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Light me up: power and expertise in risk communication and policy-making in the e-cigarette health debates

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**Light me up: Power and Expertise in Risk
Communication and Policy Making in the e-
Cigarette health debates**

Abstract

This paper presents a detailed account of policymaking in a contemporary risk communication arena, where strong power dynamics are at play that have hitherto lacked theoretical analysis and empirical validation. Specifically, it expands on the understanding of how public health policy decisions are made when there is a weak evidential base and where multiple interpretations, power dynamics and values are brought to bear on issues of risk and uncertainty. The aim of the paper is to understand the role that power and expertise play in shaping public health risk communication within policy-related debates. By drawing on insight from interdisciplinary literature, the paper argues that there several interacting factors that shape how a particular narrative gains prominence within a wider set of perspectives and how the arguments and findings associated with that perspective become amplified within the context of policy choices. These findings are conceptualised into a new model - a policy evaluation risk communication (PERC) framework - and are then tested using the Electronic cigarette debate as a case study.

Introduction

Risk communication processes are critical in shaping public understanding of health-related risks (Bennett, 2010; Fischbacher-Smith, Irwin, & Fischbacher-Smith, 2010; Veland & Aven, 2013) and have become central to public health approaches in many countries, including United Kingdom (UK) (Alaszewski, 2005; de Jong, Ros, & Schrijvers, 2014; Plough et al., 2013). Risk communication is the exchange of risk information (resulting from both human and natural processes (Löfstedt, 2008; Veland & Aven, 2013)) between various stakeholder groups, such as government agencies, professional organizations, scientists, corporations and individual citizens (Covello, Slovic, & von Winterfeldt, 1986). Risk communication contributes significantly to shaping the public understanding of risk and influences the formulation of policy perspectives around managing risk (Fischbacher-Smith, 2012; Irwin, 2014; Smith, 1988; Stilgoe, 2007; Stilgoe, Irwin, & Jones, 2006; Welsh & Wynne, 2013; Wynne, 1996).

To be effective, risk communication needs to be framed so that the encoding of the message allows for its effective decoding by its recipients (Bernstein, 1964; Fortune & Peters, 1995). Any failure to ensure that this process takes place, can lead to distortion in the message and a misunderstanding of the nature of risk and associated uncertainty. Within this context, powerful interest groups have sought to use their knowledge and expert resources in a bid to protect their interests in public health policy making by shaping the discourse around risk (Demeritt & Nobert, 2014; Hardy & Maguire, 2016; McKell & De Barro, 2016; Smith, 1988, 1990; Veland & Aven, 2013; Warner & Kinslow, 2013).

This paper examines the processes of risk communication within the context of the electronic cigarette (vaping) debate within the UK. In particular, it considers how power and expertise shape public debates that involve a high degree of uncertainty and a requirement for an unambiguous burden of proof. Particular consideration is given to how policy decisions are made where there is a weak evidential base and where multiple interpretations, power dynamics and values are brought to bear on public health risk issues. The core of the paper examines how risk debates evolve such that a particular perspective becomes dominant in shaping policy. More

specifically, it explores how a risk argument evolves through the key stages of scientific verification and then policy formulation. A theoretical framework is proposed that recognises the role of power in that process - the PERC (Policy Evaluation Risk Communication) framework – and is applied to the case of E-Cigarettes.

Perspectives on Risk Communication

Literature on risk communication can be characterised by three overlapping perspectives: science and technology studies (STS), communication studies, and management (including risk and crisis management) (Irwin, 2014; Jasanoff, 2015; Renn, 2015; Stilgoe, 2016). These three perspectives correspond to Wardman (2008), “normative,” “instrumental,” and “substantive” imperatives that touch upon ‘values’, ‘power’ and ‘co-production’ respectively in risk communication. This study draws upon these three disciplinary perspectives, although it is more inclined towards the management perspective, and subscribes to the view that risk communication is “a field of play and competition” (Bourdieu, 1998) between competing stakeholders’ interests (Petts et al., 2001; Pidgeon & Barnett, 2013). Stakeholders include: government agencies, professional organizations, scientists, corporations, non-governmental organisations and individual citizens (Covello et al., 1986; Irwin, 1995). Each stakeholder seeks to frame the agenda in a way that serves their own interest and drives the communication dynamics of their own discourse (Murdock et al., 2003; Pidgeon & Barnett, 2013). Cognitive framing processes typically define the nature of the risk problem when establishing the source of the hazard, and suggesting policy solutions (Entman, 2014; Fischbacher-Smith et al., 2010), typically in turn influencing the parameters of risk communication as essentially technocratic in scope and reliant on expert judgement.

Unfortunately, this means that risk communication is often prone to abuse by powerful interest groups, especially where there is considerable uncertainty around the nature of the risk and where vested interests combine with unequal status between stakeholder groups (Collingridge & Reeve, 1986b; Smith, 1990). Such inequalities can create significant differences in the representations of the risks (Taghavifard, Damghani, & Moghaddam, 2009), especially in new and emergent

forms of activity where there is little or no prior scientific understanding of the nature of the hazards.

Understanding risk is, therefore, a potentially double-edged process. Whilst the potential for harm in activities is often the dominant perspective of policy-makers, inadequacies or errors in understanding and framing risk can cause delays in developing appropriate policy interventions (Bero, 2003). In healthcare, these delays could potentially be lifesaving or life enhancing whilst errors in framing risk may result in policy interventions that do not reflect the available evidence, resulting in either over-regulation that could be costly and over-precautionary, or under-regulation with resultant prolonged public exposure to health risks and danger (Diggle, 2010). The negative consequences can be heightened where there is considerable scientific uncertainty about the nature of the risk and its emerging properties, with associated impacts upon sense making and the risk assessment process (Bennett, Calman, Curtis, & Fischbacher-Smith, 2010; Renn, 2008). Typically, it is the less powerful groups among larger sections of society who will bear the consequences of any errors in policy decisions.

The Evolving Risk Debate – Public Concerns, Expert Speculation and Media Attention

Concerns around public health, coupled with anecdotes and negative tales of personal experiences, often attract media attention (Bromley & Segerson, 2012) and create a wider awareness of the issues (Shih, Wijaya, & Brossard, 2008). Anecdotes, such as a doctor reporting an observation of an increase in incidences of lung cancer amongst smokers (Kasperson et al., 1988), can significantly shape public perceptions and policy perspectives towards the management of risk, even if only by providing hypotheses for scientific research (Moore and Stilgoe, 2009). Issue attention occurs where a risk issue suddenly becomes a focal point of media and public debate for a period of time, thereby creating political pressure for risk assessment (Downs, 1996). Gaps in the knowledge base or insufficient information are often addressed by seeking out potential sources of expertise (Kandlikar, Ramachandran, Maynard, Murdock, & Toscano, 2007). Technical expert judgements of risk are often deemed more credible than lay perspectives, because

of the legitimacy associated with their knowledge domain. However, when experts move outside of that knowledge domain, their ability to make ‘expert’ judgements is eroded. Thus, although many debates around risk are seen to be technical in their scope, there has been criticism of this technocratic view by those who see many of the interpretations about risk as social constructions where experts move outside of their knowledge domain (see, for example, Beck, 1986, 1992; Giddens, 1990; Nelkin, 1989; Stallings, 1990).

