts the original PMT's explanation of danger control processes that lead to message acceptance (one side of the parallel process model), and defines and expands fear control processes which lead to message rejection (the other side of the parallel process model)" (Witte, 1992, p. 337). The EPPM states that *fear* is a direct cause of maladaptive responses, and an indirect cause of adaptive responses. A diagrammatic representation of the model is reproduced below.



Reproduced from Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, *59*, 329-349.

The EPPM neatly describes how coping and threat appraisal processes interact and subsequently influence protection motivation and coping behaviours. However, the model says little about the interactions between the variables *within* each of these processes (e.g. 'vulnerability by severity' interactions). Cismaru and Lavack (2007) recently proposed a new weighted additive model that attempts to address this issue. These authors propose that decision makers rank variables according to a personal perception of importance, and set minimum cut-off criteria for each variable. If the *cost* component is considered most important, for example, it is evaluated first. When the cost of adopting the recommended action is perceived to be reasonable (below the cut-off level) the decision maker proceeds with an evaluation of the other variables. Based on meta-analytic examinations (e.g., Milne, Sheeran & Orbell, 2000) of PMT variables and their association with persuasion measures, Cismaru and Lavack assume that the process typically begins with an evaluation of cost, followed by self-efficacy, response-efficacy, vulnerability and then severity. According to these authors, a high level of one variable can compensate for a low level of another variable as long as each variable meets the minimum (maximum for cost) cut-off level. If the cut-off

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level is not passed for one or more variables the weighted additive model is not applicable and interaction effects are predicted. Cismaru and Lavack therefore caution against producing safety messages that include information pertaining to all PMT variables on the assumption that they will add together to produce a more persuasive message. According to their theorising, it may be more effective to focus on the variables considered most important in relation to behaviour aimed at increasing personal safety: typically, ***cost*** and ***self-efficacy***.

Terror Management Health Model

One particularly recent development in the application of social psychological theory to health promotion research has been the Terror Management Health Model (TMHM; Goldenberg & Arndt, 2008). In developing the TMHM, Goldenberg and Arndt (2008) noted that there has been a tendency for psychological health research to focus on two broad categories of motivation: health-oriented motivations and self-oriented motivations. Traditional health models (e.g., TPB, EPMT) typically begin with an assumption that people are motivated to protect their health. On the other hand, research on self-oriented motivations has often pointed out that other motives can interfere with health promotion efforts (for example tanning, excessive dieting, and smoking have all been linked to self-oriented concerns such as appearance and self-esteem). The TMHM integrates both health-oriented and self-oriented motives in a unifying theoretical framework based on Terror Management Theory (TMT; Greenberg, Solomon, & Pyszczynski, 1997).

Terror Management Theory has its roots in evolutionary, existential and psychodynamic theories. It begins with the assumption that, unlike other animals, humans have the necessary cognitive capacity to understand the inevitability of death. Yet, at the same time, humans share with animals a motivation to survive. According to TMT, the awareness of the inevitability of death coupled with an instinctive desire for self preservation creates the potential for debilitating anxiety. However, the theory also posits that people avoid experiencing maladaptive levels of existential anxiety by engaging a variety of defence mechanisms. TMT distinguishes between two categories of defence mechanisms: proximal and distal defences.

Proximal defences are direct, threat-focused attempts to remove thoughts of death from current focal attention. Such defences include efforts to suppress thoughts of death or bias inferential processes to reduce one's subjective vulnerability to death. Proximal defences are engaged when reminders of death are conscious, for example, immediately following a reminder of one's vulnerability to death (such as the sudden death of a friend). Distal defences, on the other hand, occur after a delay or distraction from the conscious reminder of mortality, when the concept of death is activated but non-conscious. That is, non-conscious activation of death thoughts is dealt with via symbolic (distal) defences. These defences are not logically or semantically linked to the concept of death but rather operate at more abstract levels of meaning and value. The two main psychological structures posited to serve a terror management function at the distal level of defence are the cultural worldview (or meaning systems) and self esteem (value).

