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Constantly chasing dogs: assessing landholder stress from wild dog attacks on livestock using quantitative and qualitative methods

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ABSTRACT

This study investigated landholder psychological stress associated with wild dog attacks on farm livestock in Australia. Levels of psychological intrusion, avoidance and hyperarousal were assessed using quantitative and qualitative methods.

Qualitative data were acquired using in-depth semi-structured interviews and focus groups. The internationally validated 'Impacts of Events Scale – Revised' (IES-R), which includes components of intrusiveness, avoidance and hyperarousal, was used to quantify the impact of the wild dog attacks on livestock and allow a comparison with other trauma studies. Qualitative data supported the IES-R results and provided depth to understanding the IES-R components. Intrusiveness was the most significant of the three components and was indicated by persistent thoughts of the dog attack issue, lack of sleep, anger and frustration, impacts on relationships at a personal, business and community level and time involved in dealing with the issue. This study lends weight to the validity of using the IES-R scale to assess the impact of traumatic events on landholders and the utility of the mixed methods approach for reinforcing and extending the knowledge base regarding their experience. Findings can aid decision-makers in integrating the well-being of landholders, families and communities into wild dog management policy and programs.

KEYWORDS

Wild dogs; psychological stress; Impact of Events Scale; farmers; landholders; mixed methods; traumatic events; pest management

Introduction

Overview

Wild dogs, including dingoes (*Canis lupus dingo*), feral domestic dogs (*Canis lupus familiaris*) and hybrids of the two, impose a range of detrimental impacts on agricultural enterprises and their associated communities. Wild dogs occur in all states and territories with the exception of Tasmania (Figure 1). Significant social, economic and environmental impacts are experienced by sheep producers and, less so, cattle producers (Wicks et al. 2014). The scale of the problem has been described based on economic impact with the impact to the Australian economy due to wild dogs estimated in 2011 at AUD78.8 million (Chudleigh et al. 2011).

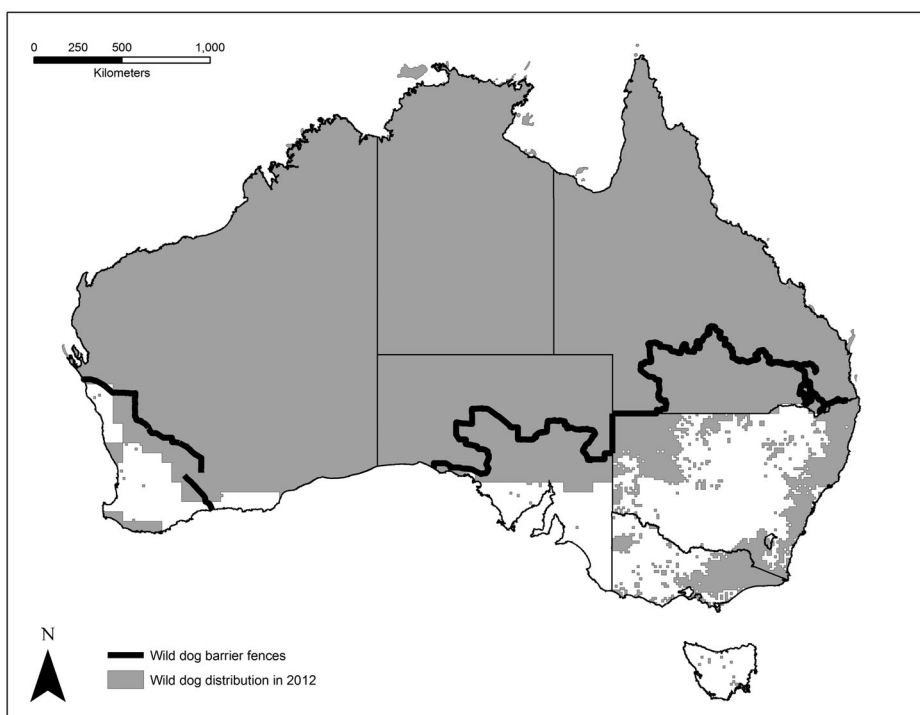


Figure 1. Distribution and abundance of wild dogs in Australia. Source: Allen and West (2013).

