Sprengholz, Philipp; Bruckmann, Robert; Wolstein, Jörg

Effects of naming heatwaves on risk perception and protective behaviour

Date of secondary publication: 12.05.2025
Version of Record (Published Version), Article
Persistent identifier: urn:nbn:de:bvb:473-irb-1082325

Primary publication
Sprengholz, Philipp; Bruckmann, Robert; Wolstein, Jörg (2025): Effects of naming heatwaves on risk perception and protective behaviour, in: Weather, Chichester [u.a.]: Wiley, Vol. 80, Nr. 5, pp. 152–154, doi: 10.1002/wea.7679.

Effects of naming heatwaves on risk perception and protective behaviour

Weather – May 2025, Vol. 80, No. 5

Philipp Sprengholz[1,2,3], **Robert Bruckmann**[1] **and Jörg Wolstein**[1]

[1] *Institute of Psychology, University of Bamberg, Bamberg, Germany*
[2] *Institute for Planetary Health Behavior, University of Erfurt, Erfurt, Germany*
[3] *Health Communication Working Group, Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany*

Introduction

Due to climate change, the number of people exposed to extreme heat is growing across the globe (Lüthi *et al*., 2023). Heat-related deaths of adults over 65 years of age have almost doubled over the last two decades (Romanello *et al*., 2023). While climate change mitigation is required to prevent further exacerbation of this trend, adaptation to more frequent, long-lasting and intense heatwaves is necessary now. Warning systems and mass communication before and during heatwaves aim to increase risk perception and promote protective actions (Toloo *et al*., 2013). However, research indicates that heat-related risks are often downplayed (Howe *et al*., 2019) and that many individuals do not follow recommended behaviours (Shamsrizi *et al*., 2023).

In a recent *New York Times* essay, Klinenberg (2024) argued that naming heatwaves could increase risk awareness and mobilise action to avoid harm. There is a long history of naming severe weather systems, such as tropical cyclones (WMO, 2023), but evidence of its psychological and behavioural effects is limited. While experimental research on fictitious storms could not substantiate the positive effects of naming on risk perception and behaviours (Rainear *et al*., 2017; Lin *et al*., 2018), a UK study comparing the 2017 storm *Doris* with an unnamed storm from 2014 affecting the same area suggests that naming can increase public awareness and accelerate protective action (such as reducing motorway traffic; Charlton-Perez *et al*., 2019). Such positive effects can be explained by various psychological mechanisms. According to the representativeness heuristic (Kahneman and Tversky, 1972), a named event may feel comparable to previous named disasters and thus seem more severe. Furthermore, when a severe weather occurrence is named, it is labelled as a specific, notable issue. It may become more salient and, according to relevant accounts of stimulus–response binding and retrieval (Hommel, 1998), encountering the name could improve the recall of recommended behaviours.

A recent study showed that people who could remember the name of a heatwave in Spain reported greater engagement in heatwave safety behaviours (Metzger *et al*., 2024). However, causal evidence on the effects of naming heatwaves is missing (WMO, 2022). To address this issue, we conducted a preregistered online experiment with older adults, which is the age group most affected by high temperatures (Winklmayr *et al*., 2022). Based on the above considerations, we assumed that naming a heatwave could increase people's risk perception and, in line with health psychological theories such as the protection motivation theory (Rogers, 1975) and the theory of planned behaviour (Ajzen, 1985), result in increased intention to show behaviours to mitigate heat stress (such as cooling down one's home before the arrival of a heatwave) or adapt to it (such as moving to cool places during a heatwave). In the experiment, participants were asked to read a fictitious warning about an upcoming heatwave that was either named or not. We hypothesised that naming the heatwave would result in (H1) higher risk perception, (H2) stronger intention to cool down one's home before the arrival of the heatwave and (H3) stronger intention to stay in cool places during the heatwave. We further explored whether the effects differed between named heatwaves carrying a German name (*Anton*) or its Mediterranean version (*Antonio*).