According to TMT, identification with cultural beliefs and ideologies affords a sense of symbolic immortality because they extend the sense of self through space and time, beyond one's ultimate demise. Self-esteem is conceptualized as a measure of the extent to which one

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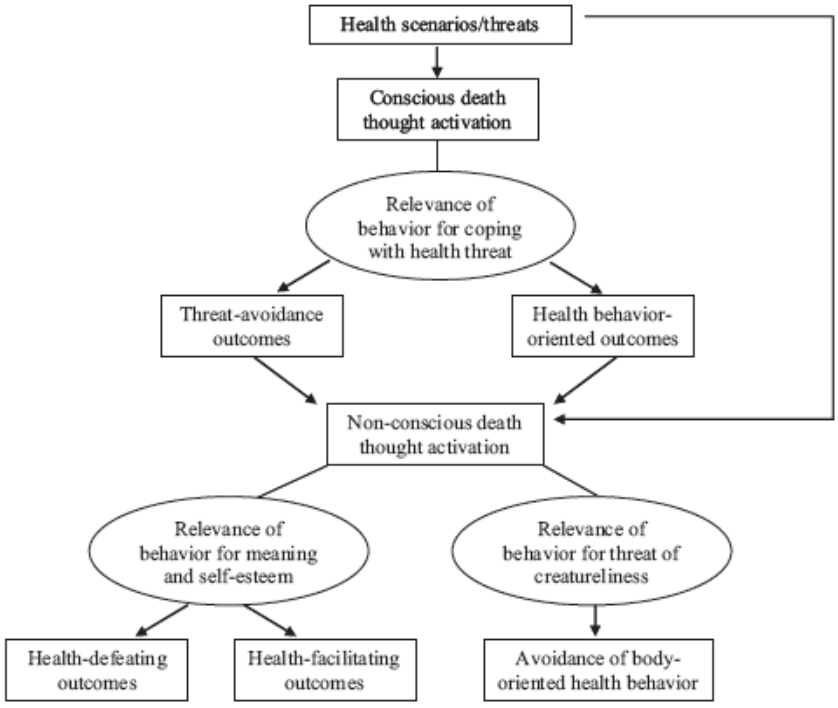
lives up to the standards of value prescribed by the cultural worldview. Thus, to the extent that these standards are met, people are able to view themselves as a valuable or worthy part of something larger than their physical selves. Together, self-esteem and cultural worldviews provide a sense of symbolic immortality. It follows then, that when mortality awareness is activated but non-conscious, people are motivated to defend the integrity of these constructs. TMT proposes that after engaging in distal defences, there should be a reduction in death thought accessibility, and as a consequence, existential anxiety is averted, allowing people to continue with their day to day functions.

Adopting the distinction between proximal and distal levels of defence, the TMHM posits that health-oriented motivations operate at a level of abstraction close to the health threat whereas meaning and value oriented motives operate at a level more distal from the health threat. That is, motivational goals are expected to vary as a function of the consciousness of mortality awareness. Both self-oriented and health-oriented goals can lead to either health-promoting or health-defeating behaviours. The TMHM is summarized in the diagram below.



Reproduced from Goldenberg, J.L., & Arndt, J. (2008). The implications of death for health: A Terror Management Health Model for behavioral health promotion. *Psychological Review*, *115*, 1032-1053.

The TMHM makes three formal propositions (Goldenberg & Arndt, 2008), the first two of which are likely to have most relevance to understanding community bushfire safety.

> Proposition 1: In the context of conscious thoughts of death, threat-avoidance and health-behavior-oriented responses may be engaged to the extent that they facilitate the removal of focal concerns with death by reducing the perceived health-related threat. Health oriented variables (relevant to the association with death) should moderate outcomes, whereas self-oriented variables should not. To the extent that any (i.e. threat-avoidance or health behavior-oriented) response functions to reduce focal concern with death, it should attenuate the need for alternative responses. (p. 1037)

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> Proposition 2: In the context of nonconscious death though activation, health decisions will be informed by the relevance of the health behavior to maintaining meaning and value of the self. Thus, whether the outcome is health facilitating or health defeating should be moderated by the implications of the behavior for the individual's cultural worldview and self-esteem and not by the relevance of the behavior for health. An effective way to facilitate productive health behavior in the face of nonconscious awareness of mortality is thus to adjust the implications of health action for meaning and esteem. (p. 1038)
>
> Proposition 3: In the context of nonconscious death thought activation, the extent to which health behaviors involve the physical body should inform the health outcome. Moreover, the degree to which a physical behavior is construed as creaturely and the degree to which the individuals are sensitive to such concerns should moderate discomfort with, and avoidance of, body-oriented health behavior. (p. 1039).