Gong et al. (2009) estimated Australian federal, state and territory government and landholders' expenditure on vertebrate pest (including wild dogs) research, administration and management (2007–2008) at AUD122.7 million, making wild dogs one of the most significant pest animal problems affecting Australian agriculture.

Psycho-social dimensions of wild dog management

Socio-economic circumstances and psychological distress are known to be linked in farming communities (Alston 2012). Ecker et al. (2015) found that farmer estimates of the degree of economic impact and social impacts of wild dogs were highly correlated. Social impacts of wild dog attacks on stock include financial stress, loss of community cohesion through loss of farming families from the area affected, a sense of disempowerment and psychological distress (Fitzgerald et al. 2007; Fitzgerald & Wilkinson 2009; Lightfoot 2010; Russell 2006; Thompson et al. 2013). Lightfoot (2010) observes that social impacts of wild dogs are complex and difficult to quantify, suggesting three main categories; personal health and safety issues; flow-on effects to community wide economic impacts and concern over livestock welfare.

Wild dog attacks as critical incidents

While these studies recognise socio-psychological impacts arising from wild dog predation on livestock, no attempts have been made to quantify the level of traumatic impact nor

detail the qualities of the psychological response of landholders who are experiencing wild dog attacks. The current study adopted a critical 'incident' theoretical framework to address gaps in knowledge regarding the psychological impact on landholders experiencing wild dog attacks or their aftermath on livestock. We recognise that critical incidents can lead to 'collective' or 'cultural' trauma as well, where damage is done to the social bonds, relationships and shared identities that bind people together (Erikson 1995; Krieg 2009). However, for this study the focus is on individual trauma.

Critical incidents have been defined as unexpected, unpredictable and alarming experiences that are outside the day-to-day experience of individuals (van der Kolk 1991). Traditionally, these events include earthquakes, fires or motor vehicle accidents associated with destruction of property and loss of life. Notably, the non-physical impact of events on humans became most evident during and following the first and second world wars – commonly termed 'shell shock'. The psychological consequences for individuals of such stresses are well documented and studied in terms of post-traumatic stress disorder (PTSD) along with such things as depression and anxiety as maladaptive side effects following such events (Bryant et al. 2014). Critical events involving child sexual abuse, suicide, deaths and injury threats have been recognised for many years, as has their impact on individuals and whole communities (Poland 1993). Direct personal events causing individual psychological distress such as bereavement (Butler et al. 2005; Siegel et al. 2008), threat of contracting epidemic disease (Cheng-Sheng et al. 2005) and impacts of life-threatening conditions (Baumert et al. 2004) have been described using the critical event framework. There are important long-term implications from such events with the Disasters Working Party (Home Office 1991) estimating that after a trauma: 40–70 per cent of people experience distress in the first months; 24–40 per cent experience distress after the first year; and 15–20 per cent experience chronic levels of anxiety, which remain high for longer than two years.

The framework has also been used to examine traumatic stress resulting from natural resource-related events. This includes assessing the stress impacts of natural disasters (e.g. Johnsen et al. 1997, cited in Joseph 2000) and disasters at sea (e.g. Dalgleish et al. 1996, cited in Joseph 2000). Bryant et al. (2014) have shown that 16 per cent of people in communities closely linked to the Victorian 'Black Saturday' bushfires reported probable post-traumatic stress three years after the event. These bushfires (in 2009) were one of Australia's worst natural disasters resulting in over 170 deaths (Bryant et al. 2014). While employing a somewhat different theoretical approach (i.e. expanding on the application of the Edinburgh Farmer Stress Inventory), Morgan et al. (2014) undertook the first study to investigate whether coal seam gas-specific stressors explain unique variance in farmers' mental health after controlling for other traditional farm stressors. They found that stress associated with coal seam gas extraction to be a unique predictor of depression. These studies lend credibility to the suggestion that events involving wild dogs may also be considered as critical incidents.

This applicability is supported by a recent survey of landholders in wild dog-affected locations in Australia (Wicks et al. 2014). The findings highlighted that 35 per cent of landholders said that wild dog attacks left them feeling angry, 21 per cent reported feelings of distress and anxiety and almost 20 per cent said they had either left the industry or changed their livestock composition as a result of wild dog predation. Survey results also suggested that the problem had become a major burden to the landholders and

often left them exhausted (Wicks et al. 2014). As anger, anxiety and stress are associated side effects of critical events, it was thought opportune to examine in detail the psychological effects of the impact of wild dog attacks on farm animals for the landholder.

