# Encouraging US households to wash laundry with cold water

An evidence review of behavioral barriers and promising interventions

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THE
BEHAVIORAL
INSIGHTS
TEAM

# Contents

# Executive summary

This report is one of two deliverables for Phase 1 of the project commissioned by the World Wildlife Fund (WWF) to draw consumer attention to the environmental impact of their current laundry practices, change ingrained laundry routines, and broadly encourage more sustainable household laundry behaviors. The Behavioral Insights Team (BIT) reviewed academic and gray literature as well as conducted light touch user research to identify key behavioral factors inhibiting and encouraging the use of cold water wash and to document promising interventions to encourage increased selection of cold water for laundry. Due to limited extant research examining consumer laundry temperature selection, we also drew on research from other consumer sustainability behaviors.

The key barriers to washing laundry with cold water were as follows.

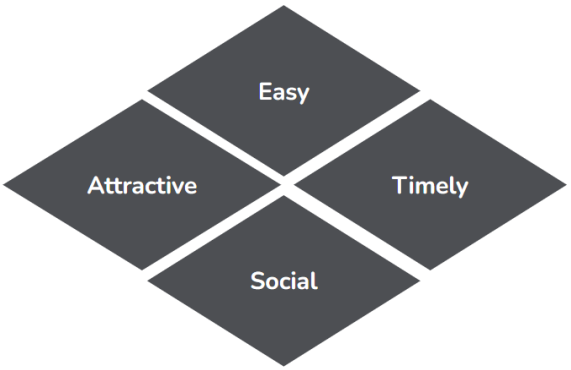
| | |
|---|---|
| **Capability** | • Lack of awareness about the negative impacts of washing on warm/hot<br>• Not knowing the benefits (e.g. energy- and cost-savings) of washing with cold water<br>• Not knowing that laundry can be washed with cold water<br>• Limited attention or cognitive effort allocated to doing laundry<br>• Lack of knowledge of how to set the machine to cold<br>• Forgetting to wash on cold |
| **Opportunity** | • Lack of helpful prompts<br>• Lack of social pressure to wash with cold, since the behavior is rarely observed<br>• Machine defaults of warm/hot water<br>• Perceived social norm that most US consumers wash their clothes on warm/hot |
| **Motivation** | • Laundry is often a habitual behavior where people are acting based on automatic responses.<br>• Mental models of laundry do not include the value of washing with cold water.<br>• Consumers may believe that washing with cold water will result in negative consequences (i.e., not cleaning clothes as effectively).<br>• The energy- and cost-saving benefits of washing with cold are not salient and they manifest in the future whereas the negative consequences appear in the present. |

The key enablers of washing with cold water were:

- Does not require new resources
- Does not require much more physical effort compared to warm/hot washing
- Minimal time investment (compared to some other sustainability behaviors)
- Aligns with consumer goals, values, and identity (e.g., monetary savings, sustainability)
- Beneficial for certain load types (e.g., delicates, color preservation)

The central message of BIT's **EAST framework** is that if you want to encourage a behavior, make it Easy, Attractive, Social and Timely. These four principles are based on BIT's research and the wider academic literature on behavior change. Promising intervention approaches to promote cold water wash and other sustainable behaviors included the following.

| EAST principle | Strategy and example |
|---|---|
| **Easy** | • Make the behavior the default setting<br>  ○ E.g., one laundry study found that default cold water setting increased cold water use in simulations<br>• Reduce hassle or friction to perform the behavior<br>  ○ E.g., decrease the number of button selections needed to use cold |
| **Attractive** | • Make the benefits of the behavior salient (and directly relevant)<br>  ○ E.g., advertise how cold wash saves money, helps the environment, and protects clothes<br>• Change the physical environment to attract attention to the behavior<br>  ○ E.g., use stickers to highlight how to perform the desired behavior<br>• Personalize the experience<br>  ○ E.g., selecting personalized energy-saving goals (as opposed to being assigned a goal) resulted in greater energy savings in a simulated washing machine trial |
| **Social** | • Highlight social norms showing that others perform the behavior or that it is the expected behavior<br>  ○ E.g., "700 people in your neighborhood wash their laundry using cold water."<br>• Leverage existing social networks<br>  ○ E.g., "eco reps" in college dorms encouraged eco-habits (including cold water wash) in a competition to save energy |
| **Timely** | • Prompt people when they have an opportunity to perform the behavior (and disrupt automatic habit) or when they are experiencing a fresh start<br>  ○ E.g., stickers on UK trash bins reminded residents to place food waste in their municipal compost bin instead of trash |



