



UK Government

# RAF034/2526: Factors affecting the take-up of home cooling adaptations

Research report

## **Authors**

The research was conducted by Verian on behalf of the Department for Energy Security and Net Zero (DESNZ).

Views expressed in this report are from the relevant research agency, based on data collected from research participants and other evidence, and not necessarily those of the UK government.



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# 1. Executive summary

## 1.1 Context

As average global temperatures increase, the UK will experience higher summer temperatures and more intense heat waves. UK housing stock was designed and constructed for less intense climate conditions, meaning people are increasingly exposed to overheating in homes. Overheating refers to periods when indoor temperatures exceed levels considered safe or comfortable for people, increasing the risk of discomfort or harm to health and wellbeing. This can have adverse consequences for public health overall and some groups who are more vulnerable to heat-related illness, such as people aged over 65, people with impairments or health conditions, pregnant women and children aged 5 or under.

A variety of home cooling measures can be taken to avoid overheating in homes. In this report these are separated into three categories. 'Simple measures' include behaviours such as closing existing curtains or blinds during the day. 'Internal measures' relate to measures installed inside properties, such as internal blinds or solar reflective film on the inside of windowpanes. 'External measures' are those installed onto property exteriors, such as fixed or removable shading on windows or doors.

## 1.2 Research objectives

Research was conducted to explore awareness of the health risks of overheating, what facilitates and inhibits decisions to adopt behavioural and home cooling measures, and whether there are any factors that affect risk awareness and ability or willingness to take measures up among vulnerable groups. The research explored four key themes: (1) awareness and take-up of home cooling measures; (2) willingness to adopt these measures; (3) barriers and enablers to taking home cooling measures up; and (4) communications on home cooling methods, including information participants currently receive, and how participants would like to receive information to support take-up of cooling measures in future.

## 1.3 Methodology

We conducted a rapid evidence review to help design the sample and research materials. A survey was conducted with 1,607 participants, exploring awareness and previous take-up, and willingness to adopt home cooling measures in the future. We oversampled participants who indicated they had a health condition to allow for robust analysis of participants' responses in this subgroup. A Bayesian Belief Network (BBN) analysis was run to understand the chain of cause-and-effect that shapes willingness to adopt cooling adaptations. This identified how different factors interacted and which levers have the strongest influence on outcomes. To help illustrate and further understand findings, 40 participants were interviewed via one-hour online in-depth interviews. The COM-B model of behaviour underpinned the approach to analysis.

## 1.4 Key findings

### Awareness and take-up of home cooling measures

Awareness of the health risks of overheating was generally low. Participants tended to associate hot weather with discomfort rather than harm, including some in 'at risk' groups (e.g. aged over 65) who did not see themselves as vulnerable. Participants were more aware of measures that cool their bodies (e.g. fans and ice packs) than those that cool their homes. Overall, these factors suppressed motivation to take home cooling measures up.

Awareness and previous take up were highest for simple measures (e.g. opening windows at night, using fans, closing curtains); knowledge of internal and external measures (such as internal blinds or fixed shading) was more limited. Understanding of how and when some measures work was sometimes partial or inaccurate (e.g. there was sometimes confusion about when to open windows). Perceived effectiveness of measures (which was important for motivation to take measures up) was strongly affected by experience: those who took measures up were more likely to see them as effective.

### Willingness to adopt home cooling measures in the future

Participants were most willing to adopt simple measures such as opening windows at night, closing existing windows and blinds and keeping windows closed during the hottest parts of the day, in combination with measures that block sunlight. Although participants understood that measures that directly block light reduce the risk of overheating indoors, they generally preferred to avoid blocking sunlight from rooms during the day. Capability factors acted to reduce likelihood to adopt: where there was uncertainty about how measures work (such as with integrated blinds or solar reflective films) whether individually or in combination, willingness to adopt was lower. Where measures had been adopted, participants had typically taken these up reactively, in response to periods of hot weather rather than after forward planning or to optimally combine measures.

### Barriers and enablers to taking up home cooling measures

Participants were more likely to adopt cooling measures when they prioritised overheating over other challenges relevant to where they lived and recognised the potential negative health impacts of overheating; this motivational factor was identified as the key trigger in the BBN analysis. Without this motivation, positive associations with warm weather and the perception that heat is short-lived and unpredictable tended to inhibit take-up of measures further. However, some vulnerable people in at risk groups (e.g. with health conditions) wanted to avoid the negative health impacts of overheating, which strongly motivated them to take measures up where possible.

Capability factors – awareness of available options, confidence in their effectiveness, and belief in one's ability to act – increased readiness to take up measures. However, lack of capability to install measures (e.g. internal blinds, insulation) themselves constrained some participants, including flat-dwellers, people with health conditions or impairments, and those lacking the confidence, tools or support to install measures in their homes.

Owner occupiers faced fewer opportunity barriers than renters, due to having greater freedom to install internal and external measures, and higher perceived responsibility to do so. Those living in houses faced fewer barriers than those living in flats: access for installing some internal measures (e.g. insulation) was more limited for the latter group.

Cost influenced decisions through up front purchase, installation and running costs; lower income and potentially fuel poor households prioritised low or no cost measures and were more constrained in adopting measures requiring investment.

Perceived effectiveness interacted with cost and aesthetics, with greater willingness to adopt measures seen as dual purpose (e.g. thermal blinds), visually acceptable (both to individuals and their neighbours and guests), and not disruptive to light or security in homes.

The BBN showed that there were different adoption pathways across measure types. Simple measures were most likely to be adopted through participants (1) perceiving overheating as a priority and (2) feeling confident to be able to act to prevent overheating. Internal measures required stronger enabling conditions, needing the same motivation factors along with home ownership, knowledge of options and confidence in ability to install measures. Willingness to adopt external measures in the future depended heavily on tenure and property type, so owner-occupiers in detached or semi-detached houses were most willing to adopt these measures.

## Variations across groups

Although there were some differences between vulnerable groups, there was no clear or consistent pattern regarding these groups and their awareness, previous take up or willingness to adopt home cooling measures in the future. Awareness and future adoption varied by measure and appeared to be affected more strongly by motivation, capability and opportunity factors, for all participants, than vulnerability to overheating alone. Previous take-up of cooling measures was affected by housing tenure and property type, with owner occupiers facing fewer barriers than renters, and those living in houses facing fewer barriers than flat dwellers. As mentioned above, those who lived in lower income and potentially fuel poor households prioritised low or no cost measures. Higher educational attainment and engagement with net zero were generally associated with higher awareness, previous take-up and perceived effectiveness of measures across most cooling measures; those with lower educational attainment or less familiarity and engagement with net zero were generally less aware and more sceptical.

## Communication

Participants recalled advice about keeping cool, but this mainly related to staying hydrated and avoiding the sun, which was well known and disengaged participants, due to the belief they were already doing this. There was limited recall of messages about overheating in the home or specific home cooling measures.

Participants perceived the NHS and medical professionals as the most trusted sources of information. Participants wanted clearer explanations of the health risks of indoor overheating, alongside practical guidance on effective and affordable measures. Receiving communication about particularly hot weather earlier, rather than just one or two weeks in advance, would help those who wanted to take up relevant home cooling measures to plan for how to best go about this to avoid overheating in their homes.

## 1.5 Conclusion

The research found that prioritising overheating over other challenges relevant to where people lived was an important motivational factor that can act as a trigger for taking up home cooling measures. For some vulnerable people in at risk groups, wanting to avoid the negative health impacts of overheating acted as an additional motivator for adopting measures. However, participants more commonly perceived overheating as a source of discomfort rather than a serious health risk, including many of those in at risk groups. This limited sense of personal relevance weakened overall motivation, particularly in the context of existing public messaging that focuses primarily on cooling individuals rather than homes.

Capability and opportunity also affected which measures people felt able to adopt, especially for internal and external measures. Enabling conditions such as knowledge of options, ability to install measures, financial capacity and home ownership supported take-up of measures. This meant that groups such as renters and people on lower incomes faced barriers to action even when motivated to adopt measures. Take up of external measures in particular was most feasible for owner-occupiers, suggesting limits to what different groups can reasonably do without additional support or intervention.

Overall, participants saw scope for more engaging and informative communication about home cooling, emphasising comfort benefits alongside health impacts, avoiding alarmist messaging, and improving understanding of the full range of measures and how they can be used effectively, alone and in combination. However, given the reinforcing role of experience in affecting future willingness to act, awareness-raising alone may not suffice to enable behaviour change.

Participants felt that trusted messengers like the NHS could help to communicate about health risks and signpost to relevant home cooling measures, in a timely manner to support preparation and measure take-up.

## 2. Introduction

### 2.1 Project context

As average global temperatures increase, the UK will experience higher summer temperatures and more intense heat waves. In July 2022, the UK experienced temperatures of 40 degrees Celsius for the first time; and the Met Office estimates a 50-50 chance of the temperature rising above this level again within the next 12 years, with such conditions perhaps continuing for a month or more.<sup>1</sup> UK housing stock was designed and constructed for less intense climate conditions (i.e. for cooler maximum temperatures and to withstand low winter temperatures), and 80% of buildings that will be occupied in 2050 have already been built.<sup>2</sup> This means people are increasingly exposed to overheating in homes, which can have adverse consequences for public health. Overheating refers to periods when indoor temperatures exceed levels considered safe or comfortable for people, increasing the risk of discomfort or harm to health and wellbeing. Some population groups are particularly vulnerable to negative health impacts from overheating, often for interlocking reasons.<sup>3</sup> Vulnerable groups included in this research were: people aged over 65, people with health conditions or impairments, households with children aged 5 or under, people living in single adult households, and households identified as potentially fuel poor. These were selected due to negative health impacts these groups are likely to experience in the event of overheating (e.g. older adults and people with health conditions) and where evidence gaps have been identified (e.g. pregnant people).

A variety of actions can be taken to address overheating risks in homes, from simple behaviours such as opening windows at night, to adaptations like fitting shutters or blinds, to retrofitting buildings to improve insulation or heat reflection. However, adoption of any of these measures depends on decisions made by tenants, landlords and owner-occupiers. The Department for Energy Security and Net Zero (DESNZ) commissioned Verian to provide evidence on what will facilitate these decisions, barriers that inhibit take-up, and any factors that affect awareness and willingness to act among vulnerable groups, to inform communications to encourage take-up of home cooling measures.

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<sup>1</sup> Gillian Kay and others (2025) '[Rapidly increasing chance of record UK summer temperatures](#)', *Weather*, 80(8), 268–276.

<sup>2</sup> UKGBC, [Climate Change Mitigation](#)

<sup>3</sup> Parliamentary Office of Science and Technology (2024) '[Public health impacts of heat](#)'

## 2.2 Research questions

The research explored four key themes, with the following specific sub-questions:

1. **Awareness and take-up:** What measures were people aware of, to what extent have people taken these up, and how effective do they perceive them to have been? How does this relate to awareness of net zero, and how does this vary between groups with vulnerable characteristics or those in vulnerable households?
2. **Willingness to adopt:** Which measures or actions are people most willing to take up, both in isolation and in combination?
3. **Barriers and enablers:** What are the barriers and enablers to people taking up different cooling actions and how does this vary by property type and income levels?
4. **Communications opportunities:** What information on cooling measures do people currently receive and how, both in general and in the context of an impending extreme heat event? What opportunities are there for communication to encourage cooling behaviours in the UK?

## 3. Methodology

### 3.1 Methodology summary

#### Rapid evidence review (REA)

We conducted an REA to identify, in the UK and internationally, the main barriers and enablers to adopting cooling actions, as well as the interventions and information-sharing activities used to support these actions and how effective they have been. The REA was used to help identify and validate which vulnerable groups to include in the research, and develop the survey and discussion guide. See the technical annex, section 1, for further details of the methodology and papers selected.

#### Quantitative research

We conducted a survey with 1,607 participants. Participants were drawn from Verian's Public Voice panel, which is a random probability panel. We used a UK representative sample, based on age, ethnicity, household composition, accommodation type (flat, [semi-]detached or terraced housing), ownership type (rent or own), region of the country and whether they were rural or urban dwellers. We oversampled participants who indicated they had a health condition when joining the panel to ensure robust analysis of participants with this characteristic. Details on the approach and analysis process, as well as the full sample composition, can be found in the technical annex, in sections 2.1 and 2.2 respectively. Fieldwork was conducted between 6 January and 28 January 2026.

