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Domestic fire risk: a narrative review of social science literature and implications for further research

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In this paper, we make the case for more social science research into fire incidents and fire-related risk behaviour. Unlike other vulnerabilities, such as crime, illness or risk-associated activities such as smoking, or accident avoidance, remarkably little research has focused on this area. This is perhaps surprising given the propensity for fire, its emotional, social and economic impacts, and evidence that fires and fire victims are not equally distributed across socio-demographic or geographical domains. In making our case, we outline: recent numbers and trends in incidents in the UK, focusing on domestic incidents and recent policy developments affecting fire and rescue services. Next, we review the social-science based literature on fire incidents, suggesting that while this offers useful insight, much more needs to be done to develop a rigorous evidence base. While we would not want to dismiss or downplay existing social science contributions, our contention is that a considerable number of opportunities exist for further work in this area. Consequently, we propose a number of ways in which popular ideas about risk theory can be applied to a domestic fire context and raise a number of questions that social scientists are well positioned to contribute to an interdisciplinary understanding of domestic fire incidents and associated risks.

Keywords: domestic fire; fire risk; risk perceptions; risk inequalities; house fires; fire and rescue services

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Introduction

This paper presents, to our knowledge, the first review of the social science evidence base on domestic fire incident risks, and makes the case for more social science attention in this area. In 2011/12, 304 people lost their lives in England as a result of fire, three-fifths of whom in accidental dwelling fires. A further 9300 were injured, with the majority (7300) again in accidental dwelling fires (DCLG 2012). Yet despite the extent and seriousness of dwelling fires, the contribution of social science research to understanding fire incidents, their impacts and associated risks is sparse. We suggest that relative to other dwelling-related risks such as crime, accidents and flooding, little research exists on perceptions of and attitudes toward risk of domestic fire, the impact of experiencing domestic fire or how individuals,

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households and communities, understand and (perhaps) mitigate against such risk. So, we contend not that existing social science literature is inadequate or poorly conducted, but rather that opportunities remain for a greater understanding of fire and fire risk afforded by theoretical, empirical and analytical understandings of risk.

Experiencing a fire, especially within the home, can be a traumatic experience with potentially devastating effects, not only in terms of casualty and loss of life, but also the psychological impact of losing valued possessions. The evidence we consider here indicates that some groups of people are at greater risk of experiencing a domestic fire and that impacts differ with respect to rates of fatality, injury and emotional impacts.

Of course, risk is not understood in rational, predetermined ways, nor experienced in the same way by all people, in all contexts. Rather it is subjective and contextually constructed and determined (Beck 1992; Douglas and Wildavsky 1982; Lupton 1999). This raises important questions about how fire risk can be mitigated. For if action towards, and perceptions and knowledge of, risk are constructed, then so there are methodological implications for how risk and risk-related behaviours are understood within the contexts that shape them. It also has implications for how policy and practice can be better attuned to understanding, accommodating and reducing the impact of risk, even if social change in late modernity appears to imply the acceptance of some degree of risk and uncertainty (Beck 1992). In this paper, we call for methodological, substantive and theoretical attention to focus on constructivist appreciation of domestic fire and associated risks to complement existing work on risk forecasting (e.g. Barillo and Godde 1996); propensity modelling (e.g. Duncanson, Woodward, and Reid 2002; ODPM 2006); individual risk-behaviour modelling (DCLG 2008a); and geodemographic analysis of fire propensity (e.g. Corcoran et al. 2007; Merrall 2001).

Our review first outlines the extent of fires in the UK and presents a brief overview of important policy developments. While neither should be a driving motivator for influencing research agendas, we suggest that the magnitude and scale of incidents, their impact on safety, health and well-being, together with their prominence in policy development and implementation mean that it is somewhat curious that social scientists have rarely engaged in fire-related research. Next, we consider key issues arising from the literature detailing socio-cultural understandings of risk (e.g. Taylor-Gooby and Zinn 2006) and reflect on how such approaches might contribute to understandings of domestic fire risk and their implications for future research, policy and practice agendas. Third, we review findings from cross-disciplinary work in Europe, North America and Australasia. It is clear that not all people are at equal risk of domestic fire. Upon experiencing such a phenomenon, different groups of people experience different outcomes, including fatality, injury and economic impact, with consequences for well-being, stress and emotional distress. From this, we identify several gaps in understanding of risk in the context of domestic fire and outline future theoretical, substantive and methodological avenues of inquiry.

The scope and extent of dwelling fires in the UK

Although some have commented on the difficulties identifying appropriate, up to date data on fire incidents (GAIN 2011), the Department for Communities and Local Government have been collating and distributing relatively detailed information for England and, arguably to a lesser extent, the rest of the UK for a number of years.

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In 2011/12, 304 people lost their lives and a further 9300 injured in fires in England. Over three-fifths of the fatalities occurred in accidental dwelling fires and 7300 injuries were caused by accidental dwelling fires (DCLG 2012) (Table 1).