# 1. Introduction

## Project Background

The World Wildlife Fund (WWF) commissioned the Behavioral Insights Team (BIT) for a project to draw consumer attention to the environmental impact of their current laundry practices, change ingrained laundry routines, and broadly encourage more sustainable household laundry behaviors. The ultimate project goal is to provide behaviorally informed solution concepts that could be implemented as consumer-facing campaigns. This supports WWF's partnership with Tide to encourage sustainable laundry behavior, especially cold water wash.[1]

This report is the one of two deliverables for Phase 1 of this project, 'Target & Explore'. The report aims to identify key behavioral factors inhibiting and encouraging the use of cold water wash and document promising interventions to encourage increased selection of cold water for laundry. A slide presentation summarizing this report will be delivered in two weeks.

## Motivation

Responding to the climate crisis requires us to change our habits and urgently adopt environmentally friendly choices, both at the individual and societal level. Such changes to our lifestyles and behavior can result in a 40-70% reduction in greenhouse gas emissions by 2050.[2] One individual behavior that could contribute to this reduction is washing laundry with cold water. Most of the energy consumption from washing a load of laundry comes from heating the water. Procter & Gamble (P&G) estimates that washing in cold water saves up to 90% of the energy in every wash cycle.[3]

Many US consumers want to make more sustainable choices, but awareness of cold water wash as an eco-habit is low. In a recent study conducted by Tide, 77% of surveyed US consumers noted that they were willing to develop a new eco-habit to save energy in the summer of 2022. Only 62% agreed or strongly agreed that washing laundry with cold water was an important eco-habit. This is compared to 83% who agreed or strongly agreed that turning off the lights when not in use was an important eco-habit. Both are simple actions to save energy.

Moreover, even when consumers know about an energy-saving behavior and intend to perform that behavior, many fail to follow through with the intended action. This divide between a person's intended behavior and their actual behavior is known as the

[1] Procter & Gamble. (April 21, 2022). "Tide and World Wildlife Fund Join Forces to Encourage Next Impactful Eco-Habit: Washing in Cold". https://news.pg.com/news-releases/news-details/2022/Tide-and-World-Wildlife-Fund-Join-Forces-to-Encourage-Next-Impactful-Eco-Habit-Washing-in-Cold/default.aspx
[2] International Energy Agency. (2021). Net Zero by 2050. https://www.iea.org/reports/net-zero-by-2050
[3] Procter & Gamble. (April 21, 2022). "Tide and World Wildlife Fund Join Forces to Encourage Next Impactful Eco-Habit: Washing in Cold".

**intention-action, or intention-behavior, gap.**[4] This gap can result from many barriers that make it harder for us to convert our intention into the desired action; they can relate to capabilities, opportunities, and motivations.[5]

A behavioral science lens is useful to identify the barriers to washing in cold water and promising solutions that could bridge the gap between intention and action. The behavioral insights approach uses evidence of the conscious and nonconscious drivers of human behavior (from disciplines including psychology, sociology, and behavioral economics) to address practical issues.[6] The key "insight" of behavioral insights is that much of our behavior is nonconscious, habitual, and driven by cues in the environment or the way in which choices are presented.

# Methodology

This evidence review aimed to answer two primary research questions.

> **Research Question 1:** What are the key (capability, opportunity, & motivation) barriers to and enablers of households choosing to wash their laundry in cold water?
>
> **Research Question 2:** What behavioral insights approaches have been found to increase consumers' selection of cold water for laundry wash temperature? What effective interventions to promote other household sustainability behaviors could be relevant for promoting cold water wash?

As a secondary research question, we were interested in understanding how household choices about laundry temperature differed by demographics (e.g., household size, income, gender of person doing laundry, age of person doing laundry, etc). Unfortunately, there was inadequate literature for us to answer that question.

Academic databases were searched for relevant peer-reviewed publications using a set of search terms related to our research questions. Additional references were identified through manual searches of reference lists. A similar approach was used for the "gray literature", which included past work by the Behavioral Insights Team (BIT), industry reports, and research shared by Procter & Gamble. Publications were then screened for applicability to the current project and entered into a database. A total of 51 articles, reports, chapters, and podcasts were included in the review.

Because few studies have examined factors influencing laundry temperature selection or interventions to promote cold water wash, we broadened our analysis to encompass other relevant household sustainability behaviors. It was surprising that laundry behavior was largely absent from academic studies of household sustainability behaviors.