The questionnaire included questions on awareness and previous take-up of cooling measures, willingness to adopt such measures in the future (for those able to make relevant changes to their house), potential barriers and enablers to adoption, participants' experiences with communication around cooling measures, demographics, and awareness and take-up of net zero actions. The full questionnaire and analysis methodology are provided in the technical annex, in sections 2.3 and 2.4 respectively.

For most of this report, we report descriptive survey outcomes, weighted to be nationally representative. When comparing across groups, we highlight results where differences in proportions exceed 10 percentage points. Note that these differences have not been statistically tested, and should not be interpreted as statistically significant. The key vulnerable groups included were: people aged over 65, people with health conditions, households with children younger than 5 years old, people living alone rather than in multi-adult households, and households identified as potentially fuel poor (see below for terminology). These were included to describe variations across priority groups we observed in the sample, rather than to imply causal or systematic differences. Other demographic groups are highlighted only where there were differences.

We also compared participants' subjective belief of being at risk of overheating across known objective risk factors. Responses are reported in section 2.5 of the technical annex.

## Bayesian Belief Network

We ran a Bayesian Belief Network (BBN) analysis using the survey dataset to understand the cause-and-effect relationships that shape willingness to adopt cooling adaptations. A BBN identifies how different factors interact and which levers have the strongest influence on the outcome. The BBN analysed how barriers and enablers influenced which and how many cooling actions a participant reported they were likely to adopt in the future. More detail is provided in the technical annex, in section 3.

## Qualitative research

We conducted 40 one-hour online in-depth interviews between 19 January and 2 February 2026. The sample included representation of a range of factors including: demographics (such as age, gender, ethnicity, income); property (inclusion of people with different tenure statuses and living in different property types); and people who were vulnerable to extreme heat or were living in vulnerable households. The full sample and recruitment screener can be found in the technical annex, in sections 4.2 and 4.3 respectively. Participants discussed perceptions of the impact of hot weather, cooling measures taken in the past, measures they would be open to taking up in future, and sources for information on cooling measures. The discussion guide and supporting stimulus materials used can be found in sections 4.4 and 4.5 of the technical annex.

## 3.2 COM-B model

This research used a behavioural insights approach to analysis based on the COM-B model,<sup>4</sup> which hypothesises that behaviour is a function of Capability (C), Opportunity (O), and Motivation (M), which interact to produce Behaviour (B). Within this framework:

- **‘capability’** refers to an individual’s psychological and physical ability to act
- **‘opportunity’** refers to external factors, both physical and social, that make a behaviour possible or prompt it
- **‘motivation’** refers to the conscious (reflective) and unconscious (automatic) cognitive processes that direct and inspire behaviour

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<sup>4</sup> Susan Michie, Maartje van Stralen & Robert West (2011) '[The behaviour change wheel: A new method for characterising and designing behaviour change interventions](#)', Implementation Science, Volume 6, 42

### 3.3 Limitations

We did not perform statistical tests and differences between groups are noted descriptively. Some questions were answered by few participants, especially questions relating to experiences of less common home cooling measures, limiting the insights we can draw for these measures. The BBN analysis can only include factors included in the survey. Although we incorporated REA findings in the design of the survey instrument, some factors involved in the decision to take up cooling measures may have been missed.

Where there were variations or disparities in interview responses, these are specified. Not all cooling measures were discussed with each interview participant, as conversations focused on participants' experiences of the measures most relevant to them.

Surveys and interviews were carried out during the winter, which may have affected participant recall of information sources and behaviour during summertime, when cooling measures were most relevant.

### 3.4 Note on terminology and analysis

When discussing 'particularly hot weather' we define this as 'several days with temperatures around 30°C during the day (and staying warm overnight)'.

Households identified as potentially fuel poor were classified as such if their monthly energy bills exceeded 10% of their monthly income after rent or mortgage payments. We used this proxy, rather than the Low Income Low Energy Efficiency (LILEE) indicator used for fuel poverty statistics<sup>5</sup>, because we expected that survey participants would find it difficult to accurately recall the energy efficiency rating of their property while completing the survey.

Due to the range of home cooling measures available to participants, we have made a distinction within this report between: simple measures that primarily require relatively simple changes in behaviour; internal measures that require some form of change made to a building interior; and external measures that require some form of change made to a building exterior (see Table 1). These included both passive cooling measures (which use no energy, e.g. curtains) and active cooling measures (which require energy, e.g. fans).

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<sup>5</sup> DESNZ, [Fuel poverty statistics](#)

**Table 1: Cooling measures included in the research**

| Simple measures                                                                                                                                                                                                        | Internal measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | External measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Open windows at night<br>Keep windows closed during the hottest parts of the day<br>Use a standing fan or table fan<br>Close existing curtains or blinds during the day<br>Switch off unnecessary appliances or lights | Install internal blinds on windows exposed to direct sunlight<br>Install shutters on windows exposed to direct sunlight<br>Install thermally lined curtains on windows exposed to direct sunlight<br>Add a solar reflective film to the inside of windowpanes<br>Add internal insulation to lofts or walls<br>Add internal insulation to hot water pipes<br>Install air conditioning units<br>Install integrated blinds to windows<br>Replace windowpanes with water-filled glass panels | Install fixed shading (e.g. shutters or awnings) on windows or doors<br>Install external removable shade on windows or doors (e.g. detachable blinds)<br>Paint external windowpanes or walls with white solar reflective paint<br>Add a solar reflective film to the outside of windowpanes<br>Add solar reflective surface material on roofs<br>Replace windows to increase how far they can open<br>Install a heat pump that offers cooling (i.e. reversible heat pumps)<br>Put up a shade sail or canopy, shade umbrella or gazebo (i.e. external wall shading) |

### 3.5 Report structure

The findings in the next section are primarily structured by research question. 4.1 explores reported awareness, previous take-up and perceived effectiveness of measures, introducing references to the COM-B factors that are discussed in detail later. 4.2 sets out which measures participants said they were willing to adopt. 4.3 discusses the barriers and enablers and how these operate to influence take-up of measures. It also explains the BBN analysis and demonstrates adoption pathways for different measure types. Finally, 4.4 reports on communication that is currently provided about home cooling measures and opportunities for improving this in future. Sections 4.1, 4.2 and 4.3 all include a paragraph summarising the considerations for behaviour that arise from the findings, some of which are referred to in section 4.4.

## 4. Findings

### 4.1 Awareness and take-up of home cooling measures

This section addresses the following research questions:

What measures are people aware of, to what extent have people taken these up, and how effective have they been?

How does this relate to awareness of net zero, and how does this vary between groups in vulnerable homes or with vulnerable characteristics?

#### **Key findings:**

- Awareness of overheating as a health risk was low, with most participants associating hot weather with discomfort rather than harm, and fewer than half of those in 'at risk' groups (e.g. those aged 65 or older) seeing themselves as vulnerable. Interviewed participants were more aware of measures that cool their bodies (e.g. using fans or ice packs) than those that cool their homes. Both factors limited motivation to take home cooling measures up.
- Awareness and understanding of home cooling measures were mixed (a capability factor). Although simple measures (e.g. opening windows at night, using fans, closing curtains) were well-known, others were less so. Understanding of how and when some measures work was sometimes partial or inaccurate (e.g. there was confusion about when to open windows or that thermal curtains can cool as well as warm homes).
- Previous take-up of measures largely reflected awareness, with simple measures (e.g. opening windows at night, using fans, closing curtains) most commonly taken up. Some differences for vulnerable groups emerged for particular measures, but these were inconsistent and context-specific, often relating to opportunity barriers like time, budget, health, tenure and housing type rather than vulnerability alone. This shows how varied approaches may be needed to support take-up of measures in future.
- Perceived effectiveness was strongly affected by experience. Those who had taken measures up were more likely to see them as effective, while those without experience were sometimes unaware of measures or uncertain about how to use them (e.g. thermal curtains, solar reflective film). This reinforces the psychological capability gaps relating to awareness of specific measures and their use. Given the importance of experience, this could mean that awareness raising alone is insufficient to encourage take-up.
- Overall, educational attainment, housing circumstances and engagement with net zero were more consistently associated with awareness and take-up than vulnerability.

## Awareness of the risks of overheating and home cooling measures

Overall, participants tended to associate particularly hot weather with discomfort, rather than explicit health risk, which generally caused them not to focus on how to prevent or avoid overheating. In the survey, only 26% of participants felt at risk themselves of negative health impacts associated with overheating. Fewer than half of those in vulnerable groups perceived themselves to be at risk: people with health conditions (43%), people living alone (39%), people living in households identified as potentially fuel poor (31%) and people aged over 65 (29%). More detail on this can be found in the technical annex, section 2.5. Similarly, in the qualitative research, participants who had impairments and health conditions, or lived with people who did, sometimes but not always perceived their household as at higher risk. Participants tended to identify older people and people with health conditions as groups vulnerable to heat, but other at risk groups (children, pregnant people) less so.

*"I don't deal very well in the heat...I just get a headache and get frustrated and tired."* – Participant living with a child aged under 5

*"Sometimes people just want to enjoy the weather, and don't think about how it can impact them long term."* – Participant with an impairment

*"I have a cardiomyopathy which affects my breathing, there's a lot of fluid retention around the heart and when you are walking that can affect your breathing, and when it is hot it affects me even more."* – Participant with a long-term health condition

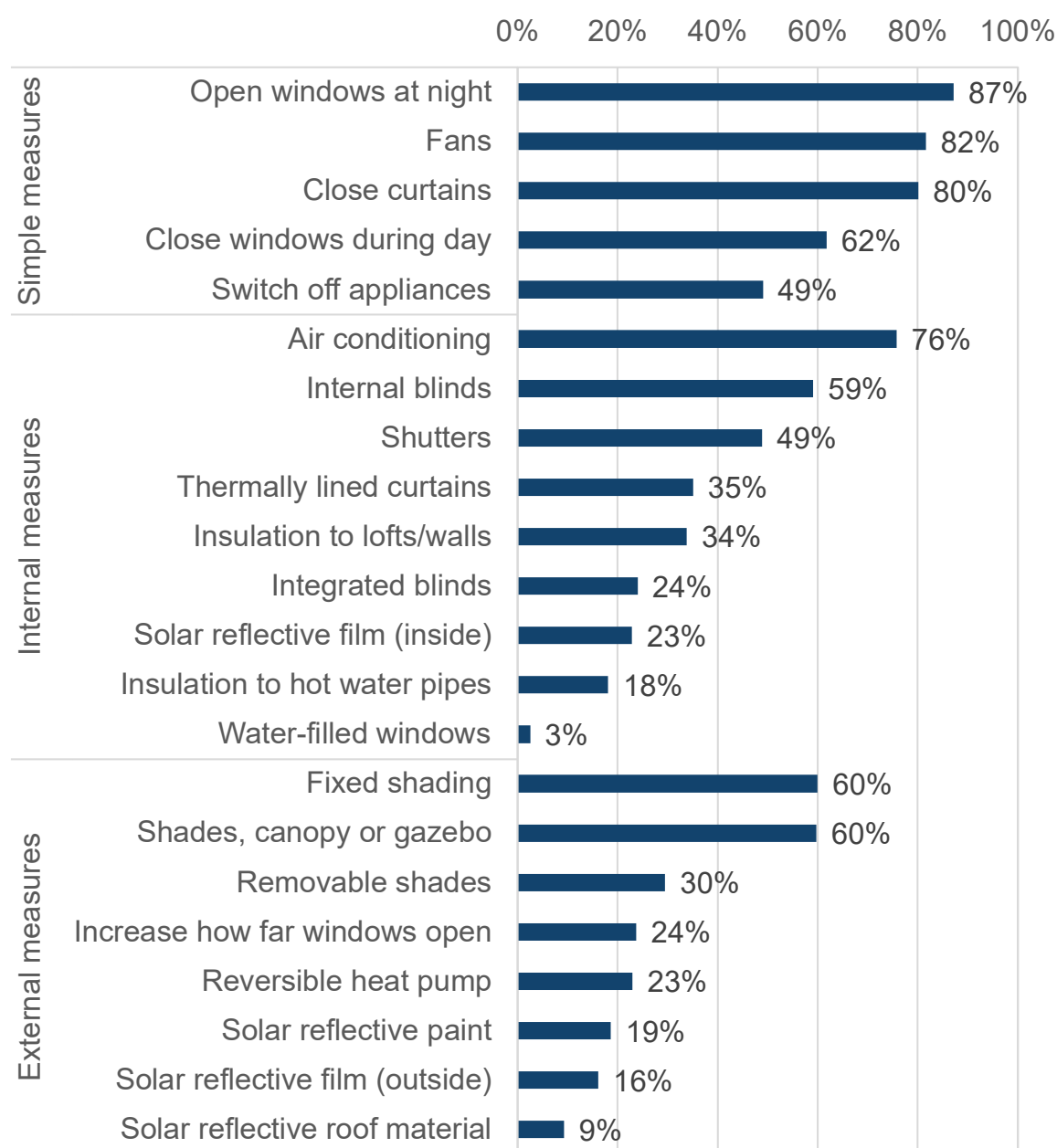
This aligns with findings from the REA, where knowledge and awareness of heat-related risks and assessment of the severity of risks (motivation factors) were two of the highest cited factors in the papers reviewed.