The present study

This study sought to quantify the psychological impact and examine in depth the qualities of the experience for affected landholders. Following interviews and focus group discussions, the event impact was quantified using the revised Impact of Events Scale (IES-R; Weiss & Marmar 1997). Use of this widely applied and psychometrically sound (Creamer et al. 2003) instrument was allowed a benchmarking comparison of landholders affected by wild dog attacks with individuals experiencing other types of traumatic events.

To better understand the event impact on landholders, this mixed methods study also employed a deductive qualitative approach. Qualitative data were analysed through a lens framed by the intrusion, avoidance and hyperarousal subscale structure of the IES-R measure. The study had two aims:

- (1) to quantify the level of event impact on landholders who experienced a wild dog attack (or aftermath) and compare this to other events; and
- (2) to qualitatively examine the landholders psychological experience of wild dog attack (or aftermath) in terms of their experience of event intrusion, avoidance and hyperarousal.

Methods

Study overview

The study design explored the permeability of the quantitative–qualitative boundary (Madill & Gough 2008) in employing a deductive exploratory approach to describe experience and social meanings (Finlay 2011). The exploration of landholders' experiences included interviews and focus groups. Participants then completed a quantitative survey (IES-R; Weiss & Marmar 1997) following the interview or focus group. Methodological pluralism or paradigm complementarity (Madill & Gough 2008) is used in this study to highlight 'points of contact between the two methods' (Madill & Gough 2008, p. 62) with the aim to use results from one method to clarify and elaborate the results from the other (Greene et al. 1989, cited in Madill & Gough 2008).

Participants

Landholders came from three study areas across Australia: western Queensland, covering the Shires of Paroo, Murweh and Blackall-Tambo; eastern Victoria, covering North-east Victoria and East Gippsland; and northern South Australia, covering the Northern Flinders Ranges area. Criteria for these areas being selected included that all case study areas are inhabited by wild dogs and that in these areas wild dogs are known to affect the people living in the surrounding communities, the state of ecosystems and the profitability of live-stock enterprises (Allen and West 2013). Each area represents different types of livestock

production systems; predominantly sheep enterprises but some with both cattle and sheep. Details of qualitative and quantitative data collection are outlined in [Table 1](#).

A combination of interviews (inclusive of 33 participants) and focus groups (inclusive of 16 participants) were held across the three case study regions. The choice of interview or focus group was made in response to individuals' availability, with interviews being the easiest and most popular option due to distance and time constraints. Seven interviews were telephone and the remainder face-to face. Thirty-nine of the participants completed the IES-R questionnaire. In completing the IES-R, participants provided notes on the frequency of the wild dog attack on livestock events and were asked to fill in the survey based on their memory of a time when the attacks were causing them to experience stress. Prior to starting the interview or focus group, information sheets on the project were provided and consent forms signed by participants.

Interviews and focus groups

The interviews and focus groups were semi-structured. Key questions relevant to the stress impact part of the study included enquiring about: the main characteristics of the wild dog attack event(s); the impacts of the wild dog attack event(s) and what support would assist with the impacts of the wild dog attack event(s). The interviews lasted from 40 to 90 minutes and focus groups from two to three hours and concluded with completion of the IES-R survey. Interviews and focus groups were digitally recorded, transcribed and thematically coded using NVivo8. Analysis drew on Layder's (1993, 1998) adaptive theory which provides a basis for combination of deductive and inductive procedures. First, inductive coding was used to determine key themes related to social impact emerging from focus group and interview data (reported in Wicks et al. 2014). Second, deductive coding based on a priori codes taken from IES-R terms: intrusion, avoidance and hyper-arousal and also subscale item terms was conducted using principles outlined in Bazeley (2013), as well. Coding identified participant comments which reflected similar sentiments to the IES-R statements. As described by Fereday and Muir-Cochrane (2006, p. 3), 'over-arching themes are supported by excerpts from the raw data to ensure that data interpretation remains directly linked to the words of the participants'.