To supplement the literature, our team conducted some light-touch exploratory research to develop a richer picture of the choice environment facing consumers as they do laundry. We

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[4] Faries M. D. (2016). Why We Don't "Just Do It": Understanding the Intention-Behavior Gap in Lifestyle Medicine. *American journal of lifestyle medicine*, *10*(5), 322–329. https://doi.org/10.1177/1559827616638017

[5] Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implementation science, 6(1), 1-12.

[6] Hallsworth & Kirkman (2020). Behavioral insights. MIT Press.

examined pictures of washing machine interfaces, detergent containers, and consumer-facing articles about how to do laundry.

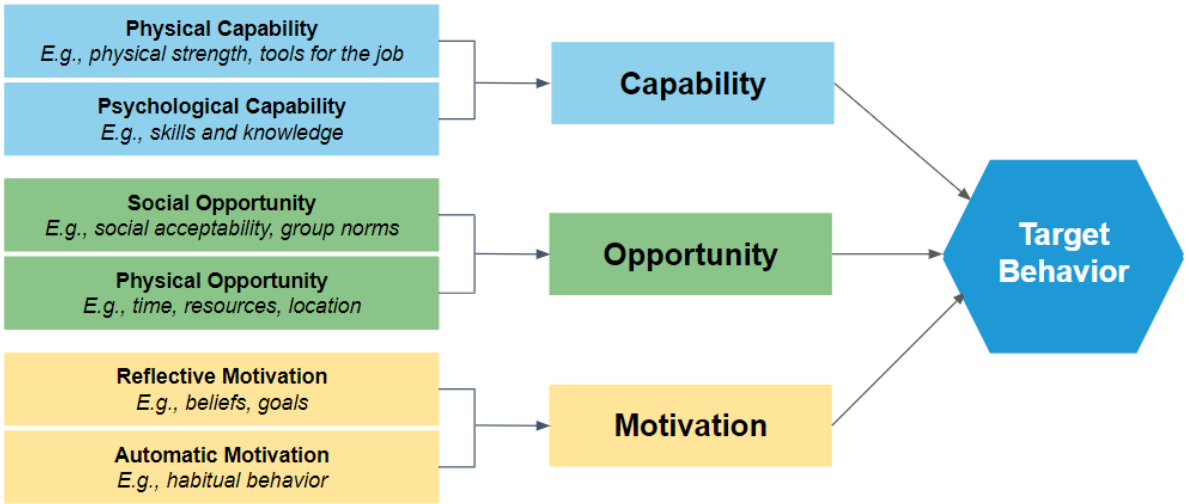
# 2. Barriers to and enablers of consumers washing laundry with cold water

There are many barriers that prevent people from changing their behavior. These can vary by levels of intensity and influence. Based on this review, we have identified 14 key barriers that may make it harder for someone to wash their laundry with cold water. We have also identified 5 enablers that make it easier for someone to wash with cold water.

To organize our analysis of barriers and enablers, we used the COM-B model, which is a widely used framework for behavior change research and intervention design.[7] The core insight is that people must have the **capability (C)**, **opportunity (O)**, and **motivation (M)** to carry out a **behavior (B).** That is to say, a person must possess the skills to perform the behavior (capability), no environmental constraints that make it impossible to perform the behavior (opportunity), and the intention to perform the behavior (motivation). Barriers and enablers of a behavior can be grouped into these three categories:

- **Capability:** Relates to a person's physical or mental potential for making a decision.
- **Opportunity:** Relates to factors in the physical, social, and/or economic environments that may make it easier or harder to perform a behavior.
- **Motivation:** Relates to the deliberate or automatic responses that may inhibit or activate a person's behavior at the time of their decision.

*The COM-B Model for Behavior Change*




[7] Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implementation science, 6(1), 1-12.

The following subsections discuss each of the identified barriers to cold water washing and relevant behavioral science concepts.

## Capability barriers to washing with cold water

**Capability barriers** inhibit a person's physical or mental ability (e.g., skills, knowledge) to perform the behavior. When a person is washing their laundry, they may encounter these capability barriers that hinder washing with cold water.

- **Not knowing that their laundry can be washed with cold water.** A person may never have been informed that they could wash their laundry with cold water, or that doing so leaves the laundry clean and fresh. As such, they might not feel the need to do so. A recent study by P&G shows that most of the infrequent cold-wash users (62%) believed that cold water does not clean as well as hot water.[8] Consumers may not be aware that many laundry detergents in recent years have been reformulated to improve their performance in cold water.