Technical Debate

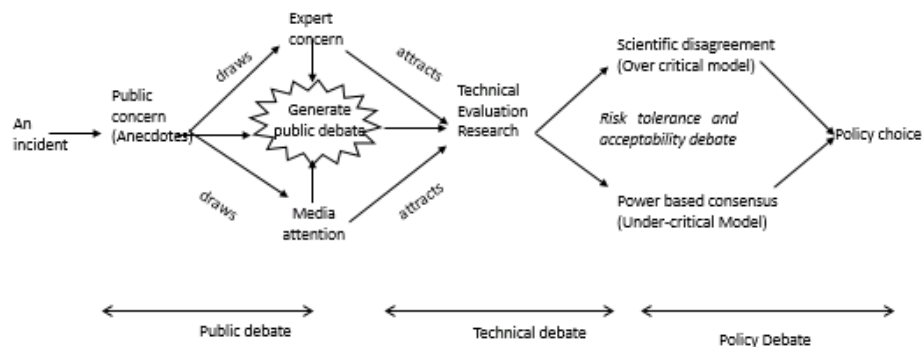
Technical verification of a public health risk is essential for rationalising policy decisions and risk mitigating strategies that are already in place (Fischer, 1990, 1998). Technical verification uses a scientific and evidence-based methodology in determining areas of known fact and determining their significance to public health and safety. Evidence from this process then shapes the state of knowledge but it can often struggle to deal with issues of emergence and the way that uncertainty is communicated. Emergence may therefore continually shift the requirement for a clear burden of proof amongst competing stakeholders. Problems may also arise from disciplinary differences because of epistemological and methodological differences with regard to facts, rigor, causal explanations and research goals (Collingridge & Reeve, 1986b). These differing paradigms may lead to different conclusions, thereby creating ambiguity and tension in how risk is identified and framed around policy debates. It is here that the dominant ideology and core belief of technical experts can combine with powerful interests to shape policy on the issue (Collingridge & Reeve, 1986a; Collingridge & Reeve, 1986b; Fischer, 1990).

Collinridge and Reeve (1986a; 1986b) suggest that technical inputs into policy debates can either heighten conflict or create a sense of agreement about the issues. Science can therefore contribute to either an under-critical debate where there is no effective dialogue due to the role played by powerful interests in suppressing opposing views, or an over-critical debate where there is perpetual conflict around the issues. (Collingridge & Reeve, 1986b). The effect of science within the policy making process is thus determined by who has power to influence the policy process. Technical verification may in turn influence debates around risk

tolerability and acceptability. The core argument here is that risk assessment is not simply a matter of science as an objective analysis of evidence, rather, risk assessment creates contexts within which statements and operations sound ‘scientific’ and valid (Latour, 1987). The interaction and communication between certain stakeholder groups allow privileged access to exclusive information and policy makers, enabling them to discuss and express certain political opinions that can have powerful influences on policy-choices (Sutton, 1999). Policy framing of public health risk is essential as it is often followed by risk reduction actions (Korn, Gibbins, & Azmier, 2003) designed to bring about the desired behavioural responses.

Figure 1 depicts the different stages of an evolving risk debate from initial anecdote to policy formulation. While Figure 1 shows a linear flow from public concern to policy debate, in reality, risk debates may begin at any stage and iterate, similarly public health risk arguments may emerge at all stages at the same time. Figure 1 highlights the relationships between the technical evaluation of risk and policy debate and policy formation.

Figure 1: The different stages of risk debate

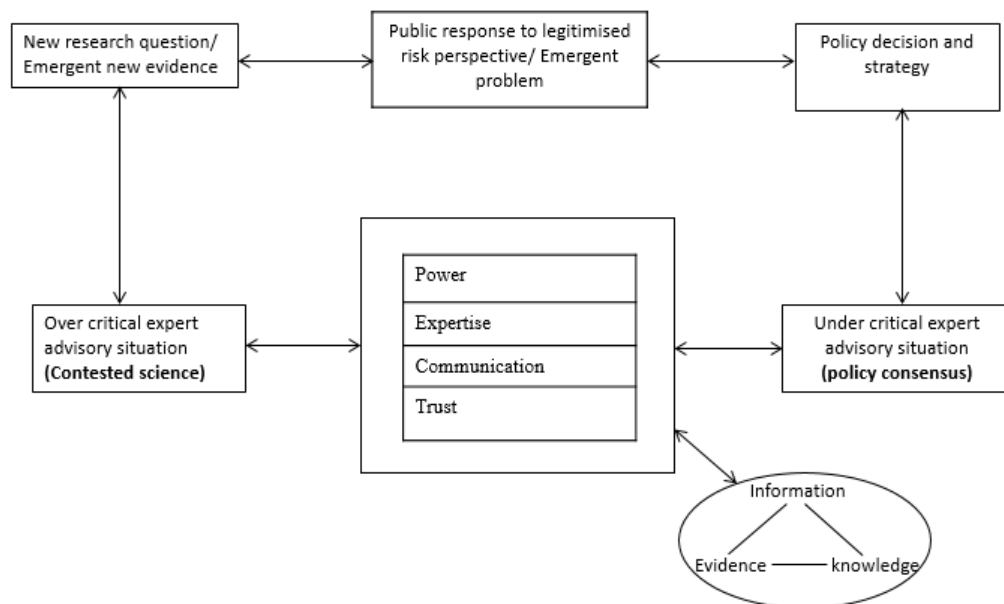


The Policy Evaluation Risk Communication (PERC) Framework

The Policy Evaluation Risk Communication (PERC) framework (see Figure 2) illustrates the factors that influence how policy-makers evaluate risk and uncertainty, especially where there are multiple perspectives, strong power

dynamics and values at play. The PERC framework assumes that the “social amplification of risk” (Kasperson et al., 1988; Renn, Burns, Kasperson, Kasperson, & Slovic, 1992) drives the transition of risk debates between the over critical and under critical models. The PERC framework identifies power, expertise, communication and trust as key factors shaping the amplification (or attenuation) of risk perspectives within the policy context. The framework also shows that the evolving nature of information, evidence and knowledge shapes how power, expertise, communication and trust are brought to bear on risk communication, and in turn further shape a risk argument.