According to the TMHM the influence of conscious thoughts of death is likely to be strongest in health domains that are death-relevant. Goldenberg and Arndt (2008) give cancer as an example of such a domain, but bushfires and other natural disasters may also be construed as domains where death is particularly relevant. The extent to which thoughts about bushfire elicit conscious thoughts about death is likely to vary across situations, individuals, and time.

Goldenberg and Arndt (2008) state that the first proposition in the TMHM comprises four specific predictions. First, it predicts that "conscious reminders of death should increase engagement of threat-avoidance strategies that attenuate focal awareness of mortality (e.g., suppression of a health threats' association with death, denying vulnerability to health threats)" (p. 1040). In the context of community bushfire safety this means that reminders of mortality can lead people to deny their vulnerability (e.g. "We live in an urban area, so bushfires aren't really likely to impact us" or "well, we might live in the bush, but we are situated in a valley that hasn't experienced a fire in over 100 years – fires just don't affect our area").

Second, the model predicts that "conscious death thought should also increase direct attempts to remove death-related thought from focal awareness by engaging or intending to engage in health behaviours that can reduce perceptions of vulnerability" (p. 1040). Thus, in the bushfire context, reminders of mortality can also lead to health promoting intentions and behaviours (e.g., "I will clear those roof gutters, and that will make me safer" or "in the event of a fire, I'll evacuate and that will make me safer[3]").

Third, the TMHM predicts that health-oriented variables will moderate threat-avoidance and health-behaviour strategies when thoughts about death are conscious[4]. Thus, when thoughts about the potentially fatal consequences of bushfire are within current focal attention, variables identified in traditional health models like PMT should predict people's responses. That is, information about one's susceptibility or vulnerability to bushfire, along with information about response and self efficacy should impact people's decisions. Enhancing perceptions of vulnerability to bushfire may increase perceived threat, and in turn, lead to greater efforts at suppressing thoughts of death (threat-avoidance), or alternatively, to more

[3] Of course, evacuation is not always a safer option. As recent research (e.g. Whittaker et al., 2009; 2010) demonstrates, many evacuations are not performed in a timely manner and the subsequently encountered difficulties (e.g. effects of smoke on visibility, exposure to radiant heat, trees falling etc.) often result in greater risks.

[4] In contrast to the EPPM, which conceptualizes threat-avoidance as a threat-control process and health behaviour as a danger-control process, the TMHM posits that both threat-avoidance and health-behaviour serve the same function – which is to remove thoughts of death from conscious awareness.

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health promoting behaviour (such as packing a 'leaving early' kit – or going online to find a list of items to include in the kit). Enhancing perceived efficacy, on the other hand, should encourage health promoting behaviours rather than threat-avoidance strategies.

Fourth, the model specifies that "to the extent that one (i.e., threat-avoidance or health behavior-oriented) defense is engaged, and conscious death thought is attenuated, TMHM predicts a reduced need for alternative defenses" (p. 1040). The implication of this hypothesis is that the more people engage in threat-avoidance strategies (like assuring themselves that bushfires are unlikely in their area), the less they will be inclined to engage in health behaviours (such as preparing their properties for the event of a fire, or even planning their actions).

Research in the TMT tradition suggests that death thoughts are activated at the conscious level immediately following reminders of mortality. In contrast, death thoughts are activated at a non-conscious level (a) following a delay or distraction from the reminder of death, and (b) immediately following subliminal priming of the concept. Explicit manipulations of mortality salience have typically involved a prompt for participants to contemplate the thoughts and feelings they have with regard to their death and expect to have as they die. Examples of the delay and distraction tasks employed in this line of research include completion of word search tasks or measures of affect, which typically take around five minutes to complete. Applying the TMHM to issues of community bushfire safety raises the question of which bushfire preparatory behaviours (or plans for such behaviours) are likely to be carried out immediately following reminders of mortality. To the extent that much bushfire preparation is likely to occur when thoughts of death are actually outside current focal attention, the impact of health-oriented motivations (that is, the variables identified in other health models like TPB and EPMT) may be questionable.