In 2011/12, UK fire services attended 272,000 fire incidents. Of these, 44,000 (16%) were fires in residential dwellings, accounting for nearly two-thirds of all building fires and 88% of all casualties in building fires. Overall, the number of dwelling fires fell by 3% from the previous year. The number of fatalities in such fires was 287, 31 fewer than 2010–2011. There was a 2% fall compared with 2010–2011 in the number of non-fatal casualties in fires in dwellings to 8930.

Most fires in dwellings were recorded as accidental (87%), the lowest number for more than a decade. Here, the main cause was the misuse of equipment or appliances, with 14,700 cases recorded in 2011–2012, little change (1% fewer) than in 2010–2011, the lowest figure since 2000–2001. Other changes in accidental dwelling fires since 2000–2001 include: chip/fat pan fires falling by over three quarters to 2600; instances of playing with fire have fallen by nearly half; and incidences of placing articles too close to heat or fire have fallen by one-fifth. Such reductions have been attributed to active promotion of smoke alarms and other building fire safety systems and features, audits and enforcement activity, fire safety campaigns and education and other advice achieved, it has been claimed, by policy changes in the activities and duties of Fire and Rescue Services across the UK (DCLG 2012).

The UK policy context

In the UK, the role of the Fire and Rescue Service has changed significantly in the past 20 years. We outline in Table 2 some of the key policy milestones impacting on the service's practice during this time. What was once a largely responsive service now promotes an increasingly preventative agenda, echoing developments in other areas of service delivery, most notably public health and social care. A key driver in this was the Audit Commission's (1995) report *In the Line of Fire*, that remarked that fire and rescue services were placing 'insufficient emphasis … on fire

Table 1. UK trends in fire incidents 2001–2011 (thousands).

Year	All fires	Building fires		Outdoor fires	Chimney fires	Dwelling fires as a % of all fires
		Dwellings	Other building fires			
2000/01	445	67	40	324	14	15.1
2001/02	525	67	42	404	12	12.8
2002/03	503	60	38	395	10	11.9
2003/04	572	62	40	460	9	10.8
2004/05	412	57	36	311	8	13.8
2005/06	409	56	34	310	9	13.7
2006/07	411	54	32	318	8	13.1
2007/08	364	50	29	276	9	13.7
2008/09	309	47	26	225	11	15.2
2009/10	299	47	27	216	10	15.7
2010/11	287	45	25	207	10	15.7

Source: DCLG (2011).

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Table 2. Selected UK Acts of Parliament, Public Policies and documentation covering fire and rescue services.

Act, policy or documentation	Year	Implications for research agendas
Fire Brigades Act	1938	Centralised co-ordination of fire brigades. Mandatory for local authorities to arrange an effective fire service
Fire Services Act	1947	Made greater provision for fire and rescue services in Great Britain; to transfer fire-fighting functions from the National Fire Service to fire brigades maintained by (as then were) county councils; to provide for the combination of areas for fire service purposes; and to make further provision for pensions and other awards for employees
In the Line of Fire (Audit Commission)	1995	Identified insufficient emphasis on fire prevention among service activities
The Future of the Fire Service: reducing risk, saving lives – The Independent Review of the Fire Service	2002	Set out recommendations for how the fire and rescue service should change in the future to meet the demands of the twenty-first century. Key recommendations included that the new emphasis must be on the prevention of fires and that the approach should be grounded in community fire safety
Fire & Rescue Services Act	2004	Prevention made a statutory requirement of all fire and rescue authorities
Government of Wales Act	2006	National Assembly for Wales given powers to (among others) pass laws on fire and rescue services and promotion of fire safety otherwise than by prohibition or regulation. Paves way for future legislation to impact upon constituent countries of United Kingdom
Fire and Rescue National Framework 2008–11. (Dept. for Communities & Local Government)	2008	Stated that all fire and rescue services must work with communities to identify and protect them from risk and to prevent incidents from occurring. Encouraged greater prevention agenda by enabling authorities to better focus and target their resources on areas where the risk from fire is greatest
Future Fires Reports (Dept. for Communities & Local Government)[a]	2010	Proposed ideas on how the fire and rescue sector can work together to address current and future challenges and presents new models and wide-ranging options for delivering fire and rescue services

(*Continued*)

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Table 2. (*Continued*).

Act, policy or documentation	Year	Implications for research agendas
Fire Futures Report Government Response (Dept. for Communities & Local Government)	2011	Outlined Conservative-Liberal Democrat UK coalition government expectations of delivery of fire and rescue services, notably through: restoring a focus on local communities rather than meeting national targets and monitoring and implementing a localism agenda over decision-making and management; and providing clarity on national and local roles in resilience and funding structures
Fire and Rescue National Framework for England (Dept. for Communities & Local Government)[b]	2012	Set out the government's expectations and requirements for fire and rescue authorities in England. The framework outlines the following priorities for fire and rescue authorities: identify and assess the full range of foreseeable fire and rescue related risks their areas face, make provision for prevention and protection activities and respond to incidents appropriately; work in partnership with their communities and a wide range of partners locally and nationally to deliver their service; and be accountable to communities for the service they provide
Police and Fire Reform (Scotland) Act	2012	Formalised the intention to create a single autonomous Scottish Fire and Rescue Service April 2013
Facing the future: Findings from the review of efficiencies and operations in fire and rescue authorities in England[c]	2013	Reviewed efficiencies and operations in fire and rescue authorities in England. The review considers the potential for greater collaboration within the fire and rescue sector and with other blue-light services
Improving Efficiency, Interoperability and Resilience of our Blue Light Services[d]	2013	Produced for the All-Party Parliamentary Group on Homeland Security to explore how collaboration and coordination between blue-light services may be enhanced
Fire future funding report (Local Government Association)[e]	2013	Outlined the size of the financial challenges facing Fire and Rescue Authorities (FRAs) in England and identifies measures Government can take to provide more flexibility and assist FRAs in meeting their budgets