Figure 2: Policy Evaluation Risk Communication (PERC) framework



Power: Policy arguments relating to risk are embedded within institutional, productive, structural and resistive forms of power, which means that power is fluid and creates imbalances in ways that enhance or inhibit certain stakeholder groups’ influence on risk communication. Power may be exercised by shaping the policy agenda (Bachrach & Baratz, 1962), controlling risk information and expertise (Lukes, 2005), establishing stakeholder relationships (Barnett & Duvall, 2005) and resisting dominant worldviews (Foucault, 1980).

By shaping the risk agenda and prioritising policy objectives, policy makers and regulators are able to shape the direction of the risk debate and the issues that are

deliberated upon. The ability to control risk information, validate appropriate expertise and decide what, when or how much information or expertise is made available or concealed, may also drive the amplification (or attenuation) of certain policy arguments relating to risk. In addition, there is the power that comes with a stakeholder relationship that allows an exchange of views and political opinions and may generate a dominant hegemony within certain risk discourses. In addition, risk communication practices (Power, 2007) that view science as superior to other forms of knowledge and expertise and which shape how risk is accessed, interpreted and communicated are further avenues for social amplification (or attenuation) of public health risk.

Expertise: Another driver of the amplification (or attenuation) of risk within the policy domain is how experts interpret evidence, what constitutes evidence, and whose expertise is legitimised (Collingridge & Reeve, 1986b; Irwin, 1995). Research suggests that technical, rather than experiential expertise has more credibility and so technical expertise is often privileged within the policy context. However, several problems with the use of technical expertise have been identified as influencing how evidence is interpreted and risk signals framed. These include the domain specificity of expertise, the interdisciplinary nature of public health risk, the “paradigm blindness” (Fischbacher-Smith, 2012) that often influences how experts acknowledge challenges to their worldview, and the fact that technical expertise is socially constructed through established training and validation structures that can reinforce powerful and vested interests. It is therefore important that other forms of expertise are considered especially the experience of those who are in close proximity to the risk, in order to improve on the robustness of evidence (Stilgoe, 2007) and to ease the burden of proof (Fischbacher-Smith & Fischbacher-Smith, 2009).

Communication: How risk is communicated between various stakeholder groups is another factor that shapes risk amplification (Smith & Irwin, 1984; Smith & McCloskey, 1998). Using language relevant to all stakeholders involved in risk communication is essential in terms of translating the language of an expert in a way that is usable by decision or policy makers, while highlighting uncertainties where they exist (Adekola, Fischbacher-Smith, Fischbacher-Smith, & Adekola,

2017; Smith, 1990; Smith & McCloskey, 1998). The use of language where the receptor cannot decode the meaning reduces or amplifies the significance and use of any expert proposition.

Also important is the quality of the feedback so that sensitive issues are addressed and dealt with appropriately: one-way risk communication may heighten tensions around risk acceptability, as it does not allow for clarification of meaning or discussion of sensitive issues. Furthermore, where the language of uncertainty is used, stakeholders have more scope to refute or undermine damaging arguments, speculations may increase, and the operating theories brought to bear on debates may push arguments towards an over critical model.

Trust and credibility: Evidence from the literature has highlighted the importance of trust or perceived credibility of the source of risk information (Mayer et al., 1995). The credibility of the source contributes to whether messages resonate with the audience (Frewer et al., 2003). Distrust contributes to heightened resistance in risk arguments that often leads to a distortion of the risk message. However, under circumstances where there is trust, the receiver of risk information may even become a walking and talking advertisement actively sharing the views of the other actors among his social network that may bring about hegemony of risk discourse in the policy domain.

Information, evidence and knowledge: What is also important is how power, expertise, communication and trust are contingent upon the evolving nature of information, evidence and knowledge and how that can potentially shift risk arguments forward and backward between under critical and over-critical models (Fischbacher-Smith, 2012; Smith, 1990). As information, evidence and knowledge become available, it is possible that the uncertainty present in the discussions may decrease. This may result in a shift in the balance of power between the different stakeholders, alter how power and expertise are effected and in turn, influence the nature of communication and trust and how the public perceived risk communication.

Behavioural response to institutionalised policy perspective: Policies that are designed to mitigate public health risk often prompt behavioural responses to perspectives about the nature of those risks. Significant response mechanisms are: the nature of social trust in policy makers and public health institutions (Renn & Levine, 1991), the ability of individuals or groups to resist a legitimised risk perspective, signal value (Kasperson, 2012), and the distribution of costs and benefits that can steer emotional responses to institutionalised policy perspectives (Adekola et al., 2017). Undesired behavioural responses or emergent problems may compel the government to change its policy and risk mitigating strategy. This is akin to Foucault's resistive power (Foucault, 1982) but may not accompany change to deep core policy ideologies or beliefs (Sabatier & Jenkins-Smith, 1993) in relation to the risk.

Behavioural responses may also create unintended problems due to the emergent properties of risk, in turn giving rise to new areas of uncertainty, new research questions and challenges to existing policies. New research questions and new evidence following a technical verification may move risk arguments towards the over critical model and restarting the entire debate. The assumption made by the PERC framework is that policy debates relating to risk arise from, and are conducted within, a public space in which there are multiple interactions between power and expertise that enhance or inhibit risk communication. These interactions can also create or destroy trust and credibility, and privilege certain social and professional relationships over others. As such, a degree of bias can arise from the asymmetries of power underpinning these interactions and processes that in turn, perpetuate the domination of certain risk perspectives and/or shape the prioritisation of issues and debates in the policy domain.

Methodology

This paper draws on archival and documentary relating to E-cigarettes as a means of developing and applying the PERC framework. The case is one of 3 employed in the full research study from which this paper derives. The records allow examination of a chronology of the debate and insight into how communications took place and between whom; i.e. there is a breadth of coverage of events and contexts over time

(Yin, 2011, 2013). Documentary data sources also help establish the validity of interpretations (Briggs, Morrison, & Coleman, 2012) within the cultural context in which they were generated (Briggs et al., 2012). Sources used include press releases, articles and media statements, official documents from government departments and organisations, reports from non-profit organisations, and scientific committee reports.

In analysing the data, close attention was paid to the description and scope of published sources used, sampling frames, and summaries of data collection procedures. Document analysis was undertaken in light of established social science methods (Bowen, 2009) where the study of evolving events develops a sound understanding of a case study (Elo & Kyngäs, 2008). Evidence provided in this study is presented chronologically (Baxter & Jack, 2008; Sandelowski, 2000) allowing debates to be understood as they occur.