Thoughts about death may be activated but non-conscious in many situations relevant to community bushfire safety. As Goldenberg and Arndt (2008) have noted, "the initial engagement of proximal defenses may move thoughts of mortality outside of focal attention, setting the stage for the distal defenses specified in Proposition 2" (p. 1043). In the case of bushfire safety, thoughts of death may be activated though non-conscious after people assure themselves that "it won't happen to me". Additionally, it is possible that thoughts about bushfires may activate thoughts of death without them reaching conscious awareness. For example, among some of those who make the decision to "stay and defend" the reported (and conscious) motivation is to protect property and precious belongings or animals, rather than to protect one's own life. Nevertheless, it is likely that the implications of staying for one's own safety are activated at a non-conscious level.

According to TMHM Proposition 2, when the concept of death is activated but non-conscious, health-oriented variables should not influence individuals' responses. This means that attempts to enhance self or response efficacy, for example, should be ineffective when thoughts of death are non-consciously activated. However, self-oriented variables are likely to have an impact on behaviour. Goldenberg and Arndt (2008) state that "'health' decisions made in the context of non-conscious death thought activation are not in the service of health: the health (defeating or facilitating) consequence is an incidental product of the goal to maintain a sense of meaning and value" (p.1043).

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Consistent with the TMHM, research has shown that when mortality salience is followed by a delay, people have a tendency to increase their approval of (as well as intentions to engage in) behaviours from which they derive self-esteem. Examples of behaviours relevant to people's sense of self worth and shown to be affected by non-conscious mortality salience have included risky sex practices, drug and alcohol use, speeding, tanning, dieting, and exercising (see Goldenberg & Arndt, 2008 for a summary). In some instances, the behaviours are clearly health defeating (e.g. tanning increasing the risk of cancer), whereas in others they are health promoting (e.g. exercise reducing the risk of heart disease). Importantly, TMHM research has shown that it is possible to manipulate esteem-contingencies in ways that promote the desired behaviour. For example, priming the idea that "pale is pretty" in conjunction with non-conscious death thought activation has been shown to enhance preferences for high SPF skin lotions.

Prior TMT research has also demonstrated the need to maintain the integrity of cultural worldviews (or meaning systems) when thoughts of death are activated but non-conscious. As Goldenberg and Arndt (2008) noted, defending a particular meaning system can have negative (or positive) repercussions for health. In one study, for example, religious fundamentalism was linked to a higher likelihood of endorsing prayer as a substitute for medical treatment, after a mortality salience reminder, and delaying seekingmedical treatment.

One worldview or ideology likely to have particular relevance to community bushfire safety is environmentalism. The TMHM would predict that among those for whom protection of the natural environment (in a non-interventionist form) is a fundamental part of their worldview, non-conscious activation of death thoughts would lead to greater rejection of some fire safety messages (e.g. vegetation clearing, extensive fuel-reduction burning). However, other belief systems could be harnessed to increase the acceptance of fire safety messages. Framing fire safety messages in esteem-relevant ways should also improve the likelihood that individuals will respond positively when activation of death thoughts is non-conscious. One strategy for making fire safety messages relevant to self-esteem may be to frame bushfire preparation behaviours in an empowering light. Another may be to link a lack of preparation to social exclusion/rejection from a (real or symbolic) valued social group—for example, not behaving like a responsible member of the local community.

To summarize, the TMHM pays explicit attention to the role of death awareness in health decisions. According to this model, the operation of health-oriented versus self-oriented motivations varies as a function of the conscious awareness of death. Specifically, health-oriented motivations are most applicable to health decisions when thoughts of death are conscious whereas self-oriented motivations are most relevant when thoughts of death are activated but non-conscious. This theoretical perspective may be particularly useful for understanding (and improving) the effectiveness of community bushfire safety messages that make death salient (both consciously and non-consciously).

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Attribution Theory

In contrast to the EPMT/EPPM and TMHM perspectives, attribution theory was not developed in a health promotion context. Rather, Weiner's (1985) attributional theory of achievement motivation and emotion was developed in the context of achievement related behaviours. Nevertheless, Weiner maintained that the theory would be applicable wherever an outcome could be construed as attainment or nonattainment of a goal, and as such, the theory has been found useful for understanding some health behaviours (e.g. attempts at quitting smoking). To the extent that community bushfire safety issues can be construed in terms of attainment and non-attainment of goals, the theory could also be useful in this context.