Awareness of home cooling measures was mixed, with participants lacking knowledge about some measures. Interviewed participants tended to be more aware of cooling measures that cool themselves (e.g. using fans and ice packs) rather than their homes. In combination with low perceived risk of overheating, this reduced motivation to take up home cooling measures.

*"I was using more water, I wasn't sleeping as well because it was warm, I was buying more cooling products when I was out [rather than thinking about taking up home cooling measures]."* – Socially isolated participant

Figure 1 shows survey participants' awareness of home cooling measures, which was generally greatest for simple measures that do not require people to make changes to their dwelling (see Table 1), as would be expected.

**Figure 1: Awareness of home cooling measures**



N = 1,607. Question: Below are some actions you could do to keep yourself cool during particularly hot weather. [For internal measures: These actions involve installing things inside your accommodation.] [For external measures: These actions involve installing things outside your accommodation.]. Before today, were you familiar with any of these actions for keeping cool? Please tick all that apply.

Interviewed participants reported similar awareness of simple measures but were sometimes confused about keeping windows closed during the day, as some participants believed that a draught would help with cooling.<sup>6</sup>

<sup>6</sup> This finding supports research conducted by the Government Office for Science's Social and Behavioural Sciences for Emergencies (SBSE) looking at public messaging for summer heat risks. This found that public messaging is inconsistent regarding when opening windows may become counterproductive due to high outdoor temperatures: a clear message on when opening windows has a cooling effect on buildings had not been received by participants in this research. Government Office for Science (2025) '[Public messaging for summer concurrent risks: Extreme heat, drought and wildfires](#)'

*"But if the windows are not open, you have that stillness in the air, which makes it feel warmer."* – Participant on a low income living with a child aged under 5

Awareness and understanding of internal and external measures was lower, revealing a capability barrier that may also be suppressing take-up. With the exception of installing air-conditioning units (76%), no more than 60% of participants were familiar with any of these measures in the survey. A similar pattern was found in the qualitative research. Curtains, blinds, and shutters were generally familiar as ways to block the sun from buildings, although participants had not realised the range of internal or external, fixed or detachable shading that might work in different ways. Of all the measures that block the sun, integrated blinds were least familiar, mainly because participants did not know how they were different from other types of blinds. However, they tended to be able to imagine accurately what they were and how they would work. Shade sails and canopies were familiar to some participants, but they were understood as a means of shading a person from the sun outside, rather than shading a wall of a property to reduce the internal temperature of the home.

Adding insulation to pipes, lofts or walls, and thermal curtains were familiar to interviewed participants as measures to keep properties warmer, but participants had generally not considered how these contributed to keeping the property cool. Despite relatively high awareness of these measures, understanding of their utility for cooling homes was not always known or top-of-mind. However, once it was explained to them that these measures could also be used for cooling, participants could see the logic behind this.

*"We got blackout thermal curtains to block out light reflecting off the TV, and we noticed when it was really hot that if you touch the curtains there's a lot of heat in them, so we guessed they prevented the heat from coming through"*– Participant living with a child aged under 5

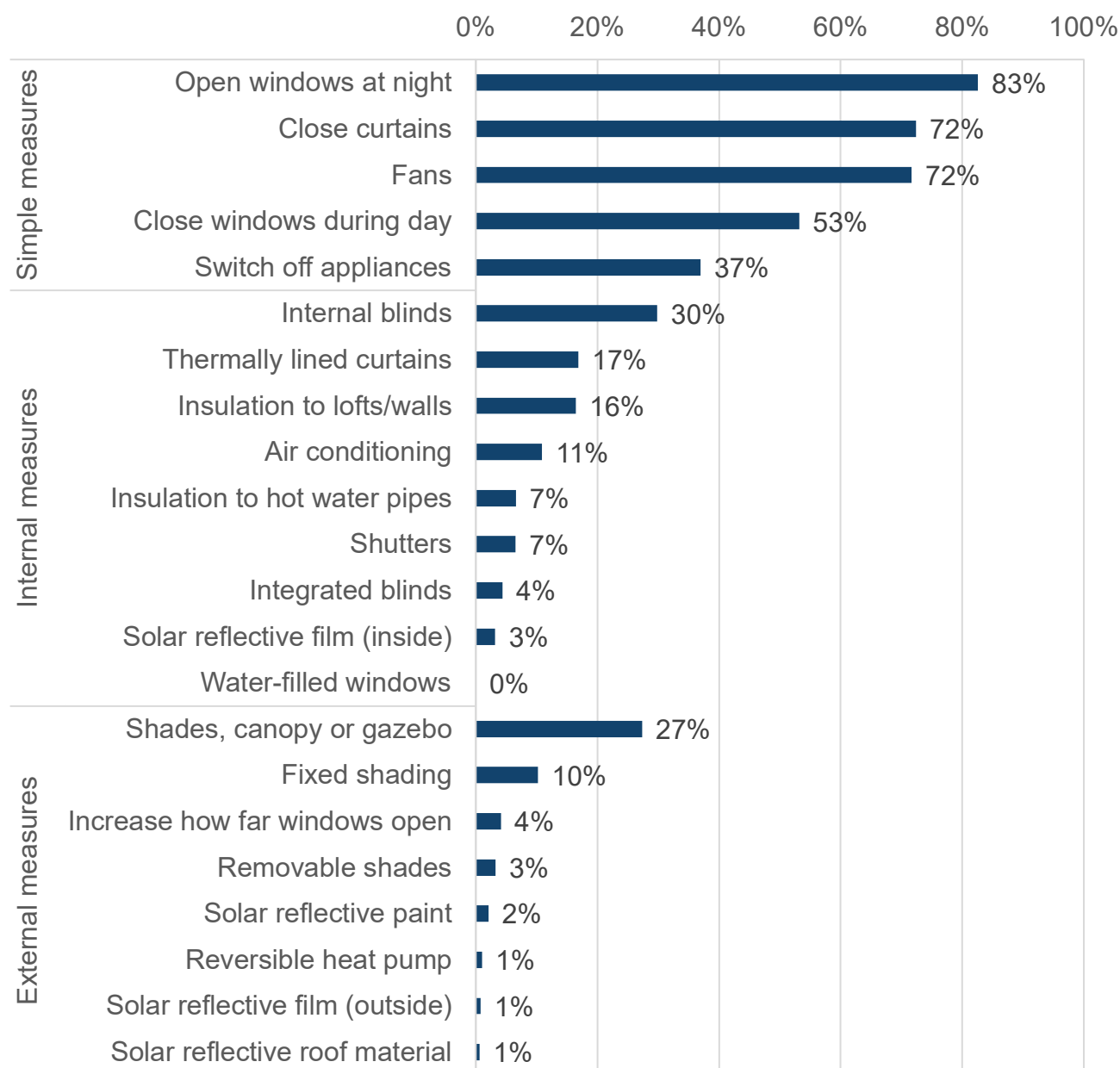
The measures with the lowest levels of awareness in the survey were specialised measures: adding solar reflective film to the outside of windows (16%), adding solar reflective surface material on roofs (9%) and installing water-filled glass windowpanes (3%). Interviewed participants, who were generally unfamiliar with solar reflective film for roofs or windows, expressed some misconceptions about them: that the film would obstruct their view or worked like a solar panel.

The survey revealed some differences in awareness of cooling measures by some characteristics. For example, awareness for all measures, except installing water-filled windowpanes, was highest for participants with higher educational attainment and lowest for participants without academic or vocational attainment. Similarly, awareness across measures was highest for those participants who knew the definition of net zero, and who reported having taken more actions to meet net zero in their life. This could be linked to these two groups having greater exposure to information on these types of measures.

## Take-up of cooling measures

In line with awareness patterns, previous take-up of measures was greatest for simple measures, as shown in Figure 2 below.<sup>7</sup>

**Figure 2: Previous take-up of cooling measures**



N = 1,607. Question: And have you taken any of these actions before in particularly hot weather? [For internal and external measures: This does not have to be where you live currently.]

<sup>7</sup> The survey underpinning the quantitative analysis did not limit the countries participants could consider and specified that previous take-up did not need to have been in their current accommodation. Therefore, it may be possible that some participants included measures they had taken up outside the UK. However, the descriptions of internal and external measures explicitly referred to installation so are unlikely to include actions taken when abroad on holiday. The qualitative research focused on asking participants about take-up and use of measures in their homes in the UK, although also discussed comparisons between experiences of taking measures to avoid overheating in the UK and other countries, where this was brought up by participants.

In the survey, the most commonly taken up measures were those with which participants were most familiar: opening windows at night (measure taken by 82% of participants), using fans (72%) and closing existing curtains (72%). High previous take-up of simple measures was also reported in the qualitative interviews, although keeping windows closed during the hottest parts of the day seemed to be taken up less frequently (reflecting the confusion mentioned earlier about why this measure was relevant).

Internal and external measures that directly block sunlight tended to have higher reported take-up than other measures. For internal measures, 30% of participants had previously installed internal blinds to windows exposed to direct sunlight, although only 7% had previously installed shutters on windows exposed to direct sunlight. For external measures, 27% had previously put up shade sails, canopies, shade umbrellas or gazebos (possibly because they were understood as a means of shading a person from the sun whilst outside) and 10% had installed fixed shadings. In contrast, 16% of all participants had added insulation to lofts or walls and 7% had added insulation to hot water pipes as a cooling measure. None of the survey participants had replaced windowpanes with water-filled glass panels and fewer than 1% had added solar reflective film to the outside of windows or solar reflective surface material on roofs. Barriers to take-up of measures, which include a range of capability and opportunity factors, are explored in section 4.3 below.

Similar to awareness patterns, take-up of most measures did not substantially differ between vulnerable participants and other participants, although there were some exceptions. These tended to be measure-specific, as described below, reflecting their different levels of opportunity to take up different measures.

For example, people older than 65 reported more often having installed the following measures: internal blinds (42% for over 65s v 27% for under 65s), thermally lined curtains (23% for over 65s v 15% for under 65s) and internal insulation (24% for over 65s v 14% for under 65s). Possibly, this could be linked to the higher proportion of people aged over 65 being more likely to own their own home (86% of over 65s were owner-occupiers v 50% of under 65s).

For participants with health conditions, take-up of fans was higher among people with a mental health condition (86%) or stamina, breathing or fatigue condition (79%) compared with all participants (72%). This was reflected somewhat in the qualitative research where there were examples of participants relying on fans to regulate their body temperature when they were bed bound, had asthma, fibromyalgia or were on antidepressants.

Parents of young children were less likely to report having taken up any internal measures than other households (50% v 60%). In particular, they were less likely to report having installed internal blinds to windows directly exposed to sunlight (18% v 31% for households without young children) and to have installed internal insulation to lofts or walls (8% v 17% for households without young children). Interviewed participants with young children at home highlighted that this was primarily due to lack of time and budget constraints.

