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# Heat protection behaviors and positive affect about heat during the 2013 heat wave in the United Kingdom

Carmen E. Lefevre [a], Wändi Bruine de Bruin [a, b, *], Andrea L. Taylor [a, c], Suraje Dessai [c], Sari Kovats [d], Baruch Fischhoff [b, e]

[a] Centre for Decision Research, Leeds University Business School, UK
[b] Department of Engineering and Public Policy, Carnegie Mellon University, USA
[c] Sustainability Research Institute & ESRC Centre for Climate Change Economics and Policy, School of Earth and Environment, University of Leeds, UK
[d] Department of Social and Environmental Health Research, London School of Hygiene and Tropical Medicine, UK
[e] Department of Social and Decision Sciences, Carnegie Mellon University, USA

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ABSTRACT

Heat waves pose serious health risks, and are expected to become more frequent, longer lasting, and more intense in the future under a changing climate. Yet, people in the UK seem to feel positive when thinking about hot weather. According to research on the affect heuristic, any positive or negative emotions evoked by potentially risky experiences may be used as cues to inform concerns about risk protection. If so, then their positive feelings toward hot weather might lead UK residents to lower intentions to adopt heat protection behaviors. Here, we examine the relationships between heat protection behaviors during the July 2013 UK heat wave and self-reports of having heard heat protection recommendations, feeling positive affect about heat, seeing heat protection measures as effective, and trusting the organizations making those recommendations. Responses to a national survey revealed that 55.1% of participants had heard heat protection recommendations during the 2013 UK heat wave. Those who reported having heard recommendations also indicated having implemented more heat protection behaviors, perceiving heat protection behaviors as more effective, feeling more positive about heat, and intending to implement more protection behaviors in future hot summers. Mediation analyses suggested that heat protection recommendations may motivate heat protection behaviors by increasing their perceived effectiveness, but undermine their implementation by evoking positive affect about hot weather. We discuss our findings in the context of the affect heuristic and its implications for heat protection communications.



## 1. Introduction

In July 2013, the UK experienced a heat wave where maximum temperatures exceeded 30 °C for seven consecutive days, from 13 to 19 July, and exceeded 28 °C on nineteen consecutive days, from 6 to 24 July (Met Office, 2013). This heat wave was the most significant since July 2006, with the summers of 2007–2012 having mostly been cool and wet compared to the long-term average (Met Office, 2014). Heat waves are projected to become more frequent, longer lasting, and more intense as climate change unfolds (IPCC, 2013). Heat protection behaviors will, therefore, become increasingly important for UK residents (Hajat et al., 2014).

Daily mortality rates tend to rise as temperatures move above the long-term local average (Curriero et al., 2002). In the temperate climate of the UK, individuals can experience thermal discomfort when outside temperatures reach 22 °C or 71.6 °F (Fuller and Bulkeley, 2012). Prolonged exposure to high temperatures during heat waves is associated with excess deaths, primarily in older age groups (Hajat et al., 2007; Kosatsky, 2005). The 2003 European heat wave caused around 35,000 deaths (Robine et al., 2008) including 2000 in England (National Health Service (NHS), Public Health England (PHE), and Met Office, 2013). Heat waves have also been associated with increased hospitalizations and emergency-room visits (Johnson et al., 2005; Kovats et al., 2004; Knowlton et al., 2009; Semenza et al., 1999). Summer heat can have rapid health

* Corresponding author. Centre for Decision Research, Leeds University Business School, Maurice Keyworth Building, Leeds LS2 9JT, UK.
*E-mail address:* w.bruinedebruin@leeds.ac.uk (W. Bruine de Bruin).

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consequences including heat stroke (Knowlton et al., 2009; Kilbourne, 1997), which can be fatal or cause neurological sequelae (Bouchama and Knochel, 2002). Although the 2013 heatwave was more notable for its length than for its intensity (Met Office, 2013), initial syndromic surveillance data suggest minor but significant increases in heat-related illness that are in line with previous hot periods (Elliot et al., 2014). Morbidity and mortality statistics have not yet been published.

Because adverse health outcomes from heat are more likely among older people and those in poor health (Bouchama and Knochel, 2002; Kovats and Hajat, 2008), heat protection messages often target these groups. However, heat protection messages are also relevant to healthy individuals of younger ages, who can experience heat illness as a result of prolonged exposure to high temperatures or vigorous outdoor physical activity in hot weather (Kovats and Hajat, 2008; Kilbourne, 1992; Glazer, 2005). Reaching young people is also important because once risk protection behaviors are learned they are more likely to be continued (Caspersen et al., 2000).