According to Weiner's (1985) attributional theory of achievement motivation and emotion, the cognitive structure underpinning causal explanations influences expectancies and emotions which, in turn, guide behaviour. The cognitive structure of causal explanations can be described in terms of three central dimensions: locus, stability and controllability. Locus refers to perceptions about whether the cause of an outcome is internal or external. An example of an internal cause of failure to achieve a particular task (perhaps clearing the gutters) is lack of effort (e.g. "I didn't do it because I just couldn't be bothered"). Causes external to the individual may be that other people stopped them from completing the task (e.g., "I didn't clean the gutters because my wife stopped me from climbing the ladder") or environmental conditions that prohibited completion of the task (e.g. "it was simply too windy for anybody to get up on the roof"). The stability dimension refers to the extent to which the cause persists over time. Stable causes change little over time, whereas unstable causes are more variable. To continue with the gutter example, the environmental conditions can be considered unstable (e.g. the wind is not always too strong) whereas the attitudes/actions of others may be considered stable (e.g. "that my husband will always stop me from getting on the roof") or unstable (e.g. "My duaghter will only stop me getting on the roof today while she is visiting"). Controllability refers to the extent to which the cause is under volitional control. The wind is a good example of an uncontrollable cause. The actions of others may be considered more controllable (e.g. "My son cannot stop me from getting on the roof if I really want to").

According to Weiner (1985), perceptions about the locus, stability and controllability of a cause relate to specific emotions. Pride is related to positive outcomes that are attributed to internal causes. Anger is likely when negative and self-relevant events are attributed to factors that others could have controlled. On the other hand, guilt occurs when one's own negative behaviour is attributed to internal and controllable factors. Whereas anger is directed outward, guilt is directed inward. Shame is related to internal and uncontrollable causes. Controllability is also relevant to pity, which is likely when others experience negative events that are attributed to uncontrollable causes. Helplessness is more likely when negative outcomes are attributed to stable causes. Finally, gratitude is more likely when the actions of others are controllable and intended to benefit the recipient. Importantly, the theory suggests that these emotions can motivate different types of behaviour. Whereas guilt has been shown to encourage 'approach' behaviours, 'shame' is related to avoidance behaviours.

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Attribution theory has obvious implications for post-fire perceptions of blame and responsibility. In terms of maintaining a sense of self-esteem following the experience of a negative event, it makes sense to attribute the negative outcomes to external causes. Consistent with this reasoning, one reasonably robust finding in the attribution literature is that people have a tendency to attribute negative outcomes more to external causes than to internal causes, and positive outcomes more to internal causes. Following previous attribution research one would expect to find that people who have experienced negative outcomes (such as injury, death of loved ones, or property loss) will attribute greater responsibility for these losses to external sources (i.e., blame others such as national park authorities). Consistent with this tendency, Whittaker et al (2010) recently found in a survey of residents living in fire affected areas that a higher percentage of respondents whose homes were destroyed or had sustained major damage (compared with those whose homes sustained only minor or no damage) thought that agencies' firefighting and fuel reduction efforts influenced how the fire impacted their home or property. Research conducted in the US reveals a similar pattern with stronger blaming behaviour evinced in areas sustaining most wildfire damage (Cohn et al., 2008).

However, attribution theory may also be usefully applied to our understanding of pre-fire risk perceptions and preparations (an observation shared by Cohn et al., 2008 and Kumagai, Bliss, Daniels, & Carroll, 2004). Kumagai et al. (2004) state that "misunderstanding the causes of wildfire damage puts property owners in fire prone areas at risk" (p. 114). A belief that damage to homes is caused by environmental factors beyond one's control (e.g. hot, dry, and windy conditions that influence the intensity of fire) rather than factors that can be controlled (e.g. roofing materials and overhanging trees) may be linked to attitudes that preventive measures are useless.