Participants living in (semi-)detached or terraced housing were more likely to report having taken external measures up, reflecting their freedom to do so. In particular, participants in (semi-)detached or terraced housing more often reported having put up shade sails, canopies, shade umbrellas or gazebos compared with those living in flats (respectively, 33% for those living [semi-]detached houses, 27% for those living in terraced houses and 11% for those living in flats). Interviewed participants highlighted how people living in these situations were not constrained by access to outside space or the structural specifics of their property (as flat-dwellers might be).

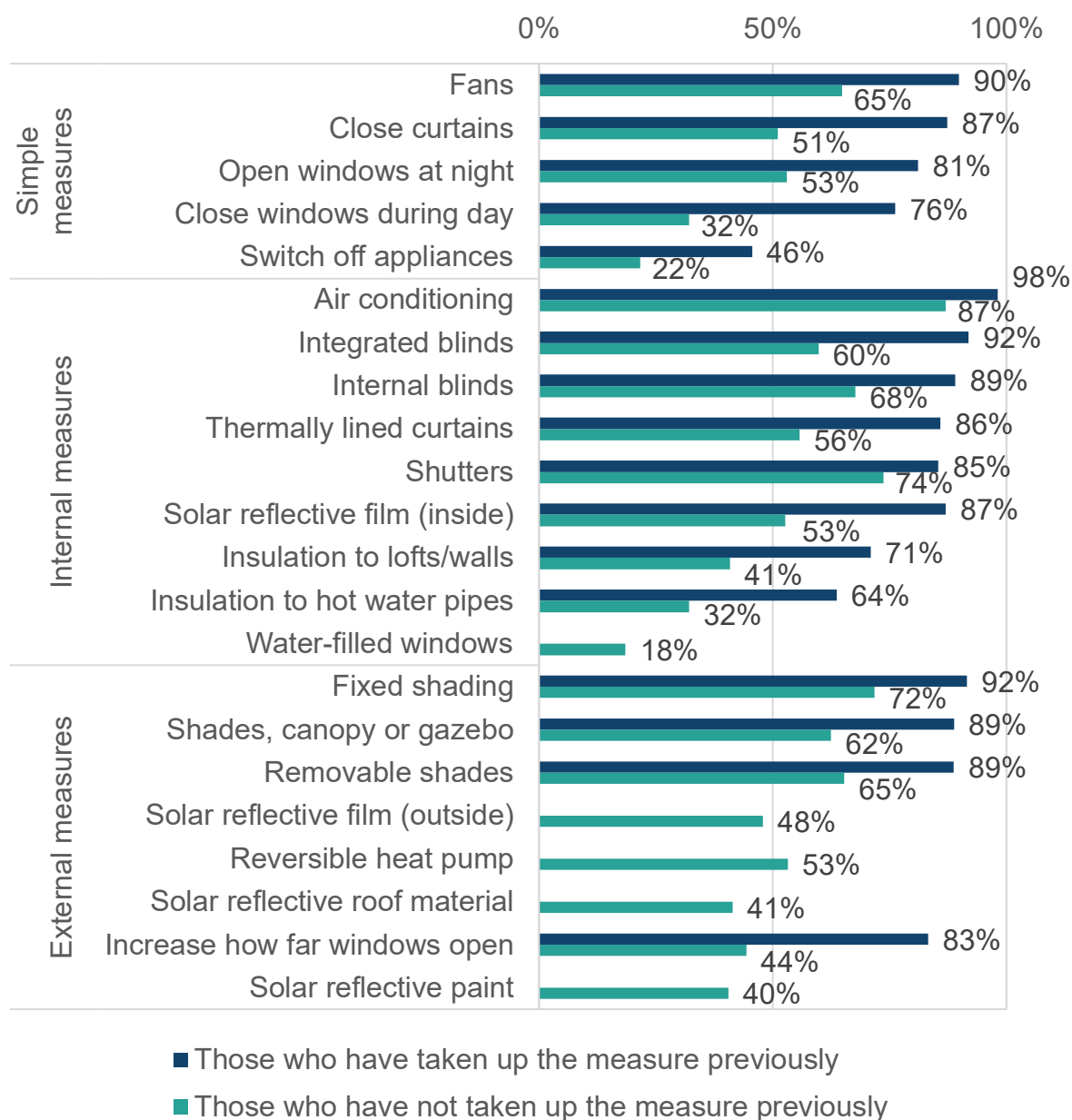
In the qualitative research some participants from ethnic minority backgrounds had taken up more internal measures to reduce indoor temperatures than white participants, such as installing thermal blinds or adding reflective film to windows to reduce indoor temperatures. Interviewed participants from ethnic minority backgrounds tended to have frequently visited or lived in countries used to high temperatures in summer: possibly this meant they were more familiar with these types of measures, which encouraged them to take them up to a greater degree than others in the sample.

Stronger patterns overall were seen relating to participants with higher educational attainment, for whom previous take-up of simple and internal measures was generally higher than for participants without academic or vocational attainment. Previous take-up of internal measures was generally higher for participants owning their dwelling, who knew the definition of net zero, or who reported having taken more actions to meet net zero in their life.

## Perceived effectiveness of cooling measures

Overall, perceived effectiveness of measures fed into participants' motivation to take measures up. The survey showed that across nearly all measures, at least 50% of participants who had taken an action found it somewhat or very effective, and interviewed participants generally found the measures they had taken up to be somewhat effective. Figure 3 sets out the survey results showing the proportion of survey participants who said they thought a measure would be somewhat or very effective at keeping them cool, separately for those who had or had not taken up the measure previously. We have not included proportions based on fewer than 50 participants.

**Figure 3: Perceived effectiveness of cooling measures**



Simple measures: N between 592 and 1,323 for those who have taken up the measure; N between 284 and 1,105 for those who have not taken up the measure. Internal measures: N between 51 and 479 for those who have taken up the measure; N between 1,128 and 1,607 for those who have not taken up the measure. External measures: N between 52 and 439 for those who have taken up the measure; N between 1,168 and 1,597 for those who have not taken up the measure. Proportions based on fewer than 50 responses not included; indicated as N/A. Questions: For those who have taken up the measure previously: And how effective were these actions at keeping you cool?

For those have not taken up the measure previously: For the actions below that you said you weren't familiar with or have not taken, how effective do you expect these would be at keeping you cool?

The survey clearly showed a disconnect between perceived effectiveness for those who had taken up a cooling measure, and the expected effectiveness for those who had not. On average, the difference was 29 percentage points, with the largest difference being for closing windows during the hottest part of the day (44 percentage points) and the smallest difference being for installing air-conditioning (11 percentage points). In particular, some passive measures were widely perceived as effective by those who had adopted them but less so by those who had not. For example, 92% of survey participants who had installed integrated blinds considered these measures to be somewhat or very effective, compared with 60% who had not.

Interviewed participants expressed uncertainty about some of the measures, such as whether different types of blinds or curtains varied meaningfully in effectiveness, for example whether integrated blinds offered advantages over curtains due to their closer fit, or whether thermal curtain fabrics made a significant difference. Those who owned thermal curtains typically reported purchasing them to retain heat in winter or reduce energy bills, although found them to have cooled their home during hot weather. Similar uncertainty was expressed in relation to reflective films and solar reflective paints. While interviewed participants inferred from product names that these measures would reflect solar radiation, they were unsure how effective they would be in practice. However, the survey showed that 11 of 13 participants who had added reflective film to the outside of windows, 8 of 10 who had added solar reflective surface materials on roofs and 19 of 33 who had painted external windows or walls with solar reflective paint thought it was somewhat or very effective.

Participants perceived air-conditioning as the most effective home cooling measure overall, although this had not translated into ownership (only 12% of survey participants reported having air-conditioning installed). Interviewed participants who had bought air conditioning units (two in this sample) felt it was effective in the room in which it was installed. Those who did not own one often thought it would be effective due to their experience of it (in places other than their home) actively circulating cold air.

Although the survey suggested high perceived effectiveness among those who had used fans (90%), interviewed participants were more sceptical as they believed that fans merely move warm air around rather than cooling it. To counter this, some participants described attempts to enhance the impact of fans, such as using multiple units, placing bowls of water in front of them, or positioning them near windows or in cooler rooms.

There were relatively few clear differences in perceived effectiveness of measures across demographics, property types or other characteristics: the main difference was between those who had and had not previously taken up an action. Having said this, for participants who did not take up relevant actions, those who reported taking up more actions to meet net zero were generally more likely to expect cooling measures to be effective than participants taking fewer net zero actions.

## Summary of patterns and variations

The findings indicate a reinforcing relationship between awareness of net zero, perceived effectiveness of cooling measures and take up. Participants more engaged with net zero tended to be more aware of a wider range of cooling measures, more likely to have taken them up previously, and more likely to believe they would be effective. It is possible that net zero engagement could increase exposure to information about cooling measures and affect expectations about their benefits, thereby supporting higher levels of take up of measures.

While some differences emerged across vulnerable groups, vulnerability alone did not explain patterns of behaviour in a consistent way. Differences (e.g. seen among older adults, households with young children, or people identified as potentially fuel poor) tended to be measure-specific rather than revealing a vulnerability driven pattern. Factors such as educational attainment, housing characteristics, tenure and engagement with net zero appeared to be more consistent predictors of awareness and take up than vulnerability status. This is consistent with the fact that vulnerable people are distributed across the population and therefore span a wide range of demographic and housing circumstances.

## Considerations for behaviour change

Overall, there was limited motivation to adopt measures, and capability and opportunity factors were further constraining take-up especially for internal and external measures. In particular, there was limited understanding of the full range of measures and how they work. However, given the importance of experience of measures for highlighting effectiveness, awareness-raising alone may be insufficient to encourage take-up. The range of opportunity barriers experienced across different population groups shows how varied approaches may be needed to support take-up.

## 4.2 Willingness to adopt cooling measures in the future

This section addresses the following research question:

Which measures or actions are people most willing to take up, both in isolation and in combination?

### Key findings:

- Participants were most willing to adopt simple measures such as opening windows at night, closing existing windows and blinds, and keeping windows closed during the hottest parts of the day, in combination with measures that block sunlight. However, they generally preferred not to block light from rooms during the day.
- Capability factors acted to reduce likelihood to adopt: where there was uncertainty about how measures work (such as with integrated blinds, solar reflective films, air-to-air heat pumps that offer cooling) whether individually or in combination, willingness to adopt was lower.
- There was some variation across the sample regarding measures participants were willing to adopt. Higher educational attainment was linked with greater reported willingness to adopt simple measures; being from an ethnic minority background was linked to greater reported willingness to install internal and external measures (e.g. internal blinds, shutters, fixed shading). Possibly these were linked to higher awareness of these measures. However, opportunity factors were cited as constraining some adoption decisions, especially for renters who needed landlord permission to take action.

### Willingness to adopt home cooling measures

Participants most often reported simple measures as those they would intend to adopt in the future; being simple to implement, these were less subject to capability or opportunity factors constraining take-up. For every simple measure, over 50% of participants reported they would adopt them in the future: 82% would open windows at night, 80% would use a fan, 80% would close existing curtains or blinds, 68% would keep windows closed during the hottest part of the day and 50% would turn off unnecessary appliances.

Willingness to take up other measures was generally lower. Participants were most open to measures that directly block sunlight, such as installing internal blinds on windows exposed to direct sunlight (43%) and thermally lined curtains on windows exposed to direct sunlight (37%). For external measures, participants most commonly said they would put up a shade sail or canopy, shade umbrella or gazebo (46%). Some interviewed participants were reluctant to keep curtains closed during the day, so were less motivated to take these measures up. In line with awareness and previous take-up, measures participants said they were least likely to adopt in future were niche internal or external measures: installing water-filled windowpanes (3%) and adding solar reflective surface material on roofs (5%).

Some of the interviewed participants mentioned they were unsure about some measures (e.g. integrated blinds, solar reflective film, air-to-air heat pumps that offer cooling). If participants had known more confidently how they work, how they would look or how they would affect daylight in their living space, they may have been more willing to say they would adopt them. This was not something that was referred to in the survey and is explored in greater detail in section 4.3.

*"It locks you in a lot during the daytime, if you've got the curtains closed. You feel as if you're stuck in a box. So, if [other internal measures] did work, then we wouldn't have to close the curtains."* – Participant aged over 65 with a long-term health condition

## Variation in willingness across the population

Willingness to adopt measures varied and none of the vulnerable groups were more likely to report adopting a measure than others. However, some patterns emerged.