[a]https://www.gov.uk/government/publications/fire-futures-reports.
[b]https://www.gov.uk/government/publications/fire-and-rescue-national-framework-for-england.
[c]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/200092/FINAL_Facing_the_Future__3_md.pdf.
[d]http://henryjacksonsociety.org/wp-content/uploads/2013/06/Blue-light-Report_LR.pdf.
[e]http://www.local.gov.uk/c/document_library/get_file?uuid=c64aa469-96ff-47e0-8982-a94e3aaf80d6&groupId=10180.

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prevention' (5), and that their risk categorisation was failing to take account of factors such as demographics, time of day or period in the year in encouraging fire prevention. The Commission recommended a shift towards a prevention-focused approach, proposing that fire authorities 'should be given statutory responsibility to promote fire safety – to educate the public about fire, its causes, its dangers and ways to combat it' (6), and that 'perverse incentives which discourage brigades from promoting fire safety should also be removed' (6). These 'perverse incentives' included an historical funding model in which fire and rescue services that had the greatest numbers of incidents received the greatest amount of government funding that meant there was no financial incentive to prevent incidents from occurring (Audit Commission 1995). Arguably, from this point on, fire and rescue services have had a mandate to better understand the risks affecting different demographic groups as part of a risk reduction (rather than fire-fighting) service.

The Fire and Rescue Services Act 2004 outlined a legislative framework to support fire and rescue services in meeting contemporary challenges, including better reflecting the service's wider role. The Act encapsulated the service's role in responding to road traffic collisions, floods, and terrorist incidents and instructed all fire and rescue authorities to promote fire safety, so sealing the drive to fire prevention and risk reduction practices. Since then, national-level legislation and local-level guidance and documentation have further driven the a risk-orientated agenda. The *Fire and Rescue National Framework 2008–2011* states that fire and rescue authorities 'must work with communities to identify and protect them from risk and to prevent incidents from occurring' (DCLG 2008b, 10), and to 'better focus and target their resources on areas where the risk from fire is greatest' (10). Localised strategies are also prominent in the 'Fire Futures' report and government responses, published with a view to 'restoring a focus on local communities' (DCLG 2011, 2) and where '[d]ecision making in local services needs to deliver better and more responsive services to local people' (4). In sum then, a mandate has been established for greater power and accountability at the local level and, it is claimed, less of an emphasis on centrally imposed targets and monitoring in favour of a locally organised and delivered set of procedures and practices.

National-level concern with prevention and risk has translated into supposedly more localised autonomy over budget and resource decisions, as well as more contextually focused intervention and prevention strategies. One provider, Greater Manchester Fire and Rescue Service (GMFRS), has reported a significant reduction in the number of incidents and the associated deaths and injuries in recent years. Over the last seven years the service has reduced all fires by 42% from 26,942 in 2005/06 to 15,664 in 2011/12 and reduced fire-related injuries by 40% from 727 to 434 and number of deaths by 40%. (GMFRS 2013, 35). Echoing national claims, the service attributes this to new legislation that provides a mandate for regional and local fire and rescue services to focus on fire safety; changes in societal attitudes to fire and fire risk; and successful fire prevention campaigns, including initiatives such as home safety checks and more widespread use of fire and smoke detector systems. Following a 2008 review, and coinciding with national moves for greater localised responsibility (Table 2), GMFRS implemented significant changes to prevention service delivery. In particular, a team of non-uniformed specialists were recruited to focus on key prevention areas such as Health and Social Care, Children and Young People, and Substance Use. Termed 'Prevention Coordinators', such individuals work alongside uniformed firefighters, community safety advisors and volunteers in

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the implementation of prevention strategies within 'at risk' communities and sharing data and information about potentially 'vulnerable' populations and groups (identified as those previously listed) with external agencies including social support services (GMFRS 2012).

The prevention agenda is thus localised (in so far as individual fire and rescue services are responsible for devising and implementing fire reduction and prevention initiatives), and particularised (in that such initiatives are increasingly directed at what has been termed 'vulnerable' groups). Rather than recognising that incidents occur 'by pure accident… research and intelligence on fires gathered to date, indicates that fires occur primarily as a result of people's lifestyle choices, attitudes and behaviours' (GMFRS 2012, 11). This is reflected in a shift from a 'universal approach' towards an 'intelligence led approach', involving the gathering and use of risk information to target where, how and among whom to deliver services. Developing a better understanding of which demographic groups are most at risk of fire has become a growing priority within England's fire and rescue services as prevention and fire safety activity has risen up the political agenda (DCLG 2008a, 2008c). Nonetheless, while the numbers of incidents as well as fatal and non-fatal casualties has declined, there continue to be sections of society that remain at greater risk; many of whom are deemed to be non-receptive to fire safety messages. As we argue shortly, expanding the epistemological and methodological frameworks for understanding fire risk provides scope for a renewed research agenda that has the potential to make a meaningful insight on fire risk from beyond 'person-focused' perspectives that, potentially, provide an overly agent-centric approach to risk based on the assumption that individuals act rationally towards, and with complete knowledge of, their risk of fire.