Attributions about the causes of one's own behaviours, and not just the cause of damage, may also be important for our understanding of bushfire preparation. If people are encouraged to contemplate the causes of their failure to adequately prepare for fire, internal and controllable attributions may lead to feelings of guilt, which in turn is likely to motivate preparatory actions in future. From the perspective of Weiner's (1985) attribution theory, encouraging people to attribute past failures to engage in community education opportunities, bushfire planning, and preparation activities to internal and controllable, but not stable, causes may be one way to increase the likelihood of engaging in community bushfire safety promoting behaviours in the future.

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Potential utility of theoretical approaches to community bushfire safety issues

The social psychologist Kurt Lewin once stated that "nothing is so practical as a good theory" (Lewin, 1951, p.169). This is because good theories advance knowledge in a scientific discipline and guide research to answer crucial questions, which in turn can help practitioners develop better interventions (e.g. Gielen & Sleet, 2003; Rothman, 2004; van de Ven, 1989). Each of the theoretical approaches described above can be applied to one or more community bushfire safety issues, generating fruitful avenues for future research. Such theoretically guided research should help to better explain, predict, and ultimately change peoples' bushfire safety behaviours. In this section of the paper we provide some illustrative examples of the types of questions suggested by the application of the theoretical perspectives to various aspects of community bushfire safety.

For the sake of brevity, the examples of questions will generally be confined to one or two of the community safety issues discussed previously (education, preparation, alertness and warnings, decision-making). To illustrate, the discussion of questions generated by the application of the EPMT focuses mainly on the issue of community education. However, this treatment is by no means meant to imply that the theory cannot generate equally important questions in other domains of community bushfire safety. Nor do we imply that every theory is always relevant to every community bushfire safety issue.

Theory of Planned Behaviour-TPB
From the TPB perspective, attitudes, subjective norms and perceived behavioural control are important determinants of intentions, which in turn predict behaviours. In the context of enhancing levels of alertness to safety warnings from official sources, for example, the theory points to the potential influence of attitudes toward engaging in alertness behaviours, subjective norms concerning these behaviours, and perceived behavioural control.

Questions raised by thinking about the attitudes concept include: What are people's attitudes toward checking official channels (e.g., radio, internet web sites) for bushfire updates?; Do people believe these sources will provide information relevant to their location?; Do people believe these sources will provide information that is up-to-date?

Questions concerning perceived behavioural control might include: Do members of a community believe they will be able to locate the information relevant to their situation on official websites? Do members of a community believe they will have difficulty accessing information from websites if/when there are large volumes of traffic (to specific sites, or using particular internet search engines)? According to Azjen (1991), perceived behavioural control should approximate actual behavioural control. Issues of awareness, availability and accessibility are likely to impact on behavioural control. To follow the alertness and warnings line of enquiry, relevant questions include: Are people aware of the sources from which official warnings will emanate, and from which officials warnings will not be delivered? When are people available to hear warnings from these sources? Do community members have the necessary means to hear the warnings (e.g. adequate radio reception)? Similar questions can be posed in other areas of community bushfire safety. For example, in terms of community education questions about behavioural control in attending community meetings

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include: Do people know when and where meetings are conducted?; Are they available to attend?; Do they have the means necessary to attend (e.g. transport)?

Questions relevant to the subjective norm component include: Do important others exert social pressure to engage in 'alertness' behaviours, and does this pressure affect intentions to engage in those behaviours? For example, are people more likely to tune their radio to the designated emergency services frequency, keep their mobile phone close by, and periodically scan the outdoor environment, etc, if they believe friends or family would strongly disapprove of failure to do so?

Although not originally included in the TPB, other types of norms shown to improve the predictive power of the theory (in certain domains), also point to important questions for community bushfire safety research. In the case of group norms, for example, does defining oneself in terms of membership in a group (of the type of people who regularly check the status of warnings from official sources) lead to greater intentions to engage in such behaviours, and subsequently increase the likelihood of receiving warnings from these sources? If so, how can such group memberships be made salient, or the relevant types of behaviours linked to perceptions of existing and relatively salient other group memberships? Moral norms might also prove useful for understanding community safety behaviours, especially in relation to responsibility for the well-being of 'others'—dependent family members, pets, neighbours. To what extent do people feel a personal responsibility to engage in alertness behaviours or attend to warning and education messages, to make firm plans, to prepare for timely evacuation or defence?