People with higher educational attainment were more likely than others to state they would keep windows closed during the hottest part of the day (76% v 66% of participants with a non-degree qualification and 61% of participants without qualifications). Similarly, they were more likely to say they would keep their curtains closed (85% v 79% of participants with a non-degree qualification and 68% of participants without qualifications). Participants from ethnic minority backgrounds reported a higher willingness to adopt a range of internal and external measures in the survey. For example, they tended to be more likely to install internal blinds (52% v 42% for participants from white backgrounds), shutters on windows exposed to direct sunlight (38% v 18%), air-conditioning units (41% v 23%) and fixed shading on windows or doors (34% v 17%). It is possible that both of these groups had greater exposure to the measures they were more willing to take up. For example, in the survey participants with higher educational attainment reported having searched for information about cooling measures across more sources than other groups (see section 4.4 for details). Participants from ethnic minority backgrounds may have had greater familiarity with measures experienced in other countries or cultures.

Participants living in a flat were more constrained in adopting some measures, due to limited access to or permission for making changes to the fabric of the building. For example, they reported less often that they would add internal insulation to lofts or walls (13% v 39% for participants in [semi-]detached housing or 33% for participants in terraced housing).

## Combinations of measures that participants reported they were most likely to adopt

Interviewed participants generally described taking up cooling measures gradually over time rather than planning strategically, suggesting limited forward planning, despite awareness of some measures. They reported making decisions in response to hot weather, rather than after consideration of which measures would work best together. This meant that combinations of measures sometimes involved repeating simple actions or taking up measures that they had already used in the past, such as buying additional fans rather than trying new measures.

Interviewed participants identified some factors that seemed to reduce willingness to combine measures. These participants saw some measures as overlapping or serving a similar purpose, for example internal and external blinds, or reversible heat pumps and air-conditioning. This led participants to believe there was limited value in adopting both, which reduced willingness to combine these measures because participants believed one option would suffice. Additionally, participants tended to perceive air-conditioning as a particularly effective cooling measure on its own, which made them feel less compelled to combine it with other measures (although only 12% of survey participants had installed air-conditioning).

## Considerations for behaviour change

In the overarching context of weak motivation to take up home cooling measures, willingness to adopt internal and external measures was reduced by uncertainty about how measures work in different situations (a capability factor). Although they stated that they would adopt simple measures in combination with those that block sunlight, interviewed participants emphasised a preference to retain daylight where possible: this shows an inherent tension that may further weaken motivation to take passive measures up.

## 4.3 Barriers and enablers to take-up of cooling measures

This section addresses the following research question:

What are the barriers and enablers to people taking up different cooling actions and how does this vary by property type and income levels?

### Key findings:

- Participants were more likely to adopt cooling measures when they prioritised overheating over other challenges relevant to where they lived; this motivation was identified as the key trigger in the BBN analysis. Without this motivation, or a motivation to avoid the negative health impacts of overheating (which was relevant for some in vulnerable groups), the qualitative research showed positive associations with warm weather, and the perception that heat is short-lived and unpredictable, inhibited take-up of measures.
- Psychological capability was a significant enabler, especially for simple measures: awareness of available options, confidence in their effectiveness, and belief in one's ability to act increased readiness to take up measures. However, lack of physical capability to install measures constrained take-up for some groups, including flat-dwellers, people with health conditions or impairments, and those lacking the confidence, tools or support to install measures themselves.
- Physical opportunity strongly affected adoption. Owner occupiers faced fewer barriers than renters, due to having greater freedom to install internal and external measures and higher perceived responsibility to do so. Those living in houses faced fewer barriers than those living in flats: access for installing some internal measures (e.g., insulation) was more limited for the latter group.
- Cost influenced decisions in relation to up front purchase, installation and running costs; lower income and potentially fuel poor households prioritised low or no cost measures and were less able to adopt measures requiring investment.
- Perceived effectiveness interacted with cost and aesthetics: there was greater willingness to adopt measures seen as dual purpose, visually acceptable (both to individuals and their neighbours and guests), and not disruptive to light or security in homes.
- There were different adoption pathways across the different measure types. Previous experience of adopting measures reinforced future willingness, particularly for simple and external measures, by increasing confidence, preparedness for action and openness to further adoption. However, take-up of external measures diminished willingness to adopt internal measures, suggesting that trade-offs may sometimes be made between measures and that participants lack clarity about how measures complement each other.
- Simple measures were most frequently adopted through participants (1) prioritising overheating over other challenges relevant to where they live and (2) feeling confident to be able to act to prevent overheating.

- Internal measures required stronger enabling conditions, requiring the same motivation factors along with home ownership, knowledge of options and confidence in ability to install measures.
- Adoption of external measures depended heavily on tenure and property type, so owner-occupiers in detached or semi-detached houses were most likely to adopt these measures – there may be a limit to what different population groups are able to take up without further support.

## COM-B factor analysis

Figure 4 below sets out an overview of the barriers and enablers to taking up home cooling measures, as identified within both the REA and primary research, using the COM-B model as an analysis framework. In this context:

- **‘capability’** refers to someone’s psychological ability to understand which home cooling measures are available and relevant, and their physical capability to put these in place
- **‘opportunity’** refers to an individual’s physical opportunity or freedom to take up home cooling measures, and whether they perceive them as fitting with social norms
- **‘motivation’** refers to unconscious emotions (automatic motivation) and conscious consideration (reflective motivation) that inspire and direct behaviour

The narrative below explains the barriers and enablers set out in the diagram in more detail, focusing on those identified in the primary research.

**Figure 4: Overview of COM-B barriers and enablers**

|                 | Capability                                                                                                                                                                           | Opportunity                                                                                                                                                                                                                                                                                                                                                                                                                              | Motivation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Barriers</b> | <b>Psychological capability</b><br>Low knowledge of measures<br>Uncertainty about effectiveness<br>Lack of cognitive ability (e.g. recall difficulty, confusion)                     | <b>Physical opportunity</b><br>Perceived or real permission issues for making changes to property<br>Lack of storage for when measures not in use<br>Cost of measures / installation / ongoing use<br>Measures not available or accessible to buy<br>Existing physical features of property inhibit installation of measures<br>Lack of time to research or install measures                                                             | <b>Automatic motivation</b><br>Pleasant associations with heat<br><b>Reflective motivation</b><br>Heat perceived as temporary<br>Perception of low vulnerability / risk<br>Low self-efficacy / perception of control<br>Focus on cooling the individual<br>Low familiarity with or perceived effectiveness of some measures<br>Aesthetics of some measures<br>Security / safety concerns around measures<br>Perception that they are doing all they can<br>Perceived inconvenience of installation |
|                 | <b>Physical capability</b><br>Perceived inability to install some internal and external measures<br>Vulnerable groups (e.g. children)<br>Lack of access to support / tradespeople    | <b>Social opportunity</b><br>Measures not aligning with social norms for property exteriors and interiors                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Enablers</b> | <b>Psychological capability</b><br>Knowledge of measures<br>Perceived effectiveness of measures<br><b>Physical capability</b><br>DIY confidence or access to support on installation | <b>Physical opportunity</b><br>Ability to make changes to property (e.g. through property ownership)<br>Low-cost or dual-purpose measures<br>Measures available or accessible to buy<br>Time to research or install measures<br><b>Social opportunity</b><br>Influence from others in social network to take up measures<br>Measures being the cultural norm<br>Measures aligning with social norms for property exteriors and interiors | <b>Reflective motivation</b><br>Perceiving overheating as a priority over other challenges<br>Perception of vulnerability / risk (of self or others in property)<br>Previous experience of negative health impact of heat<br>High self-efficacy / perception of control<br>Perceived multiple benefits of measures<br>Perception of ease of installation                                                                                                                                           |

## Motivation

As identified by the BBN and qualitative research, motivation played a central role in both enabling and inhibiting participants' take-up of home cooling measures. Both automatic and reflective motivation influenced behaviour, although they operated in different ways and with varying effects across participant groups and types of measures.

**Automatic motivation** predominantly inhibited action. Participants' instinctive responses to heat were generally positive, with warm weather associated with enjoyment rather than negative emotions, which tended to discourage focus on and take-up of cooling measures.

*"Sometimes you just want to enjoy the weather, and don't think about how it can impact you in the long term."* – Participant with an impairment

Where **reflective motivation** operated as barrier, heat was generally perceived as short lived and unpredictable rather than as a long-term health risk, which reduced the sense of urgency to act, and participants believed that the best way of addressing overheating was to cool the individual rather than adapt the home environment. These factors tended to operate in combination, compounding a lack of motivation to adopt home cooling measures.

Where participants were uncertain about the relevance or effectiveness of the measure (as discussed in previous sections), this also acted to suppress take-up.

Aesthetic considerations affected reflective motivation across different measure types. Participants frequently emphasised the importance of the look of their home décor, and of maintaining light within their homes, which reduced the appeal of measures such as thermal curtains, blinds or shutters for some. Participants' overall awareness and familiarity with solar reflective window film was lower; participants were more likely to consider installing film where it was perceived as not blocking out sunlight or negatively affecting the look or feel of rooms.

*"I wouldn't want [thermal blinds] as a permanent fixture, as I feel it might look a bit ugly in my house."* – Participant living with a child aged under 5

Negative reactions to certain measures also sometimes impeded take-up. This included concerns about security and safety, associated with leaving windows open overnight for those living on the ground floor or who had previously lived in high crime neighbourhoods. Some participants were reluctant to close windows during the day as they did not want to prevent a breeze from entering their home. Some participants with respiratory conditions did not want to shut windows, as they believed this would make their home air stuffy and uncomfortable. Some participants also referred to discomfort associated with noisy fans at night.

Participants planning to move and those living in rented accommodation, especially social housing, were less motivated to make changes to their homes overall as they did not own the property or would not be staying long enough to feel they had benefited from the measure. Renters sometimes also assumed that responsibility to mitigate heat risks lay with their landlords rather than them.

In contrast, reflective motivation acted as an enabler for some participants. In the survey, participants were asked the extent to which they prioritised overheating over other challenges relevant to where they lived. Of all participants, 42% said that overheating was important or very important to address compared to other challenges where they live, although vulnerable groups – especially those with health conditions, living alone, having children younger than 5 years old in the household and households identified as potentially fuel poor – more often reported this as a priority (see technical annex section 2.6). On average, the proportion of vulnerable participants who said this was a priority was 9 percentage points higher than for other participants. Interviewed participants sometimes talked about this (e.g. disabled participants or those living with disabled people, pregnant participants and those living with young children), as well as wanting to avoid the negative health impacts of overheating. For some in these groups, greater awareness of vulnerability and the desire to ensure the comfort of members of their household encouraged more deliberate consideration of preventive measures. Where participants had experienced heat stroke or other negative health issues from hot weather, this also strengthened reflective motivation, leading them to prioritise take-up of cooling measures. However, we note that the BBN analysis of the survey did not identify perceived vulnerability as among the strongest drivers of action (see section below).

*"We just can't cope with that level of heat really, we just don't feel well. And it would be dangerous actually for my husband to experience those sorts of temperatures on a regular basis."* – Participant aged over 65 living with someone with a long-term health condition

## Capability

Both psychological and physical capability influenced behaviour. The main **psychological capability** factors were awareness of measures and knowledge of how effective they are. These capability factors acted as enablers, especially for simple measures.

Sometimes participants were not familiar with measures but could imagine what they were and how they could work once they had been explained in more detail. This included blinds and shutters, air-conditioning, external fixed and removable shading, and shade sails or canopies. However, participants tended to be less familiar with integrated blinds (how these are different to other types of blinds), solar reflective film (internal and external), solar reflective paint and air-to-air heat pumps, which presented a barrier to take-up. Uncertainty about how to install measures, or how effective they would be in practice, sometimes inhibited adoption. In particular, participants tended to be unclear how to install measures such as solar reflective film (uncertainty about how the film adheres to the window), internal blinds and shutters (uncertainty about the weight of and type of fixture) and insulation of pipes (uncertainty about which pipes were relevant and whether they were accessible).

A **physical capability** factor discussed with interviewed participants was ease of installation. Where this was an enabler, installation was perceived as straightforward, for example purchasing a fan or opening windows. Some participants were confident to undertake do-it-yourself (DIY) adaptations for internal and external measures (e.g. putting up blinds, curtains or external shading) and had access to ladders and tools. Others were able to get help from family members or friends, or contactors, to do this.