The emergence of Vaping as an alternative to cigarettes

The current debate around the safety of e-cigarettes (popularly known as vaping) emerged following the introduction of electronic cigarettes (EC) into the European market in 2006 in what was initially seen as a safer alternative to conventional cigarettes. However, in 2008, the World Health Organisation (WHO) raised concerns about the promotion of these “safer alternatives” because of the then under-developed scientific understanding of their safety and efficacy (WHO, 2008). In July 2009, they raised further concerns that ECs were being targeted at young people and that EC packages lacked appropriate health warnings (CASSA, 2014). Thereafter, a series of industry-commissioned and other studies took place, each presenting differing accounts of the risks, thereby generating a contested environment around issues of safety.

A report commissioned by EC manufacturer Ruyan, for example, reported ECs to be a safer alternative to conventional cigarettes with only trace toxins found to be contained within them (Laugesen, 2008). The report claim that ECs containing nicotine reduced the desire to smoke, were more pleasant to use than the nicotine inhalators, and performed significantly better than a placebo EC (Bullen et al., 2010).

Flouris and Oikonomou (2010) reviewed reports published by the US Food and Drugs Administration (FDA), Health New Zealand (HNZ), a private enterprise, and Demokritos, a publicly funded Greek research institute. The reports revealed similar findings in that they identified different harmful constituents of EC liquid content, but differed in their interpretations of the implications. The US FDA focused on the potential harm of the liquid contents to human health, whilst the HNZ focused on the relative risks of tobacco and ECs. In contrast, the Demokritos report focused mainly on the consumer experience, whilst maintaining a neutral position of the safety or efficacy of ECs.

Unsurprisingly, given the growth of the EC market, and the nature of the emerging scientific evidence, reports and reviews of this nature were produced at an increasing rate and reflected the various ways in which the debate could be considered. Eissenberg (2010) reported, for example, that ECs were less effective in suppressing cravings than conventional cigarettes, raising further questions about whether ECs were the efficient replacement manufacturers claimed. Bullen et al (2010) addressed the short term effect of an EC delivery on desire to smoke and on withdrawal, and suggested that ECs could be used as an aid to stopping smoking and had potential for long term use (Bullen et al., 2010). In 2011, the British Cabinet Office's Behavioural Insights Team (BIT) endorsed tobacco harm reduction. ECs were cited as potentially effective substitutes for tobacco that could save tens of thousands of lives (Stratton, 2011).

2012 then saw position statements from consumer groups such as the Consumer Associate or Smoke Free Alternative Association (CASAA), Electronic Cigarette Consumer Association UK (ECCA UK), Stelda NL (Netherlands), and other European companies who also organized the first World Vaping Day, calling for their right to vape (CASSA, 2014). At the same time, questions were raised about the significance of passive vaping in the debate. Schripp, Markewitz, Uhde, and Salthammer (2013), for example, found that ECs do not produce second-hand smoke as conventional cigarettes do. Instead, bystanders are exposed to a mist of exhaled vapour, which undergoes changes in the human lungs similar to decomposition and evaporation (Schripp et al., 2013). This view positioned the rights of vapers and the rights of non-vaping bystanders directly in conflict. By the end of 2012, several

studies concluded that ECs are safer when compared to tobacco smoking, and are an effective smoking cessation aid, see for example, (Bullen et al., 2010; Etter & Bullen, 2011; Flouris et al., 2012). Other studies raised caution, pointing to passive vaping, inconsistency with labelling, and questioning the long term benefit of vaping, see for example, (Eissenberg, 2010; Schripp et al., 2013).

Between 2013 and 2016, emphasis on EC regulation grew, and tensions heightened as the tobacco industry became involved in the debates. Fierce scrutiny of evidence and arguments between stakeholder groups served to increase the degree of difference between stakeholders' points of view just as, in January of 2013, the first television advert for ECs on a national, mainstream British channel was launched by E-Lites (Sweney, 2013). In March 2013, the outcome of a public consultation to bring nicotine-containing products (NCPs), including ECs within the medicines licensing regime was published by the Medicines and Healthcare Products Regulatory Agency (MHRA). Medical and public health communities strongly supported regulating ECs under the medicines regulatory framework (MHRA, 2013). Those against the MHRA medical framework regulation were mainly importers and users of unlicensed electronic cigarettes who feared it could lead to a ban on available products, which would force EC users back into smoking tobacco (MHRA, 2013).

The Commission on Human Medicines (CHM) which advises the UK government on medicines then established an expert working group (MHRA, 2013). Three months later, the MHRA announced that the UK Government had decided that it would regulate all NCPs, including ECs, as medicines to ensure the safety of the product and to address the issue of distrust about the quality of some EC devices and their content. Thus, although some proponents of ECs considered them beneficial to public health, the policy stance adopted was that ECs were at that point, an inadequate intervention.

The decision to regulate ECs in the same way as medical devices was taken to ensure that high quality products were made widely available and that smokers had an effective alternative. Regulation and marketing of ECs thus changed in ethos and

focus from a consumer product that was not subject to test before being put on sale to the public, to one which is regulated under the medicines regulatory framework, requiring manufacturers to apply for a medicinal licence from the Medicines and Healthcare products Regulatory Agency (MHRA).

Later in 2013, British American Tobacco (BAT) and China National Tobacco Corporation jointly invested in a subsidiary (CTBAT International Limited) to launch their first EC product, Vype, in the UK (BAT, 2014). In February of 2014, the European Parliament approved a revised European Union Tobacco Product Directive. This regulates ECs with more than 20 mg/ml nicotine concentrations; a quantity equal to that in a pack of cigarettes (Gallagher, 2014) or with intended therapeutic use, following which they fell under the medical devices directives. The directive stipulated that ECs had to be childproof, packaging should have information relating to liquid composition, effects, with health warnings (EC, 2014).

Unsurprisingly, this was met with divergent views on the extent to which young people would be deterred from smoking (Gallagher, 2014), a divergence further fuelled by subsequent revisions to the Directive. Because of subsequent directives, advertising was prohibited for nicotine containing devices not licensed as medicines, health warnings are to be placed on all products and, data on nicotine uptake are to be provided subject to restrictions on total nicotine content. When used under normal conditions, suppliers are to take total responsibility for quality and safety (EC, 2014). Any EC that was not regulated by MHRA would be governed under the European Union Tobacco Products Directive (TPD) (EC, 2014).

The on-going divide within the scientific and public health communities was clearly illustrated when, in 2014, 53 nicotine science specialists and public health policy experts wrote to Dr. Margaret Chan, of the World Health Organization (WHO). In the letter, they argue that regulating ECs similar to tobacco products would reduce the numbers of people relying on ECs to stop smoking and this, could potentially cost lives (Dreaper, 2014). They viewed ECs a significant step in health innovations made in the 21st century that could potentially save millions of lives. They asked WHO to resist the urge to control and suppress EC (Dreaper, 2014; Nicotinepolicy.net, 2014).