- **Lack of awareness about the negative impacts of washing on warm/hot.** Washing with warm/hot has negative impacts on the environment, consumer finances, and longevity of clothes. However, if people are not aware of these negative impacts, they may not want to switch to cold. In a US study where participants were provided with feedback on appliance-level energy use, most participants reported being surprised by how much or little energy was used by specific appliances.[9] While the residents in this study did not have in-unit washer/dryers, the broader point is that they were unaware of how much energy was consumed by home appliances like their dishwasher or refrigerator versus categories like lighting and heating/cooling.

- **Lack of awareness of the benefits (e.g., energy and money savings) of washing with cold water.** A person may have never been informed of the benefits of washing with cold water. In a recent study conducted by Tide, only 36% of respondents listed washing laundry in cold water as an impactful habit for saving energy at home, compared to 63% who listed "turning off lights" and 44% who listed "Using LED lights".[10] Even if consumers know that washing with cold water can save money or energy, they might not know *how much* they could save.

- **Limited attention or cognitive effort allocated to completing the task.** Each person has limited space in their working memory that can be used to consider and complete tasks. Different decisions and actions have varying cognitive loads that strain our limited cognitive bandwidth.[11] Stress and other demands can reduce cognitive bandwidth, leaving a person with fewer cognitive resources to focus on the

[8] Procter & Gamble. (2021). Cold Water Learnings, Summary and Slides
[9] Asensio, O. I., & Delmas, M. A. (2015). Nonprice incentives and energy conservation. Proceedings of the National Academy of Sciences, 112(6), E510-E515.
[10] Tide. (2022). *Eco Habit Perception Survey.*
[11] Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, *12*(2), 257-28.

task at hand. For habitual household tasks, like laundry, we have a tendency to go into autopilot, so that we can conserve our cognitive resources for other tasks.

- **Lack of knowledge of how to set the machine to cold.** In our own research on laundry machine interfaces, we found that it can be difficult to know how to select a cold temperature. The interfaces of newer laundry machines can have multiple cycle options (e.g., sportswear, knits, etc) that make it challenging to discern which option will use cold water. This level of complexity can lead to **cognitive overload**, mental strain, or excessive effort that can discourage a person from completing a task. Instead, consumers might default to a behavior that is easy or that they have done before. Many washing machines default to a warm/hot cycle or whichever cycle was last used.

  The complexity of household appliance design is a barrier in other areas of home energy reduction. In a recent US study, focus group participants noted that they did know how to operate their refrigerator controls; energy use from refrigerators actually increased during the study.[12] A UK literature review demonstrated that many heating systems have displays that are difficult to read, poorly positioned controls, and inadequate supporting information, which contributes to many households wasting energy.[13] [14]

- **Forgetting to wash with cold**. Even if the consumer knows how to set the machine to cold and intends to wash more clothing on cold, they may forget to select that option. Limited attention and imperfect memory can make us forget to carry out a behavior even when we had prior intention to do it.[15]

## Opportunity barriers to washing with cold water

**Opportunity barriers** arise from the physical, economic, and social environments that a person interacts with at the time of the behavior. When a person is doing their laundry, they may experience the following opportunity barriers to washing with cold water.

- **Lack of helpful prompts.** Many home laundry environments lack visual prompts to wash with cold water. When implemented correctly, visual prompts can remind people to follow through on an action that they may otherwise forget to complete.[16] As we will discuss further in section 3, visual prompts, such as stickers, have been

[12] Asensio, O. I., & Delmas, M. A. (2015). Nonprice incentives and energy conservation. Proceedings of the National Academy of Sciences, 112(6), E510-E515.
[13] Consumer Focus. (2012). Consumers and domestic heating controls: a literature review. London: Consumer Focus.
[14] Department of Energy & Climate Change. (2014). Advice on how to use heating controls: Evaluation of a trial in Newcastle. https://www.gov.uk/government/publications/advice-on-how-to-use-heating-controls-evaluation-of-a-trial-in-newcastle
[15] Ericson, K.M. (2017) “On the interaction of memory and procrastination: implications for reminders, deadlines, and empirical estimation”, Journal of the European Economic Association, 15(3):692-719.
[16] Chui, W. S., Wai, C. W., & Ahmad, R. (2015). Local and Global Messages for Prompting Energy Conservation Behaviour: An Experimental Study in University. *Jurnal Teknologi*, *74*(2).

effective at encouraging eco-conscious behaviors, like recycling.[17] Unfortunately, instead of a cold wash prompt, many washing machines prompt the use of warm/hot water through their design.

- **Lack of social pressure to wash with cold, since the behavior is rarely observed by others** (i.e. no pressure to seem "eco-conscious" to their social networks). Academic literature has shown that people will participate in pro-social or pro-environmental behavior when observed or under social pressure. One experiment found that monitoring recycling and providing weekly feedback (either at the household level or neighborhood level) via door hangers was effective at increasing community curbside recycling in a California neighborhood.[18] Two other interventions, a one-time door hanger asking residents to recycle as much as possible and weekly door hangers with information about the recycling process, were not effective.