Groups who were less confident in their ability to install measures themselves included people living in flats or in multi-storey houses (who perceived working at height as not possible or desirable), those who were not confident with DIY, and people with certain impairments or health conditions. For example, one participant with a neuromuscular condition reported they would not have the strength required to put up or take down a shade sail or canopy; another with chronic fatigue would rely on others for installation.

*"We haven't got easy access to our outside windows because we've got bushes and things. So it would be physically quite a difficult thing to do."* – Participant aged over 65 with a long-term health condition

## Opportunity

**Physical opportunity** factors were more apparent than social opportunity factors. A prominent physical opportunity factor was that those who owned their properties had more freedom to adopt cooling measures than those who rented. Needing to gain permission from landlords was a common barrier mentioned by tenants regarding installing blinds, external window shading, replacing windows to increase the extent they open, installing insulation and using solar reflective paint. Participants had not generally asked their landlords about installing cooling measures but believed that gaining permission would be difficult or burdensome. This indicates that it was primarily the physical opportunity barriers that were stopping them from adoption measures, rather than the appeal of measures.

Permission could also be a perceived barrier for some owner-occupiers, who believed that they may need to obtain planning or other forms of permission to replace windows, install shutters or paint their property exteriors.

Another physical opportunity barrier related to storage: some participants did not have sufficient space in their homes to store mobile air-conditioning units or removable shading when not in use.

Cost considerations were important for all participants, though their influence varied. Measures such as closing existing curtains or opening windows that required no financial outlay, or inexpensive measures, were not subject to cost as a barrier. However, participants were generally reluctant to purchase measures to upgrade existing fittings and fixtures, such as buying new thermal curtains or blinds when alternative curtains or blinds were already installed. This reluctance was particularly evident among tenants when these furnishings had been provided by their landlord. Cost concerns were more prominent where measures potentially needed to be duplicated across multiple rooms or windows, or measures were assumed to be relevant for a relatively limited time during the summer.

Aside from up-front purchase costs, the cost of installation was also a factor, with participants assuming they may have to pay labour costs for installation of external shading, heat pumps or painting of the outside of properties. This was most relevant for those who did not feel they had the capability to install these measures themselves or who were unsure if they would require professional installation. Running costs also affected decision-making, particularly for energy using measures such as air-conditioning and fans. Although fans were widely used, some participants associated them with increased electricity bills. In most cases, this did not prevent use, suggesting that perceived effectiveness outweighed cost concerns. However, participants

who were more financially constrained described efforts to minimise running costs, for example by choosing more energy efficient or battery powered fans, or only using them as a last resort.

While cost was most frequently described as a barrier by lower income households, all participants considered costs to some degree. Financial sensitivity was influenced not only by income but also by life circumstances, such as upcoming parental leave or higher household outgoings related to caring for elderly parents or children. Participants who were less financially constrained still described making cost-benefit assessments, weighing the perceived effectiveness of measures against cost and the frequency with which they expected to use them.

*"You'd have paid a lot of money for something that was then not going to work on hot days. And since it's not hot for most of the year, you've got these shaded things on the windows and doors forever, which you may or may not need."* – Participant aged over 65 with a long-term health condition

**Social opportunity** factors were less frequently mentioned, but related to discussion of measures among social networks and how cooling measures may be perceived by others. Some interviewed participants reported that they had become aware of certain measures due to conversations with family or friends, or through seeing measures in other people's homes.

Participants noted that measures may be perceived positively or negatively by visitors to their homes, as well as by those able to view them from outside. For example, some expressed concerns about how solar reflective window film or painting building exteriors might appear to neighbours, while others worried that measures such as thermal curtains or integrated blinds would not be available in styles that would fit in with their décor and so would be judged negatively by guests.

*"The kind of house where I live, [reflective paint] just would look out of place, it would not fit in with the area. It would look ridiculous to be honest...so I wouldn't entertain that idea at all."* – Participant with a long-term health condition

## BBN analysis

### BBN analysis and what it tells us

A Bayesian Belief Network (BBN) shows how different factors are linked and influence each other. It helps to understand why an outcome happens, which factors have the biggest impact, and whether those influences are positive or negative. A BBN also shows how the likelihood of a behaviour changes under different scenarios or for people with different characteristics.

We conducted BBN analysis separately for participants' stated willingness to adopt simple, internal and external measures in the future. Providing a single BBN model across all cooling measures would produce a highly complicated map because the BBN links every factor with every other factor in the model.

In the figures below, we show only the pathways for the strongest factors influencing the adoption of each type of measure. Each line indicates a positive relationship between the nodes in the model. For example, for both internal and external measures, there was a link between being willing to adopt measures in the future and seeing overheating as a priority (see Figure 2 and Figure 3). This means participants who were more likely to prioritise overheating over other challenges relevant to where they lived were also more likely to adopt an internal or external measure.

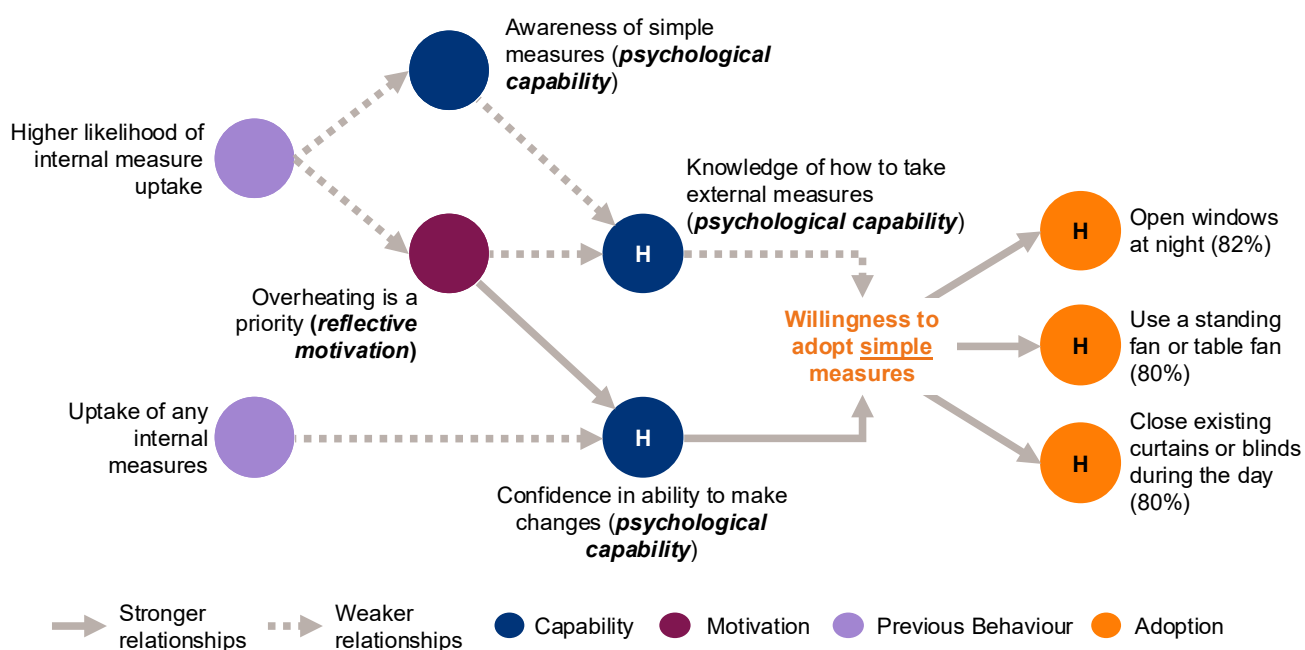
The figures show two layers of information. The arrows represent the strength of the relationships between factors, solid arrows indicating stronger connections and dotted arrows showing weaker ones. The letters inside the circular nodes show the likelihood of adoption. These labels are only applied to factors that directly influenced the probability of future adoption of simple measures. Together these show the factors that mattered most (through the arrows) and how likely each pathway was to lead to adoption (through the labels). The three actions most likely to be adopted are displayed in the right-hand nodes.

After each figure, we then describe the results of the analysis based on the full model that includes all factors for each measure category, focusing only on the barriers and enablers that impacted adoption.

## Simple measures

The BBN showed that future adoption of simple measures is most strongly driven by reflective motivation (motivations involving conscious thought or deliberations), mediated by psychological capability factors and reinforced by previous behaviour. The causal pathways for the strongest factors influencing adoption of simple measures are shown in Figure 5.

**Figure 5: Causal pathways for adoption of simple measures**



Nodes with a direct link to simple adoption are labelled with how likely adoption is: High (H, >0.8, meaning it happens in around 8 out of 10 cases or more), Medium (M, 0.7–0.8), or Low (L, ≤0.7). The three simple actions most likely to be taken are shown in the right-hand nodes. Solid lines show stronger relationships, while dotted arrows show weaker ones.

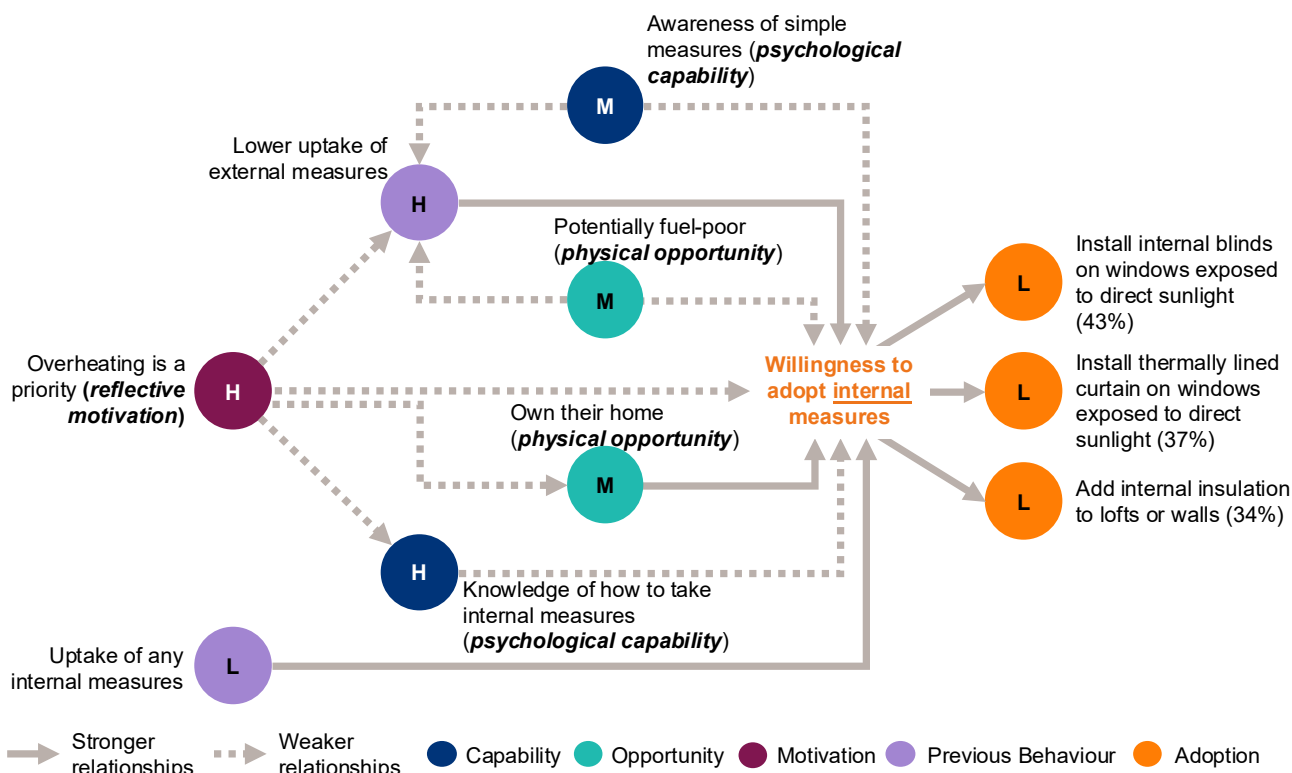
Perceiving overheating to be a priority was the upstream trigger for future adoption. This motivation was converted into behaviour when psychological capability enablers were also present. Firstly, future adoption was more likely when individuals felt confident that they were able to take cooling measures themselves. This self-efficacy was the dominant factor in the pathway to the adoption of simple measures. This pathway was supported by the qualitative evidence: interviewed participants talked about simple measures (e.g. using fans and closing curtains) as being easy to do and so did not lack confidence in being able to carry them out. Secondly, knowledge of simple and external measures raised overall likelihood of adoption. Both 'knowledge of how to take external measures' and 'confidence in ability to make changes' (psychological capability factors) together represented willingness to adopt simple measures. Previous experience of making changes in one's home in order to keep cool (internal adoption), even a single measure, increased confidence in one's ability to make changes somewhat, reducing friction and increasing the likelihood of adoption.