In response, 129 public health and medical experts from 31 countries of WHO region, signed a letter to Margaret Chan. This group of experts, in contrast, called for new controls on EC and warning of tobacco industry tactics (Aktan et al., 2014) and urging the WHO to be mindful of tobacco industry tactics in shaping arguments around EC regulation.

Similar divisions and disagreement were played out in the UK. The British cabinet office were optimistic about the potential benefits of ECs as an effective aid to smoking cessation and offering a safer alternative to those who do not want to quit smoking. The Behavioural Insights Team (BIT, also known as the ‘Nudge Unit’) as early as 2011 endorsed ECs as potentially effective substitutes to tobacco (Stratton, 2011), whereas other public institutions such as the British Medical Association (BMA), the UK Faculty of Public Health, and the European Commission took a precautionary stance and called for strict control and regulation of EC devices. They also expressed concern that ECs may be a potential gateway to re-normalizing smoking (Rigotti, 2015) and might be exploited by the tobacco industry (Kremer, 2013). For example, the BMA raised concerns that ECs may re-normalise smoking, such that could undermine the smoking bans that helped de-glamorise tobacco in United Kingdom (Kremer, 2013). Other areas of contention included: inadequate safety controls to prevent accidental injury, monitoring of trends in dual use of EC in combination with continued tobacco smoking, regulation of marketing activity, and the involvement of the tobacco industry in the EC market.

The EC Debate through a PERC Lens

The central actors involved in the initial phase of the debate were:

- the WHO, which raised the concern on the lack of evidence around the safety and efficacy of ECs;
- the scientific community who are called upon to conduct more research in this arena; and
- EC companies and retailers who claim that ECs are a safe alternative to tobacco and who benefit commercially.

The EC debate occurred in a social-political context where information and communication technologies (ICT) allow interactive and instant debate and where, in contrast to tobacco debates in the 1950s, there is more emphasis on citizens' participation and deliberative policy making. The unfolding of events suggested a sharp divide within the scientific and public health communities in their interpretation of available evidence that mirrored a divide in the wider society. This illustrates Collingridge and Reeve's (1986) over-critical model, where the science is contested and where multiple interpretations exist around available evidence. The core argument concerned the need to "*get the regulatory framework right*" for a device that could potentially save thousands of lives (Stratton, 2011); the need for more research to be done before any conclusions can be drawn (Smith, 2012); and the need to retain familiar habits and nicotine intake, to encourage cessation (CASSA, 2012). This period was marked at the end of 2012 by the entry of big tobacco companies into the electronic cigarette market creating tension and heightened scrutiny in the risk acceptability debate thereon.

With reference to the PERC framework, the evolving events suggest that the *institutional* power of the WHO was significant in pointing out that the lack of knowledge about the safety and efficacy of ECs was important within the context of their declared public health benefit. The WHO's call for research into the safety and efficacy of ECs seems to have driven scientific research around safety and efficacy. The MHRA-led public consultation on how to regulate ECs also influenced the direction of the vaping debate. This shifted the decision making power from the policy to the public domain, although this may have been a reflection of a more general shift towards democratic policy making in contemporary political life. In terms of expertise, the public relied on technical expertise to make sense of the benefits or risks of electronic cigarettes. This suggests that while the public were involved in decision-making relating to regulation; public engagement in the development of accepted knowledge around the safety and efficacy of ECs was limited to the acceptability debate with scientists playing leading role in the technical debate. The vaping debate also highlights how the presence or absence of trust could influence the nature of tension, and scrutiny of the debate around risk acceptability. For example, the entry of powerful tobacco companies in the EC industry fuelled

tension and suspicion, and further heightened scrutiny of evidence and arguments brought by stakeholders in the vaping risk debate.

In the second examined phase of the vaping debate (the period between 2013 and 2016), the entry of tobacco companies in the EC market saw more heightened tension and scrutiny of scientific evidence and interpretation. This created greater visibility for divisions and disagreements between the various stakeholders groups. Some of the situational factors that may have contributed to this scientific division and disagreement are: (a) the absence of economically resourced stakeholder groups before late 2012, (b) caution towards the use of delay tactics by EC companies in the same way as was seen in the tobacco debate, and (c) the fact that political power was less obvious earlier on in the technical debate relating to vaping. The results of the MHRA-led consultation were also published in this period. Medical and public health communities strongly supported the application of the medicines regulatory framework on ECs (MHRA, 2013). However, there were concerns on the part of marketers and users of unlicensed ECs that inappropriate regulation could lead to a ban on available products. Three months after the publication of the public consultation, the UK Government announced that all NCPs, including ECs, would be regulated as medicines and thereafter, the EU directive was adopted.

With reference to the PERC framework, *structural* power can be seen to be expressed for instance in the stakeholder relation between expert committees and policy makers. For example, in 2015, shortly after the public health England's expert conclusion that ECs are around 95% less harmful than smoking (McNeill et al., 2015), the UK government made the decision that EC could be prescribed by NHS doctors to help smokers who wanted to quit smoking (Tonkin, 2015). Such a stakeholder relationship privileges this kind of technical expertise over other forms of expertise (e.g. experiential expertise) in the policy perspective taken to risk as it provides a platform for interaction and exchange of views with policy makers. Stakeholder relationships create power imbalances altering the degree of influence that stakeholder groups are able to bring to bear on public health risk communication.

What was also important were how technical experts' interpretations and frames of argument shaped the discourse around vaping risk. There were scientists and public health expert groups who viewed ECs as an effective aid to smoking cessation, and a safer alternative to those who do not want to quit smoking. On the other hand, there were those who called for a precautionary stance and for stricter control and regulation of EC devices. The latter group of experts expressed concern that ECs may be a potential gateway to renormalizing smoking, undermining several years of effort in deglamourizing smoking, and that ECs may be exploited by the tobacco industry to recruit non-smokers and children who may then go on to smoke cigarettes. The nature of interpretation is dependent on how the relative risks are judged, from the perspective of either the smokers or non-smokers.

In terms of communication, one unique feature of this debate was how MHRA-led public consultation allowed a two-way communication between policy makers and the public, and how that has allowed different group of stakeholders to exchange views and opinions with policy makers. This may have eased public acceptability of EC regulation under the medical regime, as the public felt trusted and included in the decision as seen in the report of the consultation that shows a strong public support for medical consultation of ECs. The vaping debate also highlights the importance of (mis)trust in public health risk communication, around how the presence or absence of trust could influence the nature of tensions in, and scrutiny of the debate around risk acceptability. An important issue within this latter stage of the debate was how entrenched mistrust inherited from the smoking debate shaped the vaping debate. This was evidenced in the signed letter to Margaret Chan, of World Health Organisation – referred to earlier - that called for new regulation and control of ECs and expressed scepticism about the involvement of industry in public debate.