  In a recent article, Erez Yoeli discussed the **plausible deniability effect** in sustainability, whereby a person's willingness to do good can decrease once there is a plausible excuse not to.[19] He referenced a seminal behavioral science study in which researchers observed supermarket shoppers' willingness to donate to a Salvation Army volunteer.[20] They noticed that the shoppers' willingness to donate diminished when there was an exit door that was not monitored by the volunteer; more shoppers left through the unmonitored exit doors. Cold washing is also susceptible to the plausible deniability effect because it is not observed, there are many barriers that could be used as excuses (e.g. the cycle section panel is too difficult to understand), and consumers do not seem to recognize unambiguous expectations for when to use cold.[21] [22]

- **Machine defaults of warm/hot water.** People are susceptible to the **status quo bias**, meaning we tend to follow the status quo and choose the pre-set option or default.[23] For many washing machines, the "normal" setting is the warm temperature.

  In addition to the physical (or digital) default setting on the machines, hot/warm water appears to be the *perceived* default for how laundry ought to be done. Cold water is perceived as novel and for use in exceptional cases only. In P&G's NA FC Cold Water Sustainability Study, participants stated *"I don't have laundry that requires cold*

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[17] Shearer, L., Gatersleben, B., Morse, S., Smyth, M., & Hunt, S. (2017). A problem unstuck? Evaluating the effectiveness of sticker prompts for encouraging household food waste recycling behaviour. *Waste management*, *60*, 164-172.
[18] Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and applied social psychology*, *21*(1), 25-36.
[19] Yeoli, E. (2022, August 11). *Nudging consumers to purchase more sustainably.* Harvard Business Review. https://hbr.org/2022/08/nudging-consumers-to-purchase-more-sustainably
[20] Andreoni, J., Rao, J. M., & Trachtman, H. (2017). Avoiding the ask: A field experiment on altruism, empathy, and charitable giving. *Journal of political Economy*, *125*(3), 625-653.
[21] Yoeli, E., & Rand, D. (2020). A checklist for prosocial messaging campaigns such as COVID-19 prevention appeals. Preprint available at: https://psyarxiv.com/rg2x9/
[22] Yoeli, E. & Struck, B. (October 22, 2020). Strategies to motivate for the collective good: Erez Yoeli. https://thedecisionlab.com/podcasts/strategies-to-motivate-for-the-collective-good-erez-yoeli
[23] Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of risk and uncertainty*, *1*(1), 7-59.

*water"* or *"If it's something black and I don't want it to fade I'll use cold*.[24] In qualitative research in Norway, one participant reported "Our new washing machine uses 40 [degrees Celsius] as a default…(Barbara, 25)".[25]

- **Perceived social norm that most US consumers wash their clothes on warm/hot**. The results from the aforementioned P&G NA FC Cold Water Sustainability Study demonstrate how there is a perception of warm or hot water as the default, and thus the norm.[26] As we will discuss in section 3, the perception of how other people behave can have a large impact on shifting our own behavior.[27]

## Motivation barriers to washing with cold water

**Motivation barriers** are our internal reflective or automatic responses that inhibit our ability to perform a behavior. Essentially, it is whether we consciously or subconsciously *want* to carry out a behavior. When a person is doing their laundry, they may encounter the following motivation barriers.

- **Laundry is often a habitual behavior where people are acting based on automatic responses.** People generally think in two ways: fast and slow. In his book, *Thinking Fast and Slow,* Nobel Laureate Daniel Kahneman, sorts people's cognitive efforts into two categories: **System One**, which is fast, effortless, and often habitual, and **System Two**, which is deliberate, reflective, and analytical.[28] For frequent household tasks, people tend to operate in the automatic System One where they are not deliberately thinking about the task at hand. In the case of laundry, this means that someone may select their machine's default cycle out of habit, or the setting that they've always used. As one example of automaticity in laundry behavior, German consumers tend not to adjust detergent dosage based on textile type, load size, soil level and/or water hardness.[29]

- **Mental models of laundry do not include the value of washing with cold water.** In other words, people may not be motivated to wash with cold water because they just do not think it is that valuable to do so. A recent study by P&G shows that washing with cold water is not always top-of-mind. When US consumers were asked why they did not use cold water in all or some of their loads, 11% of consumers reported that they did not think to wash their clothes on cold.[30]