Impacts of Event Scale Survey – Revised

The IES-R (Weiss & Marmar 1997) was developed to add the third symptom cluster of hyperarousal as part of the diagnostic criteria for PTSD and is a modified version of the original IES (Horowitz et al. 1979). Creamer et al. (2003, p. 1489) highlight the scale as '... probably the most widely used self-report measure in the field of traumatic stress'. The instrument has been translated into multiple languages (e.g. Chinese,

Table 1. Data collection method by study area.

Study area	Data collection method		
	Focus groups (n = 16)	Interviews (n = 33)	IES-R survey (n = 39)
Western Queensland	2 groups – 11 participants	13	20
Eastern Victoria	No focus groups	15	14
Northern South Australia	1 group – 5 participants	5	5

German, Japanese and Spanish) and has been used as a measure of traumatic stress in Australia (Creamer et al. 2003).

In the 22-item IES-R scale, intrusive thoughts are measured using statements including ‘Any reminder brought back feelings about it’, and ‘I had dreams about it’. Avoidance was captured by statements including ‘I stayed away from reminders about it’, and ‘I tried not to talk about it’, and hyperarousal included statements such as ‘I felt irritable and angry’, and ‘I was jumpy and easily startled’. Participants responded to a five-point 0 to 4 scale, where 0 equates to not at all to 4 extreme impact. The reliability and validity of the scale is generally well regarded (Creamer et al. 2003). Instructions in this study asked participants to score a critical incident that could include witnessing a dog attack, being threatened with attack themselves, or witnessing the aftermath of an attack on livestock. Participants completed the IES-R survey after the interviews and focus groups to avoid prompting qualitative discussion according to the subscale structure. While the potential priming effect of having discussions on the topic before completing the survey is acknowledged, this approach was taken in an effort to open participants up to thinking more deeply about the issue before undertaking the IES-R survey. It is understood that encouraging people to consider specific details of the event before recalling emotions about the event is considered to improve recollection reliability (Kahneman et al. 2004).

Results

Quantitative results

The amount of time that participants had been dealing with wild dog predation on livestock ranged from 5 to 40 years. The majority of respondents said it had been part of their management for 10 years or more (81 per cent), with 30 per cent reporting 20 years or more, and 7 per cent reporting 40 years or more.

Impact of Events Scale

Table 2 outlines the statistics for IES-R total and subscale scores for the three landholder regions. Due to the smaller sample sizes, further group comparisons (e.g. ANOVA) were not undertaken.

The total and subscales were found to be reliable with Cronbach alphas of .88 (total), .77 (intrusion), .83 (avoidance) and .71 (hyperarousal). Intrusion had the highest mean score of the three components of the IES-R, followed by hyperarousal and then avoidance.

Table 2. IES-R scores for the current sample.

Sample	IES total Mean (SD)	Intrusion Mean (SD)	Avoidance Mean (SD)	Hyperarousal Mean (SD)
Victoria ($n = 14$)	2.13 (0.75)	2.55 (0.77)	1.75 (0.94)	2.06 (0.99)
Queensland ($n = 20$)	1.65 (0.59)	2.11 (0.66)	1.22 (0.81)	1.59 (1.05)
South Australia ($n = 5$)	2.03 (0.54)	2.58 (0.65)	1.23 (0.76)	2.37 (0.93)
Total ($n = 39$)	1.87 (0.67)	2.33 (0.72)	1.41 (0.87)	1.86 (0.98)

Note: The IES-R is described under section ‘Methods’.

Qualitative results

Participants made references to being overwhelmed, experiencing depression and struggling with personal relationships in relation to wild dog predation. Landholders commented on the severity of impacts in comparison to other issues they face such as drought, floods and cyclones: 'we would have lost more animals from wild dog attacks in our enterprise than what we ever did in a drought'. The personal stresses of seeing businesses fail as a result of wild dog attacks was a major theme '... wild dogs will destroy you in a very short time period'. Participants described the cycle where dog numbers increase, more people leave the industry, which in turn decreases the amount of effort put into managing wild dogs '... and the dog problem got worse, and then more people go out of the sheep industry and over the last 20 years ... there's been a big follow on effect'.