Conclusions

What will it take to protect public health risk communication within policy-related debates from a group of few influential people who may use opportunities within their reach for personal or group gains at the detriment of public health benefit? This question is pertinent where there is considerable uncertainty around the nature of the

risk and where vested interests combine with unequal status between stakeholders groups exist in a risk arena?

Firstly, there is the need to ensure that policy makers, risk regulators, and stakeholder representatives engage in a more open and transparent process of risk identification, communication and validation. This is important if policy choices are to reflect public concerns that it serves. This could also be beneficial in easing tensions around public acceptability of risk and build the much needed trust relationship between all stakeholders in risk communication. The MHRA led public consultation on whether to regulate ECs as medical devices enabled different groups within the public to express their views and input into the UK government decision to: regulate EC as medical devices and NHS doctors to help smokers who wanted to quit smoking can prescribe. Such risk communication practices could potentially eliminate inequalities in the representations of the risks that are often amplified by privileged stakeholder's relationship in the policy perspective taken to risk. Besides, relying too much on technical expertise neglects other forms of (experiential) expertise, thus, this reinforces potential misconceptions about the threats to public health and safety, especially if the dominant view is around the need for proof of harm rather than proof of safety.

An alternative would be to take more a precautionary approach to dealing with the introduction of new forms of activity that may represent the potential for harm, although there are also challenges (e.g. over regulation) with such an approach (Calman & Smith, 2001; Fischbacher-Smith & Calman, 2010). In engaging the wider public, there is an opportunity to take advantage of recent advances in communication technology (e.g. social media) to share views, information, expertise and opinion and, to an extent, redistribute power associated with control of communication (Riedlinger & Rea, 2015).

Secondly, academics have a responsibility to ensure the integrity of evidence that is relied upon for risk decisions. They must do more to interrogate new scientific evidence and challenge associated scientific assumptions that shape in particular, policy perspective taken to the risk. This was effectively illustrated in the e-cigarette debate where 129 public health and medical experts from 31 countries challenged the

arguments put forward by 53 nicotine science specialists and public health policy experts to WHO, saying that they should resist the urge to regulate ECs in the same manner as tobacco products (Dreaper, 2014). Such practices could potentially reduce the abuse of science for personal/group gains at the detriment of public health. It also creates an enabling environment where a balanced and robust science thrives, making it easy to discern science from political decisions.

Academics must also do more to counter the enduring ideology that the experience and expertise of those in close proximity to the risk is anecdotal and therefore, bad science. Rather, they should adopt an approach where contrary experiences are valued and determine how facts and evidence relate with them (Brown, 2016). Furthermore, academics can do more to make scientific information more useable and accessible to different public audience to enable them participate fully in policy decisions that affect them.

Thirdly, the media has a duty to ensure that there is unambiguous and balanced evidence based journalism and to ensure that this reflects the diversity of public concerns, more explicitly bringing these to the consciousness of experts, academics and politicians, and highlighting uncertainties where they exist. This is important in the social media age where it may be difficult to discern the differences between credible arguments from propaganda when dealing with public health risk issues or emergencies. Parents and educators also have a role here by ensuring that relevant skills such as *critical thinking* needed to evaluate the credibility of risk information are developed as early as possible.

Finally, care must be taken in how risk issues are coded to avoid communication barriers (Bernstein, 2003). Framing risk agenda and asking clear risk questions with, and for the public, void of complexity, has the potential to encourage public engagement in the policy decision processes. This in the case of the MHRA led public consultation resulted in 1,217 responses from different public groups (including medical profession and consumer of NCPs) who were able comment and express their views in the policy decision process.

Conclusively, if we are to ensure that policy decisions relating to risk are not solely the product of powerful stakeholders who are able to shape the risk debate, there is a need to embrace what Irwin (2015) described as “contemporary knowledge relations” (p.10) where citizens as well as scientific and institutional organisations engage in critical reflection and reflection-informed practice. In this way, there is greater potential to break power barriers in public health policy making.

References

- Adekola, J., Fischbacher-Smith, M., Fischbacher-Smith, D., & Adekola, O. 2017. Health risks from environmental degradation in the Niger Delta, Nigeria. *Environment and Planning C: Politics and Space*, 35(2): 334-354.
- Aktan, Ö., Alexanderson, K., Allebeck, P., de Araujo, A. J., Artundo, C. M., Asut, O., Atun, R., & Barnoya, J. 2014. 129 public health and medical authorities from 31 countries write WHO DG Chan urging evidence-based approach to ecigs.
- Alaszewski, A. 2005. Risk communication: identifying the importance of social context 1.
- Bachrach, P., & Baratz, M. S. 1962. Two faces of power. *American political science review*, 56(04): 947-952.
- Barnett, M., & Duvall, R. 2005. Power in international politics. *International Organization*, 59(1): 39-75.
- BAT. 2014. Our history – a timeline. British American Tobacco Website.
- Baxter, P., & Jack, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, 13(4): 544-559.
- Beck, U. 1986. *Risikogesellschaft: Auf dem Weg in eine andere Moderne*. Frankfurt: Suhrkamp Verlag.
- Beck, U. 1992. *Risk society. Towards a new modernity* (M. Ritter, Trans.). London: SAGE.
- Bennett, P. 2010. *Risk communication and public health*: Oxford University Press.
- Bennett, P., Calman, K., Curtis, S., & Fischbacher-Smith, D. 2010. Understanding public responses to risk: policy and practice. *Risk communication and public health*: 3-22.
- Bernstein, B. 1964. Elaborated and Restricted Codes: Their Social Origins and Some Consequences. *American Anthropologist*, 66(6_PART2): 55-69.
- Bernstein, B. B. 2003. *Class, codes and control: Applied studies towards a sociology of language*: Psychology Press.
- Bero, L. 2003. Implications of the tobacco industry documents for public health and policy. *Annual review of public health*, 24(1): 267-288.
- Bourdieu, P. 1998. Bourdieu: on television and journalism: London, Pluto Press.
- Bowen, G. A. 2009. Document analysis as a qualitative research method. *Qualitative research journal*, 9(2): 27-40.
- Briggs, A. R. J., Morrison, M., & Coleman, M. 2012. *Research methods in educational leadership and management*: Sage Publications.
- Bromley, D. W., & Segerson, K. 2012. *The social response to environmental risk: policy formulation in an age of uncertainty*: Springer Science & Business Media.
- Brown, T. 2016. Evidence, expertise, and facts in a “post-truth” society: British Medical Journal Publishing Group.
- Bullen, C., McRobbie, H., Thornley, S., Glover, M., Lin, R., & Laugesen, M. 2010. Effect of an electronic nicotine delivery device (e cigarette) on desire to smoke and withdrawal, user preferences and nicotine delivery: randomised cross-over trial. *Tobacco control*, 19(2): 98-103.
- Calman, K., & Smith, D. 2001. Works in theory but not in practice? Some notes on the precautionary principle. *Public Administration*, 79(1): 185-204.
- CASSA. 2012. World Vaping Day 2012, Vol. 2016.
- CASSA. 2014. E-cigarette History.
- Collingridge, D., & Reeve, C. 1986a. Science and Policy--Why the Marriage Is So Unhappy. *Bulletin of Science, Technology & Society*, 6(4): 356-372.
- Collingridge, D., & Reeve, C. 1986b. *Science speaks to power: the role of experts in policy making*: Pinter London.
- Covello, V. T., Slovic, P., & von Winterfeldt, D. 1986. *Risk communication: a review of the literature*: National Emergency Training Center.