Method

Participants and experimental design

In total, 483 German adults over 60 years of age self-enrolled in an incentivised lottery-based panel to repeatedly answer online surveys on heat perceptions and actions of the elderly. The panel was advertised in TV spots, newspaper articles and social media ads, and enrolment was possible from June 2024. $N = 272$ individuals completed the experiment in early September 2024. Respondents ranged in age from 60 to 86 years ($M = 69.48$ years, $SD = 4.12$ years); 56% were female and 44% were male.

Based on a one-factorial experimental design, the participants were randomly assigned to one of two groups. In the *named heatwave* group ($n = 178$), participants read a fictitious announcement of a heatwave that was named either *Anton* ($n = 80$) or *Antonio* ($n = 98$). In the *nameless heatwave* group ($n = 94$), the same announcement was used, but the heatwave was not named. The sample size was deemed sufficient for the detec-

Box 1. Heatwave announcement

Please imagine you are reading the following text in the daily newspaper:
While the current weather gives the impression that summer is already over, the next heatwave [called Anton/Antonio] is already on the horizon. Deutscher Wetterdienst (DWD) warns that temperatures could climb to over 32° for several consecutive days in the upcoming week. '[The heatwave/Anton/Antonio] is moving from southern Europe to Germany and will arrive here on Tuesday', according to the DWD. There are warnings that [the heatwave/Anton/Antonio] can be particularly hard on older people. They are advised to stay indoors in cool rooms during the day and to drink regularly, regardless of whether they feel thirsty or not. Flats should already be ventilated intensively and thus cooled down before [the heatwave/Anton/Antonio] arrives.

Note: Text translated from German, see online supplement for original material.