Impacts described by participants in reference to the specific components of the IES-R: intrusion, avoidance and hyperarousal, based on coding of the raw data for these items are detailed in [Table 3](#).

Discussion

Although a critical event approach framed this research, it is not straightforward to compare the impact of wild dog attacks with other critical events. A direct comparison with other stressful events has inherent problems, such as differences in exposure, timing and severity of the different events. However, a comparison of scores with other events does afford a rudimentary appraisal of the impact of wild dog attacks on landholders and a modest insight into levels of stress experienced by participants in the current study.

The authors acknowledge that the life-threatening impacts of the stressors in the studies listed ([Table 4](#)) are devastating and can not necessarily be considered to be on the same level as impacts of wild dog attacks. In addition, the majority of other IES-R studies examined focused on one-off events, whereas wild dog attacks were reported to be recurring events and this needs to be considered in comparing these data.

Results from studies assessing stress amongst Vietnam Veterans from the general community (Creamer et al. 2003) had a total score similar to the total stress impact score determined for landholders suffering wild dog attacks. In comparison, the sub-sample of veterans who were suffering PTSD had a higher score than the score determined in the current study. Scores determined for those suffering wild dog attacks were higher than those in studies exploring the stress impacts of a motor vehicle accident (Beck et al. 2008), having a partner with terminal breast cancer (Butler et al. 2005) or Taiwanese nurses under threat of SARS (Cheng-Sheng et al. 2005).

In terms of the Intrusion scale, the mean score was above three and lower than one of the other studies (i.e. Veterans with PTSD, Creamer et al. 2003) suggesting that wild dog events have an intrusive impact on individuals. However, this was not the case with the Avoidance and Hyperarousal subscales with only one study (Partner with terminal breast cancer, Butler et al. 2005), with lower scores for Avoidance and another (Motor Vehicle Accident, Beck et al. 2008) for the Hyperarousal scale.

Of interest here are 2 of the 22 items that were scored by participants as above 3 (i.e. quite a bit) in this study. These were 'I felt irritable and angry' (hyperarousal), which

Table 3. Selected landholder comments relating to intrusion, avoidance and hyperarousal.

Note ^a	Intrusiveness	Avoidance	Hyperarousal
1	People worry about it, and the thought is always there, because either the ewes are lambing, or you go up the paddock and you find that sheep have been mauled to death, and you have to knock them on the head, and that's when you have a real shitty day.	... Most people accept the problem ... you've got to. (You think) – I'd better run out and check that again and you don't really want to go and do it because you're bloody worried about what you're going to see there ...	It's more anger and frustration ... for what's happening to, not just my husband, but a lot of the blokes in this area ... I like my kids to have their father around. It's frustrating to see they've now got (specific wild dog management initiative) and all these people dedicated to the wild dog theme, whereas my husband has been doing this for years without recognition and that's very frustrating.
2	And socially too, it's just putting the stress on all of us. Like (name withheld) a couple of years ago, was trapping dogs, he was spending all his time, he had to leave all his station work ... constant full time trapping dogs.	You've got to turn yourself off I find ... like especially people that really work hard at what they're trying to do you want to help them as much as you can If you would get a group of husbands and wives together in one area and just turn that thing (the voice recorder) on ... you'll find that there is a lot of anger and frustration at the whole bureaucracy of it all.
3	Probably the men folk have a different aspect. – ... they don't talk about that bit, but then they get angry – or not so much angry but they get frustrated that they want to do something. ... but there's not a lot you can do.	That's always a worry ... because we live in a small rural community, they (say they) participate in baiting ... to their neighbours but then ... they'll just bury the bait because they really just don't want to bait. Because (for) a lot of people, it kills more of their working dogs than it does ... (wild dogs)	(The stock) ... rely on you being there to give them a feed every day. And there's nothing more frustrating when you go there and see, well, he's not here and this fellow's not here. Where could they be? And then you find them mauled and maimed out in the paddock, well then, it's the worst thing that I think you've got to contend with.
4	Your family quality too – you get home, and you've been chasing dogs all day and your kids are there and they're sort of asking you this, asking you ... You're tired and grumpy. They say things to you and you snap at them. And it's hard on everybody.	Name withheld (who has since transitioned to cattle) was ... the first ... sheep person inside the fence ... to really bring it to the government's attention, the problem of dingos in the sheep country and then go out of sheep. And he put his baits and everything out, but he says if he hears a dingo howling now, he puts his deaf ear up.	A dog ... or two or three could turn up like that and they could take out 400 or 500 of your sheep in two days, two nights, you know, and you just don't know and that's the worrying part of it all really.
5	Like you can't sleep at night time, you're worrying about your stock being chased, like dogs chasing ewes and if they're lambing and all that. And it puts a fair bit of stress on all of us.	That's probably going to be where the struggle will come down the track is, we don't want to be complacent again. If all of a sudden you haven't had an impact from dogs for two years, we're right, we're clean. Well, we need people to still be diligent and, you know, and still look at programs for control.	Once that (failed attempt to catch a dog) happens you'll never catch him again, you'll never catch that dog again. This becomes a problem down the track, because if it's a bitch that's had pups she's going to train her pups.
6	You might have a patch of Bathurst Burr [a weed] out there, well I don't lose any sleep, they'll eventually go and chip it all out. But with these dogs, I don't sleep. And you wake up in the morning and where do you go? Chasing dogs		It doesn't matter what fence gets in the way, what gutter gets in the way. Doesn't matter how much you smash your vehicle up, you get that dog. Straight through fences, straight through them ... because that's how important it is, getting that dog.