Theorising fire risk

Although not wanting to rehearse established arguments, constructivist understandings of risk have provided valuable critique of rational and economic-models of risk and risk taking that 'tend to view individuals as making (objectively) rational choices to minimise risks' (Henwood et al. 2008, 423). Here, risks can be measured, counted or mapped according to their probability of the occurrence or extent of exposure, so implying that risk can be calculated and seemingly controlled for. Of course, human beings are not necessarily rational, and certainly do not adopt objective, universalist and mathematically calculable attitudes to risk. Rather, risks need to be understood in relation to wider social functions and effects. This raises an ontological distinction between what Slovic and Peters (2006) call risk as 'analysis' bringing logic, reason, and scientific deliberation to bear on risk assessment and decision-making and risk as 'feelings' and emotion that encourages reflection on the instinctive and intuitive dimensions. Slovic and Peters argue that 'intuitive feelings are still the predominant method by which human beings evaluate risk' (322) rather than by rational analysis. They identify the 'affect heuristic' as the most prominent influence when individuals are making risk-related decisions. While this has certainly encouraged attention in psychological science to focus on affect, emotion and intuition, drawing on behaviourist traditions, including work on the availability heuristic, further lines of enquiry have emerged, sparked by debates over the 'risk society' to recognise the contextual and contingent nature of risk. Here, risks are understood differently by different people at different times. So;

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> [w]hat might be perceived to be 'risky' in one era at a certain local may no longer be viewed so in a later era, or in a different place. As a result, risk knowledges are constantly contested and are subject to disputes and debates over their nature, their control and whom is to blame for their creation. (Tulloch and Lupton 2003, 1)

Individuals' responses to risks and hazards are thus not inherent but shaped by a range of factors, not least the value systems to which people subscribe, and that these value systems are neither static nor mutually exclusive. Rather, individuals' perception of risk and hazards change depending on which social groups individuals belong to at different times in the lifecourse, or indeed at the same time. Parenthood, employment type, membership of a pressure group, age and gender have all been identified as affecting the ways in which risks are perceived and acted upon (Gustafson 1998). Such constructivist-inspired approaches to risk and risk-behaviour suggest that attention should not be confined to the individual but, rather, be extended to consider how individuals' social construction of risk is shaped by their membership of cultural subgroups and that 'a person's biographical background and the contexts in which their everyday lives are lived out are important factors that may shape their subjective "risk positions"' (Henwood et al. 2008, 423). While work has begun to probe these ideas in a variety of 'risky' contexts, we contend that fire remains under examined.

That risk might be socially constructed and contextually specific has not rendered individual agency and autonomy redundant. Drawing on work in industry studies (Gielen and Sleet 2003), and echoing the assumptions underpinning fire and rescue service prevention initiatives is an inference that fires, and related injuries, are preventable. Such logic infers a rational assessment of risk that has informed much modelling, forecasting and prediction work. However, it is important to recognise the contextually situated and structure-agency interactions that influence and inform attitudes to risk and risk-taking (and avoiding) behaviours as well as to consider the impact of wider factors on the extent to which individuals act on information to reduce their risk, treating 'behavioural systems as complex ecologies with multiple influences working in competing directions to influence behaviour' (Halpern et al. 2004, 16). Such influences include wider societal factors, operating at multiple levels, including: social relationships; living conditions; neighbourhoods and communities; institutions; and social and economic positions: factors which have the potential to impact on how fire risks are perceived and negated.

Reconceptualising domestic fire incidents and risk

Even a cursory glance through the contents and indices of any risk-orientated texts reveals an absence of reference to 'fire' or 'fire-risk'. This is somewhat surprising given the volume of work about comparable risks such as (e.g.) crime, health, sexual activity or work-place risks (e.g. Lupton 1999; Mythen and Walklate 2006; Taylor-Gooby and Zinn 2006). For this overview, relevant literature was located through academic search engines including Web of Science, Google Scholar, Science Direct and relevant government websites[1]. We identified very little literature that explicitly addresses domestic dwelling fires and its impacts. While the subject of how people behave *during* a fire (Kobes et al. 2010), particularly during large-scale incidents in public or industrial settings, has been the subject of several studies (e.g. Canter 1980; Melinek and Booth 1975), few studies have addressed how individuals' behaviour influences risk in the domestic setting. A notable exception is the work of

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Kent Fire and Rescue Service into human behaviour and fire (Thompson 2011). Nonetheless, there is some evidence about the scope and scale of domestic fires, vulnerability and risk.