RMetS Royal Meteorological Society

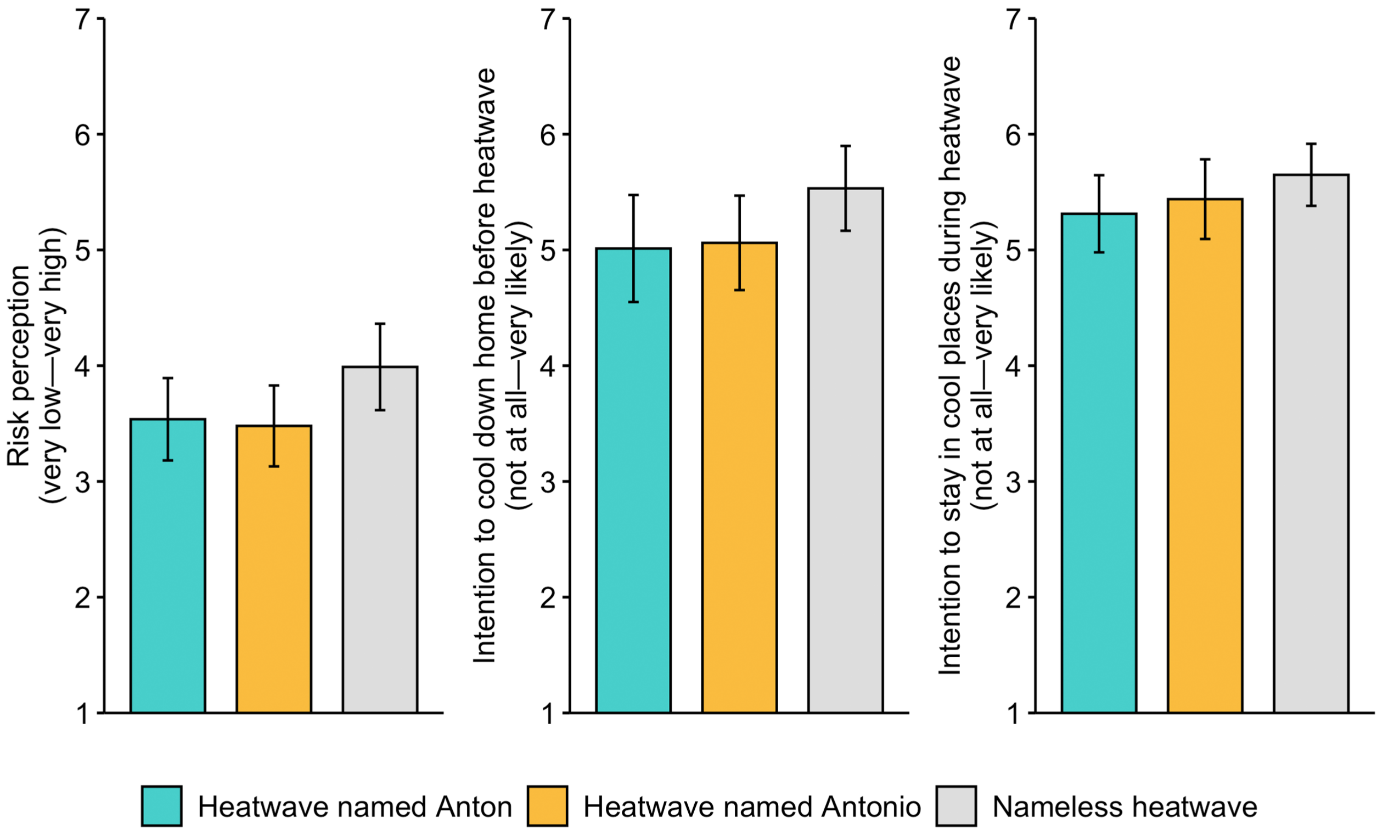

Figure 1. Effects of named and nameless heatwaves (means and 95% confidence intervals).

tion of small to medium-sized differences in risk perception and behaviours between the two groups (see preregistration for details, https://aspredicted.org/TBR_JQM).

Materials and measures

Experimental manipulation

All participants were asked to read the fictitious newspaper announcement of a heatwave that also communicated health risks for older adults and behavioural recommendations (see Box 1). Depending on the experimental group, the heatwave was nameless or named *Anton* or *Antonio*. The text was adapted from similar newspaper reports. We decided for imitating a newspaper text as older people tend to consume weather information in traditional outlets (Wehde and Nowlin, 2023) and newspapers are among the most trusted media in Germany (Jackob *et al*., 2023).

Risk perception

Risk perception was assessed by asking participants how they perceived the risk of the announced heatwave to their health on a 7-point scale from *very low* to *very high*.

Protective behavioural intentions

Participants were asked how likely they were to try to cool down their home before the announced heatwave and how likely they were to stay somewhere cool during the daytime once it arrived. Both questions were adapted from official heatwave recommendations (Deutscher Wetterdienst, 2024) and answers were assessed on a 7-point scale from *not at all* to *very likely*.[1]

Ethics and consent

The study followed the guidelines of the German Psychological Association. Ethical clearance was obtained from the University of Bamberg's institutional review board (#2024-04/21), and all participants provided informed consent for their data to be used and shared for scientific purposes without identity disclosure. Participation in the experiment was unpaid. However, taking part in the panel was incentivised with a lottery. Participants were reminded about the fictionality of the scenario at the end of the survey.

Results

As preregistered, the two groups were compared using directional *t*-tests. Contradicting all hypotheses, the announcement of a named heatwave did not increase risk perception ($t(176.03) = -2.13$, $p = 0.983$, $d = -0.28$) or the intention to cool down one's home ($t(212.84) = -2.05$, $p = 0.979$, $d = -0.26$) or stay in cool places ($t(226.32) = -1.47$, $p = 0.929$, $d = -0.18$). In fact, visual inspection suggested opposite effects (Figure 1). Rejected equivalence tests using the TOST (two one-sided tests) methodology (Lakens, 2017) indicated that naming a heatwave reduced risk perception (90% CI = [−0.85, −0.12]) as well as intention to cool down one's home before the arrival of a heatwave (90% CI = [−0.91, −0.08]). However, the intention to stay in cool places was not found to differ between the two groups (90% CI = [−0.59, 0.05]). Risk perception and behavioural intentions did not differ between the two named heatwaves *Anton* and *Antonio* (see online supplement for details).