(Continued)

Table 3. Continued.

Note ^a	Intrusiveness	Avoidance	Hyperarousal
7	I've had nightmares about it because I wasn't born and bred Australian on the land so not Australian, and not off the land to start with [and then]to see a flyblown sheep with a big chunk bitten out of its bum where the flies had literally gone in They know how to outsmart you. We've gone every year hunting them and living with them and working with them and you keep on learning more. A lot of times after you've been looking for them, you'll go back a couple of days later, and they've followed [your] tracks. And some of them, you'll put a bait out and they'll come and cock their leg on that.
8			[My] husband is worried dogs will be that bad that people walking, riding bikes or horses could be attacked, particularly if people [are] between kill and dogs.

^aNumbering in table is used in notations in section Discussion under each IES-R component.

Table 4. IES-R scores for the current sample in comparison to other studies employing the IES and IES-R.

	IES-R total Mean (SD)	Intrusion Mean (SD)	Avoidance Mean (SD)	Hyperarousal Mean (SD)
Current study (<i>n</i> = 39)	1.87 (0.67)	2.33 (0.72)	1.41 (0.87)	1.86 (0.98)
Vietnam Veterans in treatment for PTSD (<i>n</i> = 120) (Creamer et al. 2003)	2.64 (0.69)	2.72 (0.72)	2.30 (0.80)	2.99 (0.85)
Vietnam veterans in community (<i>n</i> = 154) (Creamer et al. 2003)	1.82 (1.05)	1.75 (1.11)	1.59 (1.03)	2.21 (1.22)
Motor vehicle accident with PTSD (<i>n</i> = 182) (Beck et al. 2008)	1.59 (0.90)	1.57 (0.99)	1.44 (0.90)	1.81 (1.07)
Partner with terminal breast cancer (<i>n</i> = 50) (Butler et al. 2005)	1.67 (0.81)	2.09 (1.14)	1.31 (0.81)	Not available
Taiwanese nurses under threat of SARS (<i>n</i> = 128) (Cheng-Sheng et al. 2005)	1.19 (0.83)	Not available	Not available	Not available

received the highest mean score (3.3), and 'I had waves of strong feelings about it' (intrusion, mean of 3.1).

In the following, the three components of the IES-R are discussed with reference to landholder comments, using the notation in Table 3.

Intrusiveness

The intrusiveness of the wild dog issue was evident from landholder comments about the all-consuming and intense nature of this issue (Note 1, Table 3). Many of the participants (Note 2, Table 3) termed this intrusion as a '24/7' impost, and described the impact of the attacks with comments such as 'very concerning as it has stressed the whole community (and) reduced employment'. Along with the intrusiveness were strong feelings of frustration and helplessness to change the situation.

Holidays and relaxation were compromised. Impacts on family life were also noted with partnerships and parenting often competing for time with long hours of wild dog control efforts (Note 3, Table 3). Sheep graziers were also spending significant time attending meetings and forums related to planning and or lobbying related to wild dog management. One participant estimated that this amounted to more than 16 days a year away from home on such activities.