First, research has tended to focus on behaviour during a fire incident. Kobes et al. (2010) for example summarise literature that determines fire response performances as due to the characteristics of the fire, building construction and human behaviour. Of most relevance here is evidence that humans do not behave in 'expected' (that is rationale and predictable) ways when faced with a fire. For instance, people in groups customarily ignore fire alarms, tend to walk more slowly when exposed to a fire than when walking in 'normal' conditions, and escape via familiar rather than emergency exits. Kobes et al. call for a 'pschonomic' understanding or fire safety in order to better understand or 'discover … the laws which govern human behaviour' (8). While we do not take issue with this call, this approach does imply a specific positivist-inspired methodology that prefers 'conducting tests under controlled circumstances, by striving towards objectivity, accuracy and quantifying by formulating verifiable theories' (Kobes et al. 2010, 8). The work that Kobes et al. review is framed almost exclusively in an objectivist understanding of fire risk and behaviour. Here, risks can be mapped and analysed according to their probability of the occurrence of exposure to risk, while response to risks can be predicted and subsequently better controlled for. Yet apart from the focus on fire response rather than fire risk, such an approach struggles to understand the ways in which risk is perceived as part of a wider set of contextual vulnerabilities.

Second, it is clear that not all people or households are equally vulnerable to fires. Evidence suggests that fatal unintentional domestic fire incidents occurred disproportionately in dwellings in the most socio-economically deprived localities. Much of this work is based on geo-coding fire incident data to geographical locations (e.g. Duncanson, Woodward, and Reid 2002). Beyond geographical analysis, Jennings' (1999) narrative synthesis of socio-economic characteristics and fire risk identified that most socially and materially deprived households experience the highest rates of fatal fire incidents. It highlighted the following contributory factors: housing tenure and quality; differential community prevalence of smoke detector installation; social conditions promoting smoking and alcohol use; lack of support for sole parents; and educational underachievement.

Of course, it is important not to infer causation here. As Holborn, Nolan, and Golt (2003) propose the correlation between fire and socio-economic status is probably a reflection of the association between social deprivation and other high-risk factors (low income and elderly, physically disabled, ill, mentally ill, prevalence of smoking and drinking); indicating that it is the most vulnerable, the old, the sick and disabled and those suffering from mental illness or an alcohol problem who are most at risk of unintentional death. It is no coincidence that these groups are also those that would have the most difficulty making good their escape in the event of fire. Earlier, Chandler, Chapman, and Hallington's (1984) study of three urban areas in the UK found that an unemployed city dweller living in over-crowded, shared accommodation is much more likely to experience a domestic fire than the average UK householder. Mulvaney et al. (2009) examined time trends and deprivation gradients in fire-related deaths and injuries, based on cross-sectional time trend analysis using data on fire casualties in England between 1995 and 2004. Their analysis revealed both adult and child deaths were most commonly caused by smokers' materials, cigarette lighters and matches, whilst cooking appliances caused most

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non-fatal accidents. In their analysis of unintentional fires in New Zealand, Duncanson, Woodward, and Reid (2002) identify greatest negative correlations (i.e. a decreased fire risk) associated with home ownership; adequate household income; parental presence (represented by percentage of children under age 18 living with two parents); and good education (percentage of persons aged over 25 with at least high school education). Positive correlations (i.e. increased fire risk) were associated with: under-education (percentage of persons aged over 25 with less than eight years schooling); housing crowdedness (percentage of households with more than one person per room); and poverty (percentage of persons below the poverty level). Finally, the UK Office of the Deputy Prime Minister (ODPM 2006) reports results of multivariate analysis on experience and risk of domestic fire and fire safety measures reveals households with high odds ratios of experiencing a domestic fire to be: frequency of candle use; deprivation (ACORN indices); and satisfaction with accommodation; frequency of using room heaters; economic status of head of household; socio-economic group; and satisfaction with area.

Work by Bruck, Ball, and Thomas (2011) highlights the ways in which such variables intersect to increase the risk from domestic fire in Victoria (Australia) between 1996 and 2006. Comparison of different risk factors for residential fire fatality, including consideration of demographic, behavioural, and environmental factors found that 58% of victims had a positive blood alcohol concentration and odds ratio analyses showed that four variables were significantly more associated with victims who had consumed alcohol compared with sober victims. In descending odds ratio order, these variables were: being aged 18–60 years; involving smoking materials; having no conditions preventing escape; and being male. Fire fatalities with positive blood alcohol levels were more than three times less likely to have their clothing alight or exits blocked than sober fire victims.

Third, a small body of work exists that assessed perceptions of fire risk among those who have experienced an incident. Research commissioned by the Department for Communities and Local Government compares 'the risk from fire to other risks in the home and the factors that influence these relative perceptions' (DCLG 2008b, 13). Paralleling discussion above about the contextually specific, constructed nature of fire risk, the report suggests that 'the groups reached comparative views of their risk by review of their lifestyle-related risk factors (smoking, cooking and alcohol), physical and mental vulnerability and level of personal care' (DCLG 2008b, 22). Elsewhere, Hodsoll and Nayak's (2010) survey of 1000 older people found that less than 25% had direct experience of a fire in their home, two-thirds of whom suggested this had 'sharpened their awareness of fire risk and had increased their fire precautions as a consequence' (167). However, 87% 'either did not worry at all or worried only occasionally about the risk of fire in their home' (166). So, fire 'competes' alongside other perceived risks to take precedence, with fire risk 'perceived as far less threatening than the danger of a personal attack within the home' (ibid., 166). Hodsoll and Nayak offer two explanations for this: that media coverage encourages older people to feel that 'a personal attack is more immediate' and because 'a personal attack appears more physically frightening because it is directed by a personal rather than an impersonal environmental element'.