Discussion

While scholars have called for the naming of heatwaves to improve heat-related risk perception and behaviours (Klinenberg, 2024), the desired effects were not observed in the results of our experiment. Instead, the results suggest that risk perception decreases and that immediate action to prepare for an upcoming heatwave becomes less likely when a heatwave is named (regardless of whether it has a German or Mediterranean name). This finding can be explained in multiple ways. When heatwaves are named, people may start to perceive them as part of the regular weather cycle and thus lose risk

[1] Please note that for technical reasons, we deviated from the preregistered 5-point scales and instead used 7-point scales throughout the study.

RMetS Royal Meteorological Society

awareness. For instance, heatwaves could also be confused with low-risk pressure systems that have long been named in Europe. People may also think that named heatwaves are better monitored, resulting in lower uncertainty and reduced risk perception. Moreover, naming a heatwave may currently be perceived as exaggerated, leading people to limit protective behaviours. While future research should investigate potential explanations, our findings must be interpreted and generalised with care. They relate to a fictitious scenario and results may differ when more severe heatwaves are announced or the style and medium of the announcement is changed. For instance, using a more formal or threatening language (as often used in official weather service warnings) could elicit stronger hazard perceptions. Importantly, a self-enrolled panel of older adults from Germany was surveyed. As participants had previously answered surveys on heat perception and behaviour, they may have been less susceptible to the heatwave announcement and the experimental manipulation. Naming heatwaves could result in different effects among other groups but also in other countries where severe and named weather systems are more common. Findings may also differ when investigating other protective behaviours such as avoiding time outdoors, drinking water or taking a cool shower. Furthermore, a positive effect of naming heatwaves may arise from facilitated media coverage in the long term or when only the most severe heatwaves are named, which may help people dynamically adjust protective behaviours. Besides these considerations, naming heatwaves could also be beneficial for research purposes. Names can easily be targeted on traditional and social media (Charlton-Perez *et al*., 2019), allowing researchers to track public understanding and discussions about upcoming and ongoing heatwaves. This could help in the design and testing of interventions aimed at increasing heatwave preparedness among the population. However, our results show that naming heatwaves in itself is unlikely to appropriately shift risk perception and behaviours.

Author contributions

Philipp Sprengholz: conceptualisation, methodology, formal analysis, investigation and writing – original draft. **Robert Bruckmann:** conceptualisation, methodology, formal analysis, investigation and writing – review and editing. **Jörg Wolstein:** conceptualisation and writing – review and editing.

Acknowledgement

Open Access funding enabled and organized by Projekt DEAL.

Funding information

This work was supported by the German Federal Ministry of Health (Project HEATCOM, funding number 2523FSB10B).

Conflict of interest statement

None of the authors have a conflict of interest to disclose.

Data availability statement

The data that support the findings of this study are openly available in OSF at https://doi.org/10.17605/OSF.IO/JVEDR.

References

Ajzen I. 1985. From intentions to actions: a theory of planned behavior, in Action Control. Kuhl J, Beckmann J (eds). Springer Berlin Heidelberg: Berlin, pp 11–39. https://doi.org/10.1007/978-3-642-69746-3_2.

Charlton-Perez AJ, **Vukadinovic Greetham D**, **Hemingway R**. 2019. Storm naming and forecast communication: a case study of Storm Doris. *Meteorol. Appl.* **26**(4): 682–697. https://doi.org/10.1002/met.1794

Deutscher Wetterdienst. 2024. Hitzewarnung. https://www.dwd.de/DE/leistungen/hitzewarnung/hitzewarnung.html

Hommel B. 1998. Event files: evidence for automatic integration of stimulus-response episodes. *Vis. Cogn.* **5**(1–2): 183–216. https://doi.org/10.1080/713756773

Howe PD, **Marlon JR**, **Wang X** *et al*. 2019. Public perceptions of the health risks of extreme heat across US states, counties, and neighborhoods. *Proc. Natl. Acad. Sci. USA* **116**(14): 6743–6748. https://doi.org/10.1073/pnas.1813145116

Jackob N, **Schultz T**, **Jakobs I** *et al*. 2023. Medienvertrauen in Deutschland. Bundeszentrale für politische Bildung: Bonn.