In England, the National Health Service (NHS), Public Health England (PHE) and the Met Office publish an annual Heatwave Plan (2013) with warnings about the dangers of heat and guidance on which heat protection behaviors to implement during heatwaves (see Methods). Despite being moderate in intensity, the prolonged heat in July 2013 reached sufficient levels to trigger health warnings from the 13th to the 23rd (Met Office, 2013; Elliot et al., 2014) Hence, the release of these warnings provided the opportunity to test people's responses, given the conditions of the 2013 heatwave. As described below, research on risk perception and communication has identified several factors that may motivate risk protection behavior (Bruine de Bruin and Bostrom, 2013). The present study examines the relationship of hearing heat protection messages with three of those factors: (1) perceiving the recommended protection behaviors as more effective, (2) feeling less positive about the risk (here: heat), and (3) having more trust in those issuing the recommendations.

### 1.1. Perceived effectiveness of heat protection

Although hot weather poses potential health threats, many UK adults seek the outdoors during hot weather, without protecting themselves from heat (Diffey and Norridge, 2009; Jones et al., 2000). When going on holiday, tourists from the UK (and other northern European countries) deliberately spend many hours in the sun, including during the hottest time of day (Elliott et al., 1998; Evans et al., 2001; Manning and Quigley, 2002; Wachsmuth et al., 2005). Interviews with UK migrants to Spain suggest that they are less likely than local residents to implement behaviors that protect them against heat (such as closing blinds), because they question the effectiveness of doing so (Fuller and Bulkeley, 2012). Even vulnerable older adults in the UK perceive heat protection behaviors as ineffective and unnecessary (Abrahamson et al., 2009; Wolf et al., 2010). Taken together, these findings suggest that UK residents who do perceive heat protection behaviors as more effective are more likely to implement them.

### 1.2. Positive affect about heat

Risk researchers increasingly recognize the importance of feelings (or 'affect') in shaping risk perceptions and responses to risk communications (Slovic et al., 2004; Finucane et al., 2000). Classic studies have suggested that affective responses to experiences are automatic and serve as cues for subsequent perceptions of risk (Slovic et al., 2004; Finucane et al., 2000; Bruine de Bruin and Wong-Parodi, 2014). According to research on the affect heuristic, potentially risky experiences that evoke negative feelings will fuel concerns about risk protection and potentially risky experiences that evoke positive feelings will soothe concerns about risk protection (Slovic et al., 2004; Finucane et al., 2000; Keller et al., 2006). Indeed, some risks are unique in the sense that they tend to evoke positive affect among specific audiences, including wood-burning fire places (among home owners), risky driving (among younger men), and sunbathing (among Northern Europeans) (Bränström et al., 2001; Hine et al., 2007a; Rhodes and Pivik, 2011). In line with research on the affect heuristic, people who report more positive affect for these experiences tend to judge the need for risk protection behaviors to be lower (Bränström et al., 2001; Hine et al., 2007a; Rhodes and Pivik, 2011).

In the UK, thoughts of hot summers often evoke positive affect (Fuller and Bulkeley, 2012; Wolf et al., 2010; Harley, 2003). Many UK residents (especially in the North) respond positively to the prospect of warmer summers (Palutikof et al., 2004), in contrast with Americans' negative responses (Leiserowitz, 2006). Older UK residents, who are especially vulnerable to heat, still describe heat as enjoyable (Harley, 2003). Accordingly, it is possible that messages about risks of hot weather inadvertently evoke positive (rather than negative) feelings about heat among UK recipients, thus reducing the perceived need for risk protection. Indeed, messages that evoke positive moods may decrease perceptions of risk (Johnson and Tversky, 1983). Taken together, these findings suggest that UK recipients who report less positive affect about heat after hearing heat communications will be more likely to protect themselves against heat.

### 1.3. Trust in organizations

According to the risk perception and communication literature, trust in the communicating organizations is essential for effective risk communication, because people are more likely to listen to the organizations they trust (Cvetkovich and Löfstedt, 1999; Siegrist et al., 2007; Visschers and Siegrist, 2008). Especially when people know relatively little about a risk, their decisions about whether to follow a recommendation may depend on how much they trust the communicating institutions (Siegrist and Cvetkovich, 2000a). During UK heat waves, recommendations to protect against heat are released by the National Health Service, Public Health England, and the Met Office (2013). Overall, these findings suggests that people who report greater trust in those agencies are more likely to implement heat protection behaviors (Matthies et al., 2008; Renn and Levine, 1991; Siegrist and Cvetkovich, 2000b).

### 1.4. The current study

The July 2013 UK heat wave provided a unique opportunity to examine public responses to heat protection messages, including the role of perceived effectiveness, positive affect about heat, and trust. In a UK-wide survey conducted in October 2013, we assessed four specific research questions: 1) Who heard heat protection recommendations? 2) Was hearing heat protection recommendations associated with perceived effectiveness of behaviors, positive affect about heat, and trust in communicating organizations? 3) Was hearing heat protection recommendations related to heat protection behaviors during the 2013 heatwave – and, if so, what was the role of perceived effectiveness, positive affect about heat, and trust? 4) Was hearing recommendations, perceiving effectiveness, having positive affect about heat, and reporting trust related to intentions to implement heat protection behaviors in the future?