Finally, beyond the domestic environment, insight can be gained from work on wildfire. Martin, Bender, and Raish (2007), for example, ask what motivates people to protect themselves from risk of wildfire and argue that perception of the risks associated with wildfire is based on: '[a]ssessments of threats (severity, vulnerability,

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and benefits) and coping factors (self-efficacy, response efficacy, and costs [which] … combine to form a motivation in individuals to protect themselves from the risk' (188). Wildfires, though, are phenomena that may be largely beyond the control of the individuals who suffer their effects. As we now outline, issues of agency, control and individual action are likely to affect the way in which individuals perceive risk, and adds further weight to the need to recognise the ways in which fire risk is understood neither rationally nor in the same way by everyone.

Towards a domestic fire research agenda for the social sciences

The issues discussed so far highlight a number of areas for further attention. First, while the precise order of risk varies depending on the data-sets and analytical techniques used, not all people are equally at risk all of the time. Unsurprisingly, those considered most at risk are frequently labelled vulnerable in other risk contexts: viz. young children and older people, the poor and some minority ethnic groups. Those at risk of injury and/or fatality, though not identical, also include young children, the very old and people with alcohol and drug-related dependencies (Allareddy et al. 2007, Barillo and Godde 1996; Mulvaney et al. 2009; Roberts 1997). Research also indicates that housing type and area also influence risk of fire gradients (Chandler, Chapman, and Hallington 1984; Duncanson, Woodward, and Reid 2002; Jennings 1999). However, there is still a need to better understand at a national scale the demographic and geographic variables that contribute to greater risk of fire, not least because much of this data continues to be collected and analysed locally, for example as part of fire and rescue service prevention strategies.

Second, it is of course important to not assume correlation is the same as causation nor succumb to ecological fallacies. While there is a correlation between poverty and enhanced fire risk, it is fallible to suggest that someone is susceptible to experiencing a fire because they are poor. Rather, and as attempts to disaggregate the influence of socio-demographic, economic and geographical variables illustrate, it is important to not only identify intervening opportunities and causal variables, but also avoid victim-blaming discourses in preventative strategies, but rather recognise the institutional and structural factors that can inhibit the mitigation of fire risk (Crawford 1977; Ryan 1976).

It is important to avoid labelling those who do experience domestic fires as either helpless and/or vulnerable victims, or foolish risk takers. This is particularly so when targeting particular households and individuals for fire-safety advice and preventative measures, including encouraging greater personal responsibility for reducing risk (e.g. not smoking or using candles) and mitigating risk of fire (e.g. purchasing insurance). Rather than constructing discourses of vulnerability and individual responsibility, the role of human agency in the construction of risk-related behaviours, activities and perceptions requires much greater reflexive appreciation of how action, choice, calculation and responsibility operate within (structural) constraints to inform different risk discourses. This requires more multi-methodological assessment of how statistical data is interpreted as well as engagement in critical dialogue about behaviour change, responsibility and the vulnerability of fire risk.

Nonetheless, it remains attractive to inflate different risk factors when interpreting fire risk statistics. For example, some risky behaviours (such as candle usage), may be bundled together with socio-economic status (such as economic position and poverty) and household status (such as lone occupancy) without really unpacking these

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different activities and statuses. Prevention strategies need to better understand why such factors heighten risk in combination (such as alcohol use combined with candles that heightens risk). While some activities are, perhaps, more readily targeted by intervention and prevention procedures – such as candle use or smoking in the home – it is much more difficult to target socio-demographic determinants of risk. After all, it is much easier to intervene in (say) candle use than it is to amend structural inequalities (such as being economically disadvantaged). Yet the result, potentially, is for prevention strategies to focus on the more active-dimensions of risk and vulnerability while ignoring less visible, latent risks. For example, it remains unclear why socio-economic status should remain a high-fire risk factor. In the light of increased localism of preventive strategies and practices, we contend that more work needs to be done to uncover the reasons for this and other factors in ways that do not simply 'blame the victim' for their own positions.

In sum, there are several substantive 'gaps' in understanding that require a contribution from social scientists. Research focusing on domestic fire incidents tends to call for more sophisticated analysis of: who is at risk of fire; who is at risk of fatality and injury from fire; and for a greater understanding of impact of prevention initiatives (Corcoran et al. 2007; Warda, Tenenbein, and Moffatt 1999). There is also little understanding of the impact of domestic fire, either from an empirical or theoretical perspective, of how fire risk is constructed and mediated, or what the qualitative, emotional and social consequences of experiencing a domestic fire are. Likewise, while we may, arguably, know who is more at risk of experiencing a domestic fire, we know comparatively less about why this is the case (short of resorting to reductivist assumptions). Further questions remain about the impact of incidents on those who hear about incidents second hand; experience them first hand; or about the relationship between perceptions of risk and incidents. How do perceptions of risk mitigate, or leave open opportunity for incidents to occur? And how does experiencing or witnessing an incident impact on future perceptions of fire risk?