Kahneman D, **Tversky A**. 1972. Subjective probability: a judgment of representativeness. *Cogn. Psychol.* **3**(3): 430–454. https://doi.org/10.1016/0010-0285(72)90016-3

Klinenberg E. 2024. *The Killer Climate Disaster That Has No Name*. https://www.nytimes.com/2024/09/07/opinion/heat-wave-names.html

Lakens D. 2017. Equivalence tests: a practical primer for *t* tests, correlations, and meta-analyses. *Soc. Psychol. Personal. Sci.* **8**(4): 355–362. https://doi.org/10.1177/1948550617697177

Lin X, **Rainear AM**, **Spence PR** *et al*. 2018. Don't sleep on it: an examination of storm naming and potential heuristic effects on Twitter. *Weather Clim. Soc.* **10**(4): 769–779. https://doi.org/10.1175/WCAS-D-18-0008.1

Lüthi S, **Fairless C**, **Fischer EM** *et al*. 2023. Rapid increase in the risk of heat-related mortality. *Nat. Commun.* **14**(1): 4894. https://doi.org/10.1038/s41467-023-40599-x

Metzger A, **Baharav Y**, **Nichols L** *et al*. 2024. Beliefs and behaviors associated with the first named heat wave in Seville Spain 2022. *Sci. Rep.* **14**(1): 9055. https://doi.org/10.1038/s41598-024-59430-8

Rainear AM, **Lachlan KA**, **Lin CA**. 2017. What's in a #name? An experimental study examining perceived credibility and impact of winter storm names. *Weather Clim. Soc.* **9**(4): 815–822. https://doi.org/10.1175/WCAS-D-16-0037.1

Rogers RW. 1975. A protection motivation theory of fear appeals and attitude change1. *J. Psychol.* **91**(1): 93–114. https://doi.org/10.1080/00223980.1975.9915803

Romanello M, **Napoli CD**, **Green C** *et al*. 2023. The 2023 report of the Lancet Countdown on health and climate change: the imperative for a health-centred response in a world facing irreversible harms. *Lancet* **402**(10419): 2346–2394. https://doi.org/10.1016/S0140-6736(23)01859-7

Shamsrizi P, **Jenny MA**, **Sprengholz P** *et al*. 2023. Heatwaves and their health risks: knowledge, risk perceptions and behaviours of the German population in summer 2022. *Eur. J. Pub. Health* **33**(5): 841–843. https://doi.org/10.1093/eurpub/ckad109

Toloo G, **FitzGerald G**, **Aitken P** *et al*. 2013. Are heat warning systems effective? *Environ. Health* **12**(1): 27. https://doi.org/10.1186/1476-069X-12-27

Wehde W, **Nowlin M**. 2023. Determining patterns of routine weather information usage and their demographic determinants. *Weather Clim. Soc.* **15**(3): 711–725. https://doi.org/10.1175/WCAS-D-22-0106.1

Winklmayr C, **Muthers S**, **Niemann H** *et al*. 2022. Heat-related mortality in Germany from 1992 to 2021. *Dtsch. Arztebl. Int.* **119**: 451–457. https://doi.org/10.3238/arztebl.m2022.0202

WMO. 2022. *Considerations Regarding the Naming of Heatwaves—Technical Brief*. https://library.wmo.int/records/item/58333-considerations-regarding-the-naming-of-heatwaves-technical-brief

WMO. 2023. *Tropical Cyclone Naming*. https://wmo.int/resources/wmo-fact-sheets/tropical-cyclone-naming

Correspondence to: P. Sprengholz
philipp.sprengholz@uni-bamberg.de

doi: 10.1002/wea.7679