Fear Appeals: Extended Protection Motivation Theory (EPMT) and Extended Parallel Process Model (EPPM).

Both EPMT and EPPM involve fear appeals. One example of how the theoretical approaches described above could prove useful for guiding future research concerns the application of EPMT to the issue of community education (or at least to the content aspect of this issue). Traditionally, it has been assumed that increasing people's awareness of a risk and how to manage that risk should lead people to adopt the measures prescribed in the risk message. One aspect of risk attended to in recent education efforts concerns *severity*. For example, the CFA *FireReady* campaign has included information about the current fire danger rating system, outlining the likely consequences of fire on dangerous days. Thus, this community education effort incorporates one component of the threat appraisal process identified in EPMT. This campaign has also included some information on the recommended actions given the level of risk on a particular day. For example, it is advised that people leave early where the impact of fire is classified as catastrophic. Insofar as people interpret the recommendation to mean that attempts to defend would be futile and probably fatal, the material may influence perceptions of *response efficacy*[5] (at least at that level of risk).

Applying EPMT to the issue of crafting effective community education campaigns raises questions about whether messages incorporating/addressing *all* the factors identified in EPMT would improve their persuasiveness, and lead to increases in the level of planning and preparation. For example, will education efforts that increase perceptions of *vulnerability*

[5] To the extent that concepts like 'education' and 'preparation' involve a rather diverse sets of behaviours, it may be more difficult to apply this construct to the study of community bushfire safety than other health issues (e.g. smoking, where measurement of response efficacy is relatively easy because it concerns a specific outcome, quitting).

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lead to greater uptake of the recommended actions? Are messages that elevate *self-efficacy* more effective than those that do not address self-efficacy beliefs?, and can education about ways to reduce the *response costs* improve compliance?

Applying the EPPM to this area suggests further questions. Would efforts to heighten self-efficacy beliefs have any effect on intentions to engage in more preparatory behaviours in the absence of information about vulnerability to bushfires, and/or their likely severity? Might efforts to raise perceived vulnerability without also elevating efficacy beliefs be problematic? According to the EPPM, threat appraisal takes place prior to coping appraisal and if threat is high but efficacy is low, threat-control (fear-related) processes will be initiated rather than danger-control processes. The model proposed by Cismaru and Lavack (2007) suggests other questions. For example, would community education efforts that focus on addressing the perceived costs of adopting recommend actions be more effective than efforts taking shot-gun approaches (attempting to include information about all EPMT components)? These models clearly point to the need to investigate what combination of EPMT components (and the order of delivery) will be most effective for improving responses to community education efforts.

Terror Management Health Model

The TMHM generates research questions that could also be useful for understanding and improving community bushfire safety behaviours, by considering the effects of death thought activation. The TMHM suggests that the factors identified in traditional health models (such as EPMT and TPB) affect the likelihood that the people will engage in the recommended preparations when thoughts of death are in current focal attention, because health-oriented goals are operative in this (proximal) phase of defence. When thoughts of death are activated but non-conscious, on the other hand, self-oriented goals should influence the extent to which people adopt the recommended actions. This leads to the prediction that, when thoughts of death are activated but non-conscious, the recommended actions should be more readily adopted to the extent that they are tied to cognitive systems of meaning and value. Thus applying the TMHM to the issues of community education and preparations, for example, leads to the following questions: To what extent do community education messages and warnings make the concept of death salient? What factors affect the duration of death thought accessibility? Are thoughts of death likely to be activated but non-conscious when people are in a position to engage in preparatory behaviours? To what extent are thoughts of death activated by preparations that can be made when the threat of fire is relatively remote compared with when it is imminent? How can messages be framed in ways that link preparatory behaviours to meaning systems (e.g. the Australian "way of life") and/or a sense of self-worth? What types of meaning systems are relevant to various preparations (e.g. environmentalist views and vegetation-clearing or burning-off)? What types of self-worth contingencies (e.g., intelligence, attractiveness) can be linked to bushfire preparations?