Once participants' understanding of how to adopt simple measures was high, households were willing and ready to adopt simple, low-effort behaviours in the future. This understanding is represented in the map through psychological capability factors, specifically knowledge and confidence, which feed directly into simple adoption. The actions that participants most often stated they were willing to adopt were opening windows at night, followed by closing curtains or blinds during the day, and using a standing or table fan, although adoption of each cooling measure was positively impacted by general willingness to adopt simple measures. When people took one internal action, they were more likely to have taken additional actions too, while awareness and knowledge about specific measures added smaller but meaningful lifts. Interviewed participants also described adopting multiple simple measures at once and having experienced these as relatively effective.

Demographic and contextual factors (such as age or potential fuel poverty) had some indirect effect on actions but rarely affected the overall outcome or path to the outcome. These variables were strongly associated with the type of housing participants lived in but showed little direct relationship with willingness to adopt simple cooling measures. The model indicated that simple measures were undertaken across demographic groups, rather than by specific groups only.

## **Internal measures**

Willingness to adopt internal measures in the future was driven by reflective motivation, psychological capability and a reinforcement effect of previous behaviour. These pathways were influenced by demographic characteristics relating to physical opportunity. The causal pathways for the strongest factors influencing internal adoption are shown in Figure 6.

**Figure 6: Causal pathways for internal adoption**

Nodes with a direct link to simple adoption are labelled with how likely adoption is: High (H, >0.8, meaning it happens in around 8 out of 10 cases or more), Medium (M, 0.7–0.8), or Low (L, ≤0.7). The three simple actions most likely to be taken are shown in the right-hand nodes. Solid lines show stronger relationships, while dotted arrows show weaker ones.

Seeing overheating as a priority was an important initial requirement for individuals to be willing to make changes to the inside of their home to keep cool. Unlike for simple measures, internal adaptations needed more factors to line up before people were willing to act, so overheating as a priority appeared earlier in the pathway. Home ownership had a strong direct relationship with internal adoption: those who owned their home showed a higher readiness to make changes. This was supported by qualitative evidence: for example, renters reported being less willing to adopt measures that they saw as needing permission or action from their landlord (e.g. installing insulation). Renters were also reluctant to upgrade fittings that their landlord had already provided themselves (e.g. blinds and curtains) and expressed concern about installing measures that may damage the building (e.g. internal reflective film).

Readiness to take internal measures was constrained by take-up of external measures; participants who had previously taken up more external measures were less likely to be willing to adopt internal measures in the future, suggesting a trade-off was made between internal and external measures. This trade-off can have complicated indirect consequences. For example, the BBN suggests that those identified as potentially fuel poor were less likely to have taken up external measures in the past, and therefore were – indirectly – more likely to take up internal measures in the future.

Awareness of simple measures was linked to willingness to adopt changes inside the home. Similarly, previous take-up of measures in the home increased readiness, which was further supported by knowledge of how to take up internal measures. These influences fed most strongly into overall willingness to adopt internal measures, which in turn translated most often

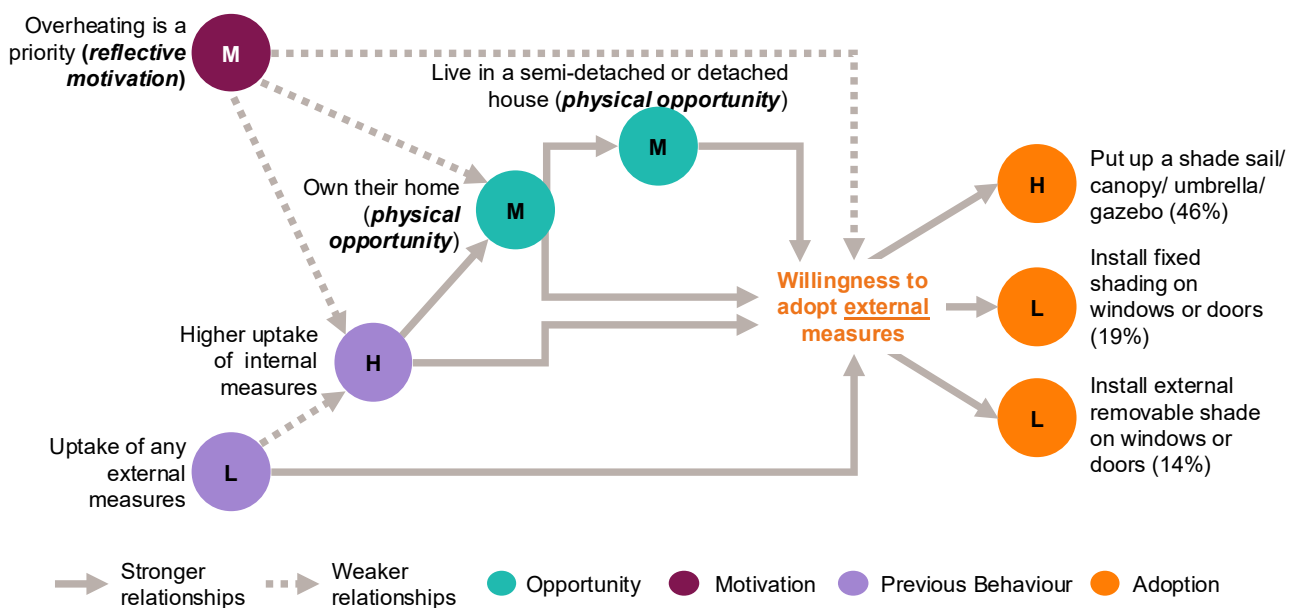
into installing internal blinds, thermally lined curtains, and loft or wall insulation; more specialised or higher-cost measures were less likely to be adopted (and therefore not shown in the figure above) but were still positively influenced by overall willingness to adopt internal measures.

The qualitative research found that adoption of internal measures was additionally influenced by three other factors. Firstly, participants were more willing to adopt measures if they had a double function (e.g. thermal curtains also acting as blackout curtains and retaining heat in winter). Secondly, participants were more willing to adopt a measure if it would fit in aesthetically with their interior decoration (e.g. internal blinds complementing their existing décor) or the look of their property from the outside (e.g. if reflective film would not be noticeable from outside). Thirdly, participants were less likely to adopt a measure if it was perceived to be difficult to install (e.g. putting up internal blinds and insulating pipes).

## External measures

This pathway was strengthened by previous take-up of greater numbers of internal cooling measures, and previous take-up of even one external measure. The causal pathways for the strongest factor influencing external adoption are shown in Figure 7.

**Figure 7: Causal pathways for external adoption**



Nodes with a direct link to simple adoption are labelled with how likely adoption is: High (H, >0.8, meaning it happens in around 8 out of 10 cases or more), Medium (M, 0.7–0.8), or Low (L, ≤0.7). The three simple actions most likely to be taken are shown in the right-hand nodes. Solid lines show stronger relationships, while dotted arrows show weaker ones.

The external adoption pathway began when individuals saw overheating as a priority and were therefore motivated to make changes, but action was only likely to follow when there were enabling housing conditions or if individuals had previously taken up internal measures. Those who owned their home and those who lived in a detached or semi-detached property were more likely to be willing to make install external cooling measures. This was supported by the qualitative research, as renters reported requiring permission from landlords. Those who lived

in flats above the ground floor expressed concern about access to be able to install external fixed shading or to paint external walls.

Previous take-up of external measures (in either people's current or previous dwelling) could be a key turning point: households that had taken at least one external measure were substantially more likely to say they would adopt further actions in the future. Previous internal actions also signalled readiness to make external changes. This was in contrast to the results from the BBN for internal measures, where previous take-up of external measures decreased the likelihood of internal adoption. This could be because external measures were seen as a substitute for some internal ones, or sufficient on their own, while internal measures were not seen as sufficient on their own. In line with future adoption of simple and internal measures, overheating being seen as a priority to address also directly influenced the probability of adoption of external measures. These measures required more effort, cost or permission, so stronger prerequisites – such as owning a home, living in a (semi-)detached house or more previous experience – were needed before people could act. This differed from simple measures, where behaviours tended to be easier, more familiar and lower effort, meaning action was triggered by confidence and knowledge to a greater extent.

Once willingness to adopt external measures was high, households were most likely to implement practical, shade-based measures. Installing external wall shading (e.g. a shade sail or gazebo) was by far the most likely measure for adoption, followed by fixed shading on windows or doors, and external removable shading on windows or doors. The qualitative research showed that participants generally preferred measures that directly shade or block light (e.g. blinds, curtains, shutters, gazebos), aligning with the finding that survey participants were more aware of and had taken this type of measure up more often than others. However, these interviewed participants tended to describe using gazebos to shade themselves or others from the sun when outside, rather than to shade external property walls, indicating that people may be employing this measure to cool people when they are outside, rather than to keep their building cool.

Risk-related motivation factors (such as seeing oneself as at risk of overheating) play a small role in increasing the readiness to adopt external measures, while wider demographic characteristics play a smaller role still.

## Considerations for behaviour change

Motivation was the key factor in triggering take-up of measures, so it may be beneficial to focus on increasing motivation by highlighting home overheating as a health risk, so that people ultimately prioritise it. Capability sometimes undermined take-up of simple measures (e.g. when to open windows) but more significantly impacted take-up of internal measures (e.g. installing thermal curtains or insulation). The BBN showed that past behaviour can influence willingness to act in the future, mostly positively, especially encouraging take-up of the type of measure that has already been adopted. However there is evidence that take-up of one measure does not always result in greater take-up of others (e.g. previous external measures diminished willingness to adopt internal measures), suggesting that trade-offs may sometimes be made by participants and they may lack clarity about how measures complement each other. Take-up of external measures was primarily affected by opportunity factors (e.g. owning a house), which indicates that there may be a limit to which population groups are able to take up these measures without further support.

## 4.4 Communication opportunities

This section addresses the following research questions:

What information on cooling measures do people currently receive and how, both in general and in the context of an impending extreme heat event?

What opportunities are there for communication to encourage cooling behaviours in the UK?

### Key findings:

- Although participants had generally seen advice about keeping cool during hot weather, this largely related to drinking water and staying out of the sun, which felt repetitive, reduced engagement and did not highlight home cooling measures. The risks of overheating (to all and specific vulnerable groups) were not well understood.
- People most often encountered advice through informal networks and broadcast media; the NHS was the most trusted source for this type of information overall.
- Communication could be more effective by focusing on explaining the health risks to all, highlighting how to prevent indoor overheating and promoting less familiar but practical and affordable measures. Communication about forecasts of particularly hot weather could also be delivered earlier so those who want to can plan to take relevant home cooling actions.

### Information on cooling people currently receive

Interviewed participants generally recalled having seen or heard general (unspecified) information about cooling adaptations during recent periods of particularly hot weather, although this was typically received passively rather than actively sought out. Most survey participants (72%) recalled receiving information about keeping cool; 16% had not previously received information; and 12% did not recall. The most common sources of information were friends and family (38%), followed by TV and radio (31%), social media (30%), and central government (27%); the least popular source was emergency notifications (8%). This was reflected in the qualitative interviews.

*"It's not really me seeking out this information, it's me using social media, and then seeing a caption of how to keep cool this summer, and then you just kind of follow into it."* – Participant living with a child aged under 5

Survey participants aged over 65 were less likely to have received information from social media in the past (14% v 34% for under 65s), as were those in single adult households (17% v 32% in multi-adult households). A larger proportion of adults aged over 65 had previously received information from TV or radio than others (40% v 29% for under 65s) and newspapers or news sites (33% v 20% for under 65s), but fewer had received information from friends and family (28% v 40% for under 65s). Those with young children were less likely than those without to have received information on TV or radio (21% v 32% for households without young children). There were no other notable differences by vulnerable group.