- **Consumers may believe that washing with cold water will result in negative consequences.** Research shows that US consumers are concerned that washing

[24] Procter & Gamble. (2021). *Cold Water Learnings, Summary and Slides*
[25] Laitala, K., Klepp, I. G., & Boks, C. (2012). Changing laundry habits in Norway. *International Journal of Consumer Studies*, *36*(2), 228-237.
[26] Procter & Gamble. (2021). *Cold Water Learnings, Summary and Slides*
[27] Allcott, H. (2011). Social norms and energy conservation. *Journal of Public Economics*, *95*(9-10), 1082-1095.
[28] Kahneman, D. (2011). Thinking Fast and Slow. Farrar, Straus and Giroux.
[29] Kruschwitz, A., Karle, A., Schmitz, A., & Stamminger, R. (2014). Consumer laundry practices in Germany. *International Journal of Consumer Studies*, *38*(3), 265-277.
[30] Procter & Gamble. (2021). *Cold Water Learnings, Summary and Slides*.

with cold water will not kill all germs.[31] [32] US consumers also worry that cold water will be less effective at removing odors and stains, resulting in worse cleaning performance (ibid). This perception of inferior cleaning performance may be exacerbated by our intrinsic **loss aversion,** which means that losses are felt almost twice as much as equivalent gains.[33] In other words, when trading off the benefits (environment and costs) vs. the perceived losses (less clean laundry), the losses will tend to be weighted more.

Consumers may also perceive washing with cold water as risky or as having uncertain outcomes. Humans generally have **ambiguity aversion**, preferring known risks over unknown risks.[34] If consumers have not used cold water before, they may perceive unknown risks with using cold. They may fear the risks of not having clean clothes to wear or needing to wash clothes again if they do not come out clean.

- **The incentives/benefits of washing with cold are not salient and they manifest in the future whereas the negative consequences appear in the present.** When doing laundry, people do not immediately see the money and energy savings from each load. Rather, people might only see those savings quantified once a month when their utility bill comes; these savings might still be hard to notice given the inherent noisiness of energy bills. Even the benefits of protecting clothing would not be salient in the short-term; damage would happen over many washes. Conversely, the fresh clean and stain removal benefits are immediately apparent after a wash.

  People tend to place greater value on immediate rewards or costs compared to those occurring in the future; in fact, we tend to place greater value on *smaller*, immediate gains (or losses) than *larger* ones in the future.[35] This is known as the **present bias** or **hyperbolic discounting**.[36] [37] [38] Thus, consumers may place greater value on short-term gains like cleaner clothes or time savings from using their machine's default setting compared to long-term gains such as cost savings.

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[31] Mars, C., & Cold Water Wash Initiative. (2016). Technical brief: Benefits of using cold water for everyday laundry in the U.S. The Sustainability Consortium. https://www.cleaninginstitute.org/sites/default/files/assets/1/Page/Cold-Water-Wash-Technical-Brief.pdf

[32] Procter & Gamble. (2021). *Cold Water Learnings, Summary and Slides*.

[33] Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *The quarterly journal of economics*, *106*(4), 1039-1061.

[34] Ellsberg, D. (1961). Risk, ambiguity, and the savage axioms. The Quarterly Journal of Economics, 75(4), 643-669.

[35] O'Donoghue, T., & Rabin, M. (1999). Doing it now or later. *American economic review*, *89*(1), 103-124.

[36] Frederick, S., Loewenstein, G., & O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of economic literature*, *40*(2), 351-401.

[37] Joshi, P. D., & Fast, N. J. (2013). Power and reduced temporal discounting. *Psychological science*, *24*(4), 432-438.

[38] Kirby, K. N., & Maraković, N. N. (1995). Modeling myopic decisions: Evidence for hyperbolic delay-discounting within subjects and amounts. *Organizational Behavior and Human decision processes*, *64*(1), 22-30.

## Enablers of washing laundry with cold water

Thus far, we've discussed barriers to behavior change. However, the COM-B model can also be used to identify enablers to encourage the target behavior of cold water wash.

- **Unlike some other energy-saving behaviors, washing with cold does not require new resources**. In order to wash with cold water, laundry users do not need to purchase new equipment or upgrade their machinery to a high-efficiency model. They could switch to a detergent that is more effective in cold water, but this is not a requirement.

- **Cold water wash does not require more physical effort compared to warm/hot washing**. Switching from warm/hot to cold would not require additional physical effort for laundry users (except perhaps to change a default setting). It requires less physical effort than switching to line drying clothes from machine drying for example.