Another issue associated with the all-pervasive nature of the problem was the impacts on sleep. Having trouble staying asleep and not being able to sleep is considered an important indicator of stress (Creamer et al. 2003) and is an item on the IES-R scale (Note 4, Table 3). Another participant highlighted the difference between intrusive thoughts concerning wild dogs compared with other pest management issues (Note 5, Table 3). Having dreams about the event is also an item of the IES-R rated for intrusion. A number of participants mentioned dreams about a wild dog attack event they had witnessed (Note 6, Table 3).

Avoidance

Avoidance was not strongly represented in the interview information. Where it was spoken of or alluded to, it took a variety of forms: the desire to take action and fix the problem instead of avoiding it; the need to take a break from the issue at times; tactics for avoiding baiting; the situation of ex-sheep producers who have shifted to cattle and are less actively involved; and a desire to avoid the issue once it has been addressed in the short term.

The wild dog issue was more often than not considered as something to be dealt with directly, and not be avoided. For example one landholder indicated that it is a challenging issue that cannot be ignored (Note 1, Table 3). However, along with this overall trend of addressing the problem directly, it was observed that there is sometimes a need to try to find ways to avoid thinking and taking action on wild dog issue at times (Note 2, Table 3). As well, it is known that some people have particular techniques for avoiding confronting issues to do with community wild dog management (Note 3, Table 3).

Observations were made of some people not involved in this study who appeared to be avoiding dealing with the issue. Cattle farmers who had transitioned from sheep to cattle had often exhausted their resources and given up sheep farming. This meant that many had limited energy for ongoing wild dog management. One participant in this study talked of another landholder who, after leaving the sheep industry, often avoided the problem (Note 4, Table 3). Finally, there are concerns about community members' capacity to want to forget the issue once it has been dealt with in the short term; a desire to avoid the issue if at all possible (Note 5, Table 3).

Hyperarousal

With the IES-R questionnaire results, there were two hyperarousal items that rated highest across all of the 22 items in the questionnaire: (1) the statement 'I felt irritable and angry' (mean = 3.3), and (2) 'I had waves of strong feelings about it' (mean = 3.1). The anger was confirmed by interview and focus group participants' responses. It was commonly spoken of in association with frustration. Frustration seemed to be a commonly experienced strong feeling and the term 'frustrating' had over 20 references in transcripts.

Anger and frustration, which were often combined, were directed at a wide range of issues that were seen to be impeding the management of the impacts of wild dogs. One landholder expressed it in relation to the lack of recognition received (Note 1, Table 3). Much of the anger and frustration was blamed on the institutional arrangements (Note 2, Table 3). Participants were also frustrated about the economic impacts, with wild dog

predation impacting their ability to take advantage of business opportunities, specifically improving wool prices. Another source of frustration was related to loss of animals to which farmers had developed carer attachments (Note 3, Table 3).

Another high scoring (mean = 2.4) hyperarousal item was 'Feeling watchful and on-guard'. This was again supported by the interview and focus group findings. Participants told how they were constantly alert to the problem of wild dogs and spent large amounts of time chasing dogs. One participant called this a 'system of vigilance'. They described an ongoing cycle of seeing, chasing and hunting individual dogs which would have them up early and home late until that particular dog was eliminated. An ever-present alertness to the possibility of wild dog attacks was mentioned by several landholders (Note 4, Table 3).

A compulsion behind this 'system of vigilance' relates to the intelligence and adaptability of the dogs and the belief that once a dog had been spotted, and an attempt made to kill it, the dog becomes 'shy' and disappears (Note 5, Table 3). Hence, graziers believed they needed to hunt down the dog on first sighting, as this may be the only chance they have. At times this led to injuries or damage to property (Note 6, Table 3).

The dog is an intelligent and adaptive foe, and dealing with this behaviour was a source of stress and powerlessness. Hyperarousal when out hunting the dogs was also reported. Participants said dogs had defaecated or destroyed traps without taking the baits, sometimes only minutes after they had been laid, giving the landholders the impression they were being watched by the dogs (Note 7, Table 3). In Victoria, several participants spoke of the threat of attacks by wild dogs. These 'watchful' and 'on-guard' thoughts are characteristic of hyperarousal (Note 8, Table 3). Whilst attacks on people were considered rare and unlikely, depending on the region, one participant stated '[I am] scared, and will not go on the property without a gun after being stalked'. Other participants said that they had concerns over small children being attacked and said they had to keep a watchful eye for this.