Third, and relating to the last question posed above, there is a need to understand how knowledge about fire and fire risk circulates and is consumed. If one accepts that risk is socially constructed and that individuals' perceptions of risk are temporal and affected by wider influences, such as membership of particular social groups, it follows that the way in which information and guidance about risk is communicated requires sensitivity to these factors. Risk communication is an interactive process of exchange of information and opinion among individuals, groups and institutions. Consequently, and echoing now long-standing debate about 'active trust', citizenship and risk knowledge, the media and individuals through which risk messages are conveyed (including scientists, social leaders, the government and pressure groups), have the capacity to amplify or reduce risk perception. The generation of risk discourse can thus present risks as being more or less likely to occur even if, 'objectively' (as a quantifiable event), this is not the case. Understandings of the ways in which media act alongside experience, biography, social relations and personal judgements to influence fire risk remain unexplored. Considerable work exists on how risk knowledge is imparted from experts and interpreted by lay people yet we know little of how fire safety advice is received, reflected and acted upon, drawing attention to the need to understand who is best placed to impart knowledge about fire safety, or how fire safety messages are received. And do those who experience incidents share experiences and fire safety knowledge with others or does shame or embarrassment mean they remain unshared?

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Fourth, there is a need to establish a stronger theoretical basis for how risk is understood within the domestic fire context. As reflections on the risk society imply, to recognise that risk is a social construct is not to suggest that it does not exist, or that the outcomes of risk aversion and risk taking are not tangible or material (Beck 1992). Rather, 'it is to contend that our understanding of these dangers and hazards, including their origins and their outcomes, are constituted through social, cultural and political processes' (Petersen and Lupton 1996, 18). This includes the ways in which fire risk information is communicated and the discrepancy that can exist between the transmitter and the receiver of such messages. Moreover, it is to accept that fire risk is perceived, imagined, understood, and mitigated against as a subjective, constructed, but still 'real' phenomenon. Recognising the subjective nature of risk and its relationship to underlying structural and institutional practices, may go some way to understanding the unequal social and geographical experiences of fire. One way of answering some of these questions may be through more international comparative work. For instance, does the magnitude or socio-historical legacy of incidents, or their frequency in some parts of the world mean that fire is understood differently in different socio-cultural contexts or habitus?

Responding to these issues will demand interdisciplinary perspectives that, thus far, have struggled to develop. While health and health-behaviour risk has found a home within the sociology of health and illness, and risk of crime and victimisation is well established within criminology, fire and fire risk has a less identifiable disciplinary anchor. In part, this may be because of the dominance of engineering and construction-based research, though there is also considerable work on insurance and loss adjustment in economics (GAIN 2011). Yet while historians have explored past conflagrations (Bankoff, Lübken, and Sand 2012), and environmental scientists have taken research on wild-fire (McCaffrey et al. 2013; USDA 2007), social scientists have been less interested, with the exception of a small body of work exploring work place identities of fire fighter personnel (e.g. Desmond 2006). In addition to theoretical and substantive insight on risk and danger, social science can offer innovative and robust methodological input to research endeavours. So, alongside the development of more sophisticated statistical analysis of geographical and historical trends, there is opportunity to be found in hearing the voices of those who have experienced a fire, not just in order to understand how such incidents impact on behaviour change or risk perception, but also how risk, in a wider sense, is constructed and negotiated. As we have noted, little research has been conducted into what victims of fires themselves perceive as having put them at risk of fire. In contrast to literature relating to the experiences of, for example, victims of crime, whether and how people's perceptions of risk change after a fire remains unknown.

Our assessment of existing understanding of domestic fire literature identifies important opportunities for social science research to contribute further knowledge. While we do not intend to dismiss or downplay existing research (indeed, it is clear that further work is required), it is dominated by overtly positivist and behaviourist traditions (what happens, where, and to whom). The availability of considerable, yet hitherto unexplored, fire data provides opportunity for further work to identify who has a fire, where fires occur, the risk-ratios of experiencing a fire, and the (at least empirically observable) causes of fire? Such endeavors are framed largely within empiricist, positivist or behaviourist traditions that inevitably only present parts of a complex whole. As we (admittedly partially) depict in Figure 1, more complete explanations require appreciation of multiple, at times competing, epistemic