- **The time investment to wash with cold could be minimal**. Compared to other household sustainability behaviors like repeatedly unplugging electronics and turning off lights, washing with cold water requires less time to have a larger impact. There might be some time spent upfront figuring out *how* to select cold on the machine and small amounts of time for subsequent cycles if the machine does not retain the cold setting as default.

- **Cold water wash can align with consumer goals, values, and identity.** Washing with cold water aligns with consumer goals and values of being sustainable and saving money (as well as protecting clothes). Goals are effective tools for promoting behavior change.[39] We are more likely to perform behaviors that align with our self-image/identity, goals, and values than behaviors that do not. Moreover, behaving in a way that is congruent with one's goals, values, and identity could prompt positive emotions that make the behavior even more rewarding.

- **Certain load types may lend themselves to washing with cold water.** If the person is washing delicates or worried about colors bleeding, then certain load types can benefit from cold water and there may be a perceived norm of washing these types of laundry with cold water.

[39] Berkman E. T. (2018). The Neuroscience of Goals and Behavior Change. Consulting psychology journal, 70(1), 28–44. https://doi.org/10.1037/cpb0000094

# 3. Promising interventions to increase the use of cold water wash

## Introduction to BIT's EAST framework

Having described the main barriers that stop people from washing their laundry with cold water, this section will review evidence-based interventions that could be leveraged to overcome those barriers. As mentioned, extant research focused on laundry temperature behavior was limited, so this section will also include interventions that have been applied to other consumer sustainability behaviors.

We organized our findings using BIT's **EAST framework**.[40] The central message of EAST is that if you want to encourage a behavior, make it Easy, Attractive, Social and Timely. These four principles are based on BIT's research and the wider academic literature on behavior change. While EAST is not a comprehensive summary of all there is to know about behavioral science, it is an accessible framework that can be used to generate and organize ideas for effective and evidence-based behavioral interventions.

Effective interventions can combine insights from multiple dimensions of the EAST framework. For example, we will discuss a sticker that is placed on a recycling bin, which needs to be *attractive* in order to capture people's attention, and that people see at the *time* they are deciding whether to recycle.[41] While we are not yet recommending solutions, the EAST framework will also guide our next project phase of the Solution Design.

In addition to thinking about how EAST principles can be applied to intervention design, it is also important to consider the **touchpoints** during a user journey when an intervention could be delivered. For example, an awareness-raising message delivered via a television ad uses a touchpoint that reaches the consumer when laundry is probably not top of mind (and leaves time for the consumer to forget). On the other hand, interventions delivered at the washing machine leverage a touchpoint when consumers are doing laundry (e.g., a magnet reminding consumers to choose cold).

[40] Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., Sanders, M., Pelenur, M., Gyani, A., Harper, H., Reinhard, J., & Kirkman, E. (2014). *EAST: Four simple ways for applying behavioural insights.* The Behavioural Insights. Team. https://www.bi.team/wp-content/uploads/2015/07/BIT-Publication-EAST_FA_WEB.pdf

[41] Shearer, L., Gatersleben, B., Morse, S., Smyth, M., & Hunt, S. (2017). A problem unstuck? Evaluating the effectiveness of sticker prompts for encouraging household food waste recycling behaviour. *Waste management*, *60*, 164-172.

## Summary of findings

Before describing promising interventions in detail by EAST principle, here are some high level takeaways.

1) In the literature on sustainable behavior more broadly, interventions using defaults and social norms are among the most tested and most effective.

2) We identified 4 studies that evaluated interventions to promote cold water wash.

- Making it Easy: One simulated laundry study found that a default cold water setting increased use of cold water wash in the Netherlands.[42]
- Making it Attractive: P&G's In Use Learning Study increased cold water use through a flyer that made salient several benefits of washing with cold water: saving money, helping the environment, and protecting clothes. In a Dutch experiment, selecting personalized energy-saving goals (as opposed to being assigned a goal) resulted in more energy saving in a simulated washing machine trial.[43]
- Making it Social and Timely: Training US college freshmen "eco reps" to promote energy-saving behavior like cold water wash during a residence hall competition increased reported cold water wash among the eco reps and reduced overall energy use in the dorms (although it could not be attributed to cold water wash).[44]

[42] McCalley, L. T. (2006). From motivation and cognition theories to everyday applications and back again: the case of product-integrated information and feedback. Energy policy, 34(2), 129-137.
[43] McCalley, L. T., & Midden, C. J. (2002). Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation. Journal of economic psychology, 23(5), 589-603.
[44] Bloodhart, B., Swim, J. K., & Zawadzki, M. J. (2013). Spreading the eco-message: Using proactive coping to aid eco-rep behavior change programming. Sustainability, 5(4), 1661-1679.