The erratic nature of the attacks on livestock and not knowing when these might happen was a source of stress. One participant located south of the dog fence said whilst there might be two attacks over a six week period, chasing the dogs was constant. Graziers described spending large amounts of time on purposeful hunting and trapping, but also responding to chance sightings. This sense of needing to be constantly alert meant that graziers were vigilant all the time.

The constant vigilance experienced by landholders has another consequence: They cannot have working dogs or let their pet dogs out of the home yard for fear of them taking a bait. Graziers have to be constantly surveying their own dogs and many of them had lost valuable working dogs and pets to baits. As well as the emotional cost, working dogs can be expensive with a trained dog valued at around AUD20,000.

Limitations and future research

A limitation of this study is the small sample size used for the IES-R survey. The IES-R survey component of the study was a pilot. The results indicate that a future study using a larger sample size could provide more statistically significant findings.

Another limitation is that this study was restricted to three case study areas. This means that the results may not generalisable to other areas. Combined with this general limitation

is the fact that each of the three case study areas has a distinct physical, social and cultural context. There are insufficient data from the case study areas to be able to comment on the relationship between the different contexts, such as length of time attacks had been occurring, and the level of psychological stress experienced by the landholders in these different areas.

Conclusion

The current research shows that the psychological impact of wild dog attacks on livestock experienced by individual landholders and their families is considerable. The IES-R instrument provides a useful framework to better understand the specific nature of the stress experienced by landholders in this context.

While some issues with comparing this data with that from other IES-R studies are noted, measures determined through application of the IES-R in this study showed high levels of intrusion and moderate levels of avoidance and hyperarousal in comparison with other studies. The high level of intrusive thoughts found in the IES-R was validated by participants' reflections including strong feelings of anger, as well as constantly being reminded of the issue and trouble with sleeping. Concurring with low test results for avoidant thinking, participants tended not to avoid the issue and rather shared frustrations about others in the community not acting on the issue, such as landholders who were not affected. The main hyperarousal items scored highly were those of feeling irritable and angry and the feeling watchful and on-guard item. Both anger, in the form of frustration at a number of contextual issues and hypervigilance were commonly expressed.

In terms of implications for action, participants did not imply a specific need for counselling and focused rather on the need for improved management of the wild dog problem. However, the need to tell the story of the trauma of wild dog predation is evident and the authors commend initiatives that allow people to have their stories of trauma associated with wild dog attacks heard and taken seriously. Opportunities for participants of wild dog management programs to voice the social, economic and psychological stresses associated with attacks on livestock, such as might occur in support groups, are needed.

The methodological pluralism approach used in this study enabled the experiences of participants to be more fully expressed than they would have in using just one of these methods. Importantly, the qualitative evidence supported the results from the IES-R psychological test. The complementarity of results from both methods suggests that wild dog attacks on livestock might be considered a critical incident that leads to higher levels of stress symptoms in landholders dealing with attacks compared to landholders not affected by wild dog attacks.

We suggest that further research undertaken using the IES-R to assess trauma amongst landholders impacted by wild dog attacks on stock be used in conjunction with survey questions that measure other stressors that landholders might be dealing with as well as measure the emotional state of the participants (see Morgan et al. 2014). Also, further validation of the scale could involve participants completing the scale without the associated qualitative discussion first. As well, a larger sample size (across Australia and not just of individual case study areas) and the inclusion of a comparison sample of landholders not impacted by wild dog attacks could provide a more robust platform for studying this issue.

This study goes some way towards addressing the challenge of adequately describing the psychological impacts experienced by landholders dealing with wild dog attacks and the authors trust that this and other studies which honour these experiences can reduce the frustration of not being adequately heard that many of our participants communicated. In better understanding the severity of impacts experienced in this context, the well-being of landholders, their families and communities can become central to policy, extension and engagement activities relating to the management of wild dogs in agriculture.

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