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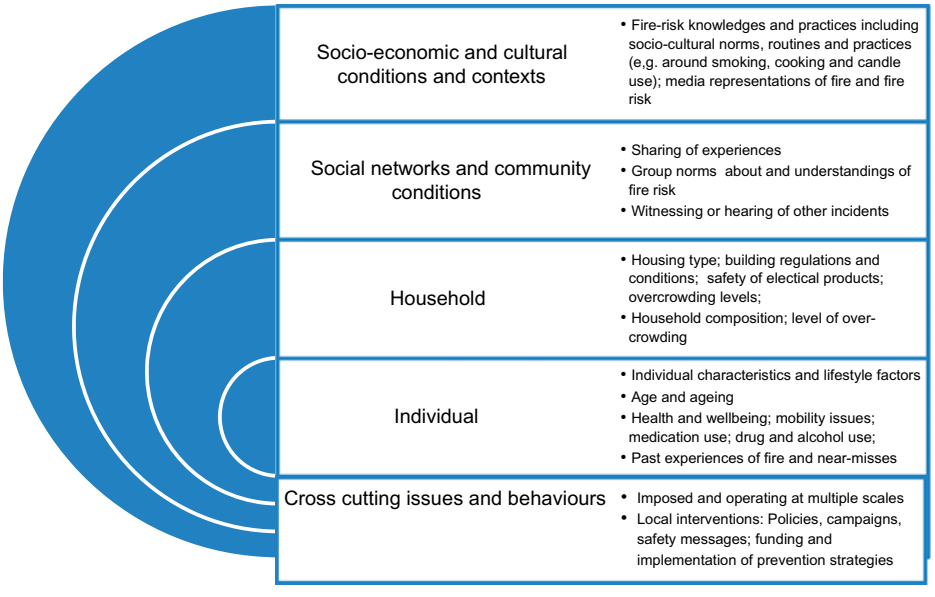

Figure 1. An analytical framework for understanding fire risk.

approaches to knowledge production, the ontological frameworks within which such knowledge is recognised as valid, and recognition of the interconnections between micro-level of individual action and the macro-level of social structures. This requires analytical frameworks that draw on a range of different strategies. To identify a few among many, these include critical realism to question why structural inequalities make certain socio-economic groups at heightened risk; phenomenological investigation of the lived experiences of experiencing a fire and their implications for risk perception; and discourse analysis of how people make meaning of fires through language. We know, for instance, little about how people talk about fires; how fire knowledge circulates through discourse; nor of the place of fires and fire risks within different cultural milieus. In sum, there is much to be gained then, not just from 'more of the same', but of bringing a whole range of social science perspectives together to further our collective understanding.

Conclusion

There are a number of gaps in our knowledge about domestic fire. However, we contend that a particular challenge for researching risk and behaviour arises from balancing competing conceptualisations of risk. While accepting that there are activities and behaviours individuals can amend and adopt to reduce their risk of domestic fire, there is also solid evidence to indicate that ecological and social factors also influence understandings of risk (Halpern et al. 2004). This includes socio-economic status, age, access to information and experience. Some of these, such as access to information, or altering risky behaviours such as installing and checking smoke alarms, appear, initially at least, as more 'achievable' by national and local level policy initiatives. Others, such as socio-economic status are, of

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course, much harder to address. Yet given the evidence that certain groups do appear to be more at risk of fire, and suffer greater consequence following fire incidents, the need to understand how such groups perceive, understand and act within, their own individually, and socially tailored, constructions of risk, is all the more pressing. How this can be done without succumbing to fallacious causality (e.g. that being poor causes people to have a fire), requires a sophisticated research agenda that is able to untangle the nuances, interpretations and narratives that seek to define people's experiences of domestic fires. It also implies that, while preventive strategies targeted at particular social groups may reach those at risk, they will not, ultimately, understand why such groups remain at risk now or in the future.

Understanding how risk can be conceptualised has important implications for understanding behaviours that may be perceived as in some way risky. Our argument here is that there are important questions to be asked about how risk is constructed (structurally as well as individually), interpreted and perceived, and in turn, how these risk-constructs inform people's practices, activities and beliefs. As we have noted, the same groups of individuals are considered to be at risk of domestic fire: the very young and the very old are most at risk of fatality, while those living alone, are male, and poor are more likely to suffer a domestic fire. Conceptualising risk as a construct, thus encourages us to re-frame the question of 'What is it about these particular groups who appear to be susceptible to domestic fires?', with its inferences of victim blaming, to instead ask questions about how these groups conceptualise the risk of domestic fire, and how this impacts on how these groups mitigate against such constructed risks. To put the issue in more concrete terms, if Duncanson, Woodward, and Reid (2002) and others (e.g. Chandler, Chapman, and Hallington 1984; Merrall 2001; ODPM 2006) are correct in their analysis, those most at risk of fire tend to be poorer, older, and living in overcrowded conditions (to take just three variables among many identified), then adopting either a reflexive or behaviourist approach to mitigating risk among these groups may only go so far in understanding why they are most at risk to start with. Moreover, interventions, however tailored to each demographic (DiGuiseppi et al. 2000; Heimdell Consulting Ltd. 2007; GMFRS 2012), will not be able to make a significant contribution to the illumination of risk until more detailed understanding has been gained of how these groups conceptualise risk, and how externally operating structures *beyond* the scope of those behaviours and activities identifiable at an individual level, can be better understood to impact upon fire risk and its mitigation.

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Note

1. Key words searched for were: domest*AND fire*; risk* AND fire*; risk AND fire AND human behaviour; fire AND behave* and; home AND fire. We also conducted manual searches of 'Fire Safety Journal'; 'Journal of Occupational Accidents', the Health and Safety Executive Research Report database and the Royal Society for the Prevention of Accident website.

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