Attribution Theory

According to Weiner's (1985) theory, the cognitive structure underlying causal explanations has implications for emotions which in turn influence motivation. For example, when failures are attributed to internal and controllable causes this can lead to feelings of guilt which may in turn encourage approach rather than avoidance behaviours. In the context of community bushfire safety, the theory leads to questions such as: To what types of causes do people attribute their failures to (a) take advantage of community education opportunities, (b)

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engage in preparatory behaviours, and (c) make firm decisions? Can people be encouraged to attribute these failures to internal and controllable causes? Can people be persuaded that such failings are not due to external, uncontrollable and/or stable causes? Would these types of measures produce feelings of guilt? Would that guilt translate into greater engagement in education, preparation and firm decision making?

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Conclusion (and cautions)

Each of the theoretical approaches to health behaviour described in this paper can potentially be applied to one or more community bushfire safety issues to guide research to inform the development of effective interventions which change peoples' behaviours. That is, the application of these theories to guide research questions and the ensuing results of such investigations may prove useful for creating measures and programs to improve: (a) the uptake of community education opportunities and messages; (b) the adequacy of preparatory actions; (c) alertness and responsiveness to warnings; and (d) decision making. However, it should be noted that no single theory or model described here (or even a combination of them) is likely to be able to explain or predict all the issues. One reason for this concerns the extent to which the theories deal with the fluctuating levels of risk which bushfires pose (during the course of a single year, and across years—and even decades!). The psychological processes involved in the execution of behaviours relevant to bushfire safety when the chance of a bushfire impacting is relatively remote are likely to differ from those operating when the threat is considered imminent. For example, the role of affect (or emotions) in these processes may vary with proximity (both temporal and spatial) to the impact of a bushfire. Although some of the theoretical approaches described above acknowledge that emotions are likely to play a role (albeit indirect) in determining behaviour, none clearly specifies when emotions will influence behaviour directly[6]. Evidence given to the Bushfires Royal Commission suggests that: (a) some of the 173 deaths from the Black Saturday fires need not have occurred if people had made more realistic appraisals of the threat posed by imminent bushfire attack; and (b) stress and anxiety may have impaired judgement and decision making by some of the deceased (Handmer, O'Neil, & Killalea, 2010).

Another limitation concerns the level of analysis and the target of the intervention. The social psychological theories and models traditionally applied to health promotion research emphasize the **intra**personal and **inter**personal levels of analysis. At the intrapersonal level, they focus on an individual's knowledge, attitudes and beliefs. At the interpersonal level, the influence of significant others such as friends, family and neighbours are considered. Yet, an understanding of neighbourhood-level and community-level processes is also necessary if a more comprehensive understanding of community bushfire safety issues is to be developed.

Another relevant issue has less to do with the theories considered in this discussion paper, and rather more to do with the state of knowledge about what precisely constitutes effective "community bushfire safety". The theories discussed have been found to have most utility when the to-be-predicted health promoting behaviours are well-specified, and perceived to be appropriate, and in principle achievable : cease smoking; use a condom; make an appointment for a pap smear; wear a bicycle helmet, use SP30+ sunscreen. In many community bushfire safety messages the intended behaviours have not been well specified, and thus were not necessarily evidently appropriate and achievable: 'activate your fire plan'; 'prepare your property'; 'leave early'. It may well prove to be the case that genuine advances in community bushfire safety require substantial research efforts to establish a set of well-

[6] Note that Rogers (1983) did,however, state that "threats requiring immediate action are facilitated by physiological activity" (p.166) and that EPMT relates to responses that can be made repeatedly over an extended period of time.

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specified, effective, bushfire safety-enhancing behaviours to be suitable targets for persuasive, behaviour-changing community bushfire safety education programs.

Notwithstanding, we propose that the theories described in this paper can provide useful insights into the psychology of community bushfire safety.

We conclude by repeating the questions presented in the introduction to the discussion paper:

1. **Do any of the theories have noteworthy relevance to current approaches to community bushfire safety?—policies, planning, procedures, practices?**
2. **Are the theories broadly supportive of current agency approaches to community bushfire safety?**
3. **Do any of the theories suggest that aspects of current approaches to community bushfire safety might be faulty?**
4. **Do any of the theories suggest that there may be shortcomings or inadequacies in aspects of current approaches to community bushfire safety?**
5. **Do any of the theories suggest gaps in community bushfire safety knowledge which need to be addressed by targeted research?**
6. **Which of the theories (or combination of the theories), if any, is the most useful for agencies to explore in addressing community bushfire safety?**

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