As mentioned earlier, not everyone was aware of the risks of overheating, and participants tended to recall advice framed around sun exposure (e.g. staying in the shade, using sun cream to avoid skin cancer) or personal comfort (e.g. drink water, use ice packs), rather than the risk of high temperatures indoors. This supports research conducted by the Government Office for Science's Social and Behavioural Sciences for Emergencies (SBSE)<sup>8</sup>, which found that behaviour change messaging does not tend to explain the rationale for advised behaviours or the evolving nature of extreme heat risks (such as the temperatures at which this advice becomes relevant), and focuses on hydration and sun protection.

Participants sometimes felt that the messages with high cut through, about staying out of the sun and drinking water, were repetitive and reinforced the idea that there were no additional actions worth taking. This could cause them to lose interest in receiving further information.

Some participants had intentionally sought information on home cooling measures. These participants tended to have impairments or long-term health conditions, or had a professional medical background. Like those who had experienced heat related health issues, they were generally more aware than others of heat health risks, which led them to actively seek information. Among survey participants, 84% said they would be likely to search for information on what they can do to keep themselves and those they live with cool. The places they were most likely to look for information were central government (46%) and friends and family (44%); the least popular options were the local council (28%) and emergency notifications (21%). These responses contrasted with where participants said they had received information from in the past: TV or radio and social media were among the most common responses.

There were some differences in the use of information sources for vulnerable groups. Survey participants aged over 65 were less likely to use social media to search for information (21% v 40% for under 65s), and were more likely to use central government websites (54% v 43% for under 65s), newspapers and news sites (44% v 28% for under 65s), TV or radio (44% v 28% for under 65s), and their local council (36% v 25% for under 65s). Those with young children were less likely than those without to have looked for information on TV or radio (21% v 32% for households without young children), and those identified as potentially fuel-poor were less likely to look for information in newspapers and news sites than others (24% v 36% for those not identified as potentially fuel poor). In addition, survey participants with higher educational attainment reported searching for information across different types of sources. Participants from ethnic minority backgrounds more often said they search for information on keeping cool on social media (48% v 31% for participants from white backgrounds).

Participants were better able to remember information about simple, immediate actions that could be taken up with little effort or cost, such as using fans or behaviours aimed at feeling cool. Information was also more salient where it contradicted participants' intuitive beliefs, such as advice to keep windows closed or blinds drawn during the day. In some cases, unexpected information encouraged participants to try out the measure, and participants found it to be effective. Participants tended not to recall hearing information about internal or external measures requiring installation; when this was remembered, it came via word of mouth from neighbours, tradespeople, or medical professionals.

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<sup>8</sup> Government Office for Science (2025) '[Public messaging for summer concurrent risks: Extreme heat, drought and wildfires](#)'

Participants generally remembered receiving information about cooling measures immediately before or during periods of particularly hot weather, around one to two weeks in advance. They believed this timing was appropriate, as they imagined that they would ignore information provided earlier, especially if the weather was not hot at that point. Some participants felt that advice delivered very close to extreme heat events could even have a negative impact by contributing to panic-buying of recommended items (such as fans). However, those who had experienced the negative effects of hot weather emphasised the importance of being informed earlier than one to two weeks in advance of particularly hot weather where this was possible.

## Perceptions of existing sources and messengers

The NHS was the most trusted source among survey participants (63%). In the qualitative research, NHS and medical professionals were consistently perceived as the most trustworthy messengers for information about health risks and recommendations for home cooling measures; participants believed that medical professionals would not financially benefit from giving this type of advice. Findings from the REA also supported the idea that communications may be more effective when they come from medical professionals. Participants in regular contact with health professionals (e.g. due to ill-health, disability, pregnancy or having a baby) had received information either directly from medical professionals or in waiting areas in hospitals or GP surgeries.

*"The NHS have got the knowledge, the expertise, the specialism."* – Participant with an impairment

Local government was trusted by some groups, particularly social tenants, while central government was viewed more sceptically, especially by older participants. The quantitative research found that central government websites were the second-most trusted source (62%), although this explicitly included the Met Office; those identified as potentially fuel-poor were less likely to trust central government websites than other participants (56% v 67% for those not identified as potentially fuel poor). Survey participants reported that they were less likely to trust information from newspapers and news websites (22%) and TV and radio (25%), although those aged over 65 were more likely than younger participants to trust TV and radio (34% v 22% for under 65s). However, as mentioned above, news and weather channels were identified as an exception to this in the qualitative research; those who had sought information on cooling had tended to go to the Met Office or use NHS apps. Additionally, when interviewed participants could not recall where they had found information, they often assumed it must have been from these sources. Other sources of consumer advice, such as Citizens Advice, were not top-of-mind for participants.

The survey found that social media was the least trusted source (only 13% of participants trusting it to provide accurate information), and was also rated as the least useful by those who had received information about cooling from it. However, 77% of participants still found social media useful. The qualitative research also found that although social media was not trusted in principle, as revealed in the survey, participants would still be likely to pay attention, especially to official social media accounts from otherwise trustworthy messengers like the NHS.

*"Everyone is on social media, so you've got to listen to it... It's not that everything that happens in social media is happening, but if there was a heatwave I would listen to social media."* – Participant with long-term health condition

## Opportunities for communication to encourage take-up of home cooling actions

The REA found that there is limited evidence on the effectiveness of communication interventions that have aimed to promote home cooling measures to the public. When prompted, participants believed that there is scope to broaden the range of actions communicated, particularly increasing awareness of less familiar but effective home cooling measures. For example, they expressed a strong preference for communications that highlight easy, low-cost actions. Only those participants who were least convinced of the risks of particularly hot weather felt, upon reflection, that they were receiving enough information.

Participants suggested that highlighting measures that provide a focus on indoor cooling rather than repeating familiar advice relating to cooling the person, could help to increase the salience of information, and overcome the problem of repeating information that was already known and well established. They were also interested in hearing an explanation of the health risks of extreme heat: once participants understood why heat posed a risk to the body, and the dangers of not taking appropriate action, they were more open to changing their behaviour. Papers reviewed as part of the REA also suggested that communications may be more effective when they provide detail on why a behaviour is recommended. Specifically widening the focus of messaging beyond at risk groups to communicate the risks to all people was more acceptable to vulnerable groups, as these individuals did not always perceive themselves as vulnerable. More information on the full range of measures, how best to use them and how they can be used in combination was also of interest to participants. They believed that low-cost measures would be more relevant to a wider range of people, given variation in financial circumstances.

*"I'm 65, but I don't feel like I'm an average 65 – everyone else is older than me. And I've been training, and doing things... So, if instead of telling me the age is a vulnerability you tell me: 'the hot weather affects the body this way'." – Participant aged over 65 with an impairment*

For many, especially those who did not see themselves as at risk, there was a tension between communicating the need to take action and what some characterised as 'scaremongering'. Participants believed that although communication about health risks was important, it would be more engaging if it was tailored to their level of awareness and highlighted comfort and wellbeing benefits.

*"It's about the message, and being kind in the message, instead of being: 'you will do this that will cause you death and cancer'...that actually will make people switch off. People don't want to hear stuff, people are quite sensitive to hearing this information." – Participant living with a child aged under 5*

Linked to this, some (including people on low incomes and socially isolated participants) felt strongly that communications should be tonally positive, encouraging people to enjoy the heat in a safe and responsible manner.

*"Saying that...it is something nice, especially for our country that doesn't have a lot of hot weather, but please be mindful that there are things that could happen as well, so let's put things into place, just to make sure we can minimise these risks." – Pregnant participant (also living with a child under 5)*

While participants agreed that communications shortly before periods of particularly hot weather are appropriate for most people, some wanted information to be provided as early as possible to help plan and invest gradually in more substantial home adaptations. They thought this would also help prevent panic-buying of cooling measures during particularly hot weather.

Participants believed that visual communication of these messages is critical and so welcomed the provision of short, clear messages delivered through posters, flyers or concise digital content. Older and socially isolated participants were more likely than others to focus on these types of communications.

Participants felt that the NHS and medical professionals were the most obvious messengers for these types of messages. They suggested that coordinated communication involving health services, weather services and, where appropriate, local authorities could increase reach while aligning on and maintaining the credibility of messaging about cooling measures.

Participants felt that there would not be one channel that would work for everyone and suggested that information should be provided on TV and radio (e.g. through adverts, during news and weather announcements or via special features), in local physical environments (e.g. on buses, bus stops, in doctors waiting room, leaflets through the door), on websites (e.g. government and NHS) and social media.

## 5. Conclusion

The research showed that prioritising overheating in homes over other challenges relevant to where people lived can act as a key trigger to taking measures up. For some in vulnerable groups, wanting to avoid the negative health impacts of overheating acted as an additional motivator for adopting cooling measures. However, overheating was generally not perceived as a health risk, tending to be seen as a source of discomfort rather than harm, including among many of those in at risk groups. This limited sense of personal relevance weakened motivation overall, particularly in the context of existing public messaging that focuses primarily on cooling individuals rather than cooling homes.

Unsurprisingly, simple measures, such as opening windows at night, using fans and closing curtains, were widely known, commonly used and generally perceived as effective. In contrast, internal and external measures were less familiar and less frequently taken up (e.g. integrated blinds and solar reflective film). Some simple measures were poorly understood in terms of how and when they should be used (e.g. when and in what circumstances to open windows). Where participants were taking up measures, they were doing so reactively and piecemeal, without thinking holistically about their home environment. They were most willing to adopt simple measures, such as opening windows at night, and closing existing windows and blinds during the hottest parts of the day (despite having some misconceptions about some of these measures), in combination with others that block sunlight. Where participants had taken up measures (particularly passive measures), they were more likely to judge them as effective than those who had not.

Overall, a range of capability and opportunity barriers were experienced across different population groups, which affected take-up of internal and external measures. These included: not owning the property, limited knowledge of options, limited confidence in installation and/or limited access to professional support. Renters, people living in flats, those with limited storage space or lower financial flexibility faced barriers even when they were motivated to take actions up. These factors appeared to be more significant than vulnerability: vulnerable groups were not homogeneous in terms of motivations, capabilities or opportunities overall, or predictably different by subgroup. Take-up of external measures was particularly affected by opportunity factors (i.e. owning a house), which indicates that there may be a limit to what different population groups are able to take up without further support.

The BBN showed that adoption of home cooling measures can be understood as a journey and that taking up measures can sometimes act as an entry for adoption of further actions in the future (especially internal measures). However, there is evidence that take-up of one measure does not always result in greater take-up of others (in the case of external measures diminishing willingness to adopt internal measures). This suggests that trade-offs may sometimes be made, possibly due to some measures being perceived as a substitute for others or sufficient on their own, which highlights participants' lack of clarity about how measures complement each other.

Participants believed that there is an opportunity to communicate about the importance and utility of home cooling measures in future, to supplement well-known messages (that are currently experienced as disengaging) that encourage people to cool themselves. Participants felt that alarmist messaging would alienate them, so wanted communication to emphasise the comfort benefits of taking up measures, as well as the health consequences, but without moving to worst case scenarios. There was limited understanding of the full range of measures available, their relative benefits, and how they are best used, in isolation and combination. In light of the confusion regarding some measures, or uncertainty about their effectiveness, it may be helpful to communicate about when to open windows, measures that can be used to warm and cool homes (e.g. thermal curtains, air-to-air heat pumps) and passive measures that prevent heat build-up (e.g. solar reflective film or paint and external shading). However, the reinforcing role of previous take-up in affecting future willingness to act may mean that awareness-raising alone is insufficient to encourage take-up of cooling measures. It was also apparent that participants said they wanted to adopt measures that block sunlight but that they preferred to retain light in rooms during the day, which adds complexity.

Participants suggested using trusted messengers like the NHS for communicating about the health risks of overheating, and indicating or signposting to relevant home cooling measures to combat overheating. They wanted to hear about particularly hot weather earlier than the one to two weeks that they normally do, to enable those who are interested in doing so to prepare to take relevant action to cool their homes.

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