- de Jong, C. C., Ros, W. J. G., & Schrijvers, G. 2014. The effects on health behavior and health outcomes of Internet-based asynchronous communication between health providers and patients with a chronic condition: a systematic review. *Journal of medical Internet research*, 16(1): e19.
- Demeritt, D., & Nobert, S. 2014. Models of best practice in flood risk communication and management. *Environmental Hazards*, 13(4): 313-328.
- Diggie, R. 2010. Regulatory science and uncertainty in the risk assessment of pesticide residues.
- Downs, A. 1996. 2.1. Up and Down with Ecology: The " Issue-Attention Cycle. *The Politics of American Economic Policy Making*: 48.
- Dreaper, J. 2014. 'Resist urge to control e-cigarettes', WHO told: BBC news.
- EC. 2014. Revision of the Tobacco Products Directive, Vol. 2014. European Commission.
- Eissenberg, T. 2010. Electronic nicotine delivery devices: ineffective nicotine delivery and craving suppression after acute administration. *Tobacco control*, 19(1): 87-88.
- Elo, S., & Kyngäs, H. 2008. The qualitative content analysis process. *Journal of advanced nursing*, 62(1): 107-115.
- Entman, R. 2014. Framing: Toward Clarification of a Fractured Paradigm URL: https://www.attorneygeneral.jus.gov.on.ca/inquiries/cornwall/en/hearings/exhibits.Mary_Lynn_Young/pdf/05_Entman.pdf Retrieved February, 13.
- Etter, J. F., & Bullen, C. 2011. Electronic cigarette: users profile, utilization, satisfaction and perceived efficacy. *Addiction*, 106(11): 2017-2028.
- Fischbacher-Smith, D. 2012. Getting pandas to breed: Paradigm blindness and the policy space for risk prevention, mitigation and management. *Risk Management*, 14(3): 177-201.
- Fischbacher-Smith, D., & Calman, K. 2010. A precautionary tale – the role of the precautionary principle in policy making for public health. In P. Bennett, K. Calman, S. Curtis, & D. Fischbacher-Smith (Eds.), *Risk Communication and Public Health*: 197-211. Oxford: Oxford University Press.
- Fischbacher-Smith, D., Irwin, A., & Fischbacher-Smith, M. 2010. Bringing light to the shadows and shadows to the light: risk, risk management, and risk communication.
- Fischbacher-Smith, D., & Fischbacher-Smith, M. 2009. We may remember but what did we learn? Dealing with errors, crimes and misdemeanours around adverse events in healthcare. *Financial Accountability & Management*, 25(4): 451-474.
- Fischer, F. 1990. *Technocracy and the Politics of Expertise*: SAGE Publications, Incorporated.
- Fischer, F. 1998. Beyond empiricism: policy inquiry in post positivist perspective. *Policy Studies Journal: Wiley Online Library*, 26(1): 129-146.
- Flouris, A. D., & Oikonomou, D. N. 2010. Electronic cigarettes: miracle or menace? *BMJ*, 340.
- Flouris, A. D., Poulianiti, K. P., Chorti, M. S., Jamurtas, A. Z., Kouretas, D., Owolabi, E. O., Tzatzarakis, M. N., Tsatsakis, A. M., & Koutedakis, Y. 2012. Acute effects of electronic and tobacco cigarette smoking on complete blood count. *Food and chemical toxicology*, 50(10): 3600-3603.
- Fortune, J., & Peters, G. 1995. *Learning from failure - The systems approach*. Chichester: John Wiley and Sons.
- Foucault, M. 1980. *Power/knowledge: Selected interviews and other writings, 1972-1977*: Pantheon.
- Foucault, M. 1982. The subject and power. *Critical inquiry*: 777-795.
- Gallagher, J. 2014. Tough EU smoking rules approved, *BBC News Health*.
- Giddens, A. 1990. *The consequences of modernity*. Cambridge: Polity Press.

- Hardy, C., & Maguire, S. 2016. Organizing risk: discourse, power, and “riskification”. *Academy of Management Review*, 41(1): 80-108.
- Irwin, A. 1995. *Citizen science: A study of people, expertise and sustainable development*: Psychology Press.
- Irwin, A. 2014. Risk, science and public communication. *Routledge Handbook of Public Communication of Science and Technology*: 160.
- Irwin, A. 2015. Citizen Science and Scientific Citizenship, *Science Communication Today*: Nancy Université.
- Jasanoff, S. 2015. 4. Science and technology studies. *Research Handbook on Climate Governance*: 36.
- Kandlikar, M., Ramachandran, G., Maynard, A., Murdock, B., & Toscano, W. A. 2007. Health risk assessment for nanoparticles: A case for using expert judgment. *Journal of Nanoparticle Research*, 9(1): 137-156.
- Kasperson, R. E. 2012. *Social Contours of Risk: Volume I: Publics, Risk Communication and the Social*: Routledge.
- Kasperson, R. E., Renn, O., Slovic, P., Brown, H. S., Emel, J., Goble, R., Kasperson, J. X., & Ratick, S. 1988. The social amplification of risk: A conceptual framework. *Risk analysis*, 8(2): 177-187.
- Korn, D., Gibbins, R., & Azmier, J. 2003. Framing public policy towards a public health paradigm for gambling. *Journal of Gambling Studies*, 19(2): 235-256.
- Kremer, W. 2013. E-cigarettes: Is a smoking alternative being choked by regulation?, *BBC News Magazine*.
- Latour, B. 1987. *Science in action: How to follow scientists and engineers through society*: Harvard university press.
- Laugesen, M. 2008. Second Safety Report on the Ruyan® e-cigarette. *Cell*, 27(488): 4375.
- Löfstedt, R. 2008. *Risk management in post-trust societies*: Earthscan.
- Lukes, S. 2005. *Power: A radical view*: Palgrave Macmillan.
- McKell, S., & De Barro, P. 2016. Between Two Absolutes Lies Risk: Risk Communication in Biosecurity Discourse, *Communicating Risk*: 229-241: Springer.
- McNeill, A., Brose, L. S., Calder, R., Hitchman, S. C., Hajek, P., & McRobbie, H. 2015. E-cigarettes: an evidence update. A report commissioned by Public Health England. *Public Health England*.< www.gov.uk/government/uploads/system/uploads/attachment_data/file/454516/E-cigarettes_an_evidence_update_A_report_commissioned_by_Public_Health_England.pdf>(Accessed August 22, 2015).
- MHRA. 2013. UK moves towards safe and effective electronic cigarettes and other nicotine-containing products.
- Murdock, G., Petts, J., Horlick-Jones, T., Pidgeon, N., Kasperson, R. E., & Slovic, P. 2003. After amplification: rethinking the role of the media in risk communication. *The social amplification of risk*: 156-178.
- Nelkin, D. 1989. Communicating technological risk: The social construction of risk perception. *Annual review of public health*, 10(1): 95-113.
- Nicotinepolicy.net. 2014. Statement from specialists in nicotine science and public health policy.
- Petts, J., Horlick-Jones, T., Murdock, G., Hargreaves, D., McLachlan, S., & Lofstedt, R. 2001. *Social amplification of risk: The media and the public*: HSE Books Sudbury.
- Pidgeon, N., & Barnett, J. 2013. Chalara and the Social Amplification of Risk. *London: Department for Environment, Food and Rural Affairs*.
- Plough, A., Fielding, J. E., Chandra, A., Williams, M., Eisenman, D., Wells, K. B., Law, G. Y., Fogleman, S., & Magaña, A. 2013. Building community disaster resilience:

- perspectives from a large urban county department of public health. *American journal of public health*, 103(7): 1190-1197.
- Power, M. 2007. Organised Uncertainty: Oxford University Press: Oxford.
- Renn, O. 2008. *Risk governance: coping with uncertainty in a complex world*: Earthscan.
- Renn, O. 2015. Stakeholder and public involvement in risk governance. *International Journal of Disaster Risk Science*, 6(1): 8-20.
- Renn, O., Burns, W. J., Kasperson, J. X., Kasperson, R. E., & Slovic, P. 1992. The social amplification of risk: Theoretical foundations and empirical applications. *Journal of social issues*, 48(4): 137-160.
- Renn, O., & Levine, D. 1991. *Credibility and trust in risk communication*: Springer.
- Riedlinger, M., & Rea, J. 2015. Discourse Ecology and Knowledge Niches Negotiating the Risks of Radiation in Online Canadian Forums, Post-Fukushima. *Science, Technology & Human Values*: 0162243915571166.
- Rigotti, N. A. 2015. e-Cigarette Use and Subsequent Tobacco Use by Adolescents: New Evidence About a Potential Risk of e-Cigarettes. *JAMA*, 314(7): 673-674.
- Sabatier, P. A., & Jenkins-Smith, H. C. 1993. *Policy change over a decade or more*: PA.
- Sandelowski, M. 2000. Focus on research methods-whatever happened to qualitative description? *Research in nursing and health*, 23(4): 334-340.
- Schripp, T., Markewitz, D., Uhde, E., & Salthammer, T. 2013. Does e-cigarette consumption cause passive vaping? *Indoor Air*, 23(1): 25-31.
- Shih, T.-J., Wijaya, R., & Brossard, D. 2008. Media coverage of public health epidemics: Linking framing and issue attention cycle toward an integrated theory of print news coverage of epidemics. *Mass Communication & Society*, 11(2): 141-160.
- Smith, C. 2012. Standard Life bans employees from smoking electronic cigarettes at work, *The Scotsman*.
- Smith, D. 1988. Corporate power, risk assessment and the control of major hazards: A study of Canvey Island and Ellesmere Port. *Unpublished PhD Thesis, Department of Science and Technology Policy, University of Manchester*.
- Smith, D. 1990. Corporate power and the politics of uncertainty: Risk management at the Canvey Island complex. *Industrial Crisis Quarterly*, 4(1): 1-26.
- Smith, D., & Irwin, G. A. 1984. Public attitudes to technological risk: The contribution of survey data to public policy-making. *Transactions of the Institute of British Geographers*, 9(4): 419-426.
- Smith, D., & McCloskey, J. 1998. Risk communication and the social amplification of public sector risk. *Public Money and Management*, 18(4): 41-50.
- Stallings, R. A. 1990. Media discourse and the social construction of risk. *Social problems*, 37(1): 80-95.
- Stilgoe, J. 2007. The (co-) production of public uncertainty: UK scientific advice on mobile phone health risks. *Public Understanding of Science*, 16(1): 45-61.
- Stilgoe, J. 2016. Scientific advice on the move: the UK mobile phone risk issue as a public experiment.
- Stilgoe, J., Irwin, A., & Jones, K. 2006. The received wisdom: Opening up expert advice.
- Stratton, A. 2011. Try smokeless nicotine cigarettes, says government, *The Guardian*.
- Sutton, R. 1999. *The policy process: an overview*: Overseas Development Institute London.
- Sweney, M. 2013. E-cigarette company to launch TV advertising campaign, *The Guardian*.
- Taghavifard, M. T., Damghani, K. K., & Moghaddam, R. T. 2009. Decision Making Under Uncertain and Risky Situations: Society of Actuaries.
- Tonkin, S. 2015. First e-cigarettes to be prescribed on the NHS in the New Year but ministers 'wanted to keep it quiet in case GPs are overrun' *Mail online*.
- Veland, H., & Aven, T. 2013. Risk communication in the light of different risk perspectives. *Reliability Engineering & System Safety*, 110: 34-40.

- Wardman, J. K. 2008. The constitution of risk communication in advanced liberal societies. *Risk Analysis*, 28(6): 1619-1637.
- Warner, K. D., & Kinslow, F. 2013. Manipulating risk communication: value predispositions shape public understandings of invasive species science in Hawaii. *Public Understanding of Science*, 22(2): 203-218.
- Welsh, I., & Wynne, B. 2013. Science, scientism and imaginaries of publics in the UK: Passive objects, incipient threats. *Science as Culture*, 22(4): 540-566.
- WHO. 2008. Marketers of electronic cigarettes should halt unproved therapy claims.
- Wynne, B. 1996. A reflexive view of the expert-lay knowledge divide. *Risk, environment and modernity: towards a new ecology*. Sage, London: 44-83.
- Yin, R. K. 2011. *Applications of case study research*: Sage.
- Yin, R. K. 2013. *Case study research: Design and methods*: Sage publications.