*Summary of promising strategies to promote cold wash or other sustainable behaviors*

| EAST principle | Strategy and example |
|---|---|
| **Easy** | ● Make the behavior the default setting<br>○ E.g., one laundry study found that default cold water setting increased cold water use in simulations<br>● Reduce hassle or friction to perform the behavior<br>○ E.g., decrease the number of button selections needed to use cold |
| **Attractive** | ● Make the benefits of the behavior salient (and directly relevant)<br>○ E.g., advertise how cold wash saves money, helps the environment, and protects clothes<br>● Change the physical environment to attract attention to the behavior<br>○ E.g., use stickers to highlight how to perform the desired behavior<br>● Personalize the experience<br>○ E.g., selecting personalized energy-saving goals (as opposed to being assigned a goal) resulted in greater energy savings in a simulated washing machine trial |
| **Social** | ● Highlight social norms showing that others perform the behavior or that it is the expected behavior<br>○ E.g., “700 people in your neighborhood wash their laundry using cold water.”<br>● Leverage existing social networks<br>○ E.g., “eco reps” in college dorms encouraged eco-habits (including cold water wash) in a competition to save energy |
| **Timely** | ● Prompt people when they have an opportunity to perform the behavior (and disrupt automatic habit) or when they are experiencing a fresh start<br>○ E.g., stickers on UK trash bins reminded residents to place food waste in their municipal compost bin instead of trash |

## Making the behavior easy

There's a famous quote from one of the founders of behavioral economics, Richard Thaler, that "If you want people to do something, make it easy."[45] Effective interventions to make things easy include: setting smart defaults, reducing hassle, and simplifying messages. As discussed in the previous section on barriers and enablers, the actual behavior of choosing cold laundry is not as easy as it might seem.

A commonly used tool to make a behavior easier is to make the desired behavior the **default**. Defaults are consistently one of the strongest behavioral science interventions. A seminal study showed that defaulting people into a retirement savings program (that they could opt out of) rather than giving individuals the option to opt in drastically increased their savings.[46] In a sustainability context, most people selected a green utility (instead of switching to a "gray" electricity utility) when the green utility was the default.[47]

In the case of cold water washing, one study tested a low temperature default on a computer simulated washing machine control panel with adults and university students in the Netherlands.[48] Those who were defaulted to low temperature wash used 24% less energy.

In a different energy-saving context, defaults were applied to thermostats in a French office building to promote lower temperatures during the winter heating season.[49] Decreasing the default temperature from 20 degrees Celsius by 1 or 2 degrees Celsius led to a decrease in chosen temperatures. This study also provided a caveat on the power of defaults: employees who more frequently adjusted their thermostats prior to the intervention were more likely to override the lower temperature default during the intervention.

Another technique to make a behavior easy is to **reduce hassle or frictions** that make it harder to carry out a behavior. Even something as seemingly minor as the number of clicks can impact behavior. For example, the Dutch government found that decreasing the number of clicks by one tripled the download rate of an energy efficiency report.[50] An example of applying this to cold laundry could be reducing the number of button selections needed to choose a cold wash.

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[45] Hartford, T., (2019, August 2). *The master of behavioural economics on the power of the nudge — and why Remain was destined to lose.* Financial Times. https://www.ft.com/content/a317c302-aa2b-11e9-984c-fac8325aaa04

[46] Beshears, J., Choi, J. J., Laibson, D., & Madrian, B. C. (2009). The importance of default options for retirement saving outcomes: Evidence from the United States. In *Social security policy in a changing environment* (pp. 167-195). University of Chicago Press.

[47] Pichert, D., & Katsikopoulos, K. V. (2008). Green defaults: Information presentation and pro-environmental behaviour. *Journal of environmental psychology*, *28*(1), 63-73.

[48] McCalley, L. T. (2006). From motivation and cognition theories to everyday applications and back again: the case of product-integrated information and feedback. *Energy policy*, *34*(2), 129-137.

[49] Brown, Z., Johnstone, N., Haščič, I., Vong, L., & Barascud, F. (2013). Testing the effect of defaults on the thermostat settings of OECD employees. *Energy Economics*, *39*, 128-134.

[50] Broughton, N., Costa, E., Pickering, J., Shakhina, N., Tilleard, R., & Wu, H. (2019). Boosting businesses: applying behavioural insights to business policy. https://www.bi.team/wp-content/uploads/2019/10/BIT_Boosting-Businesses_Report_Final.pdf

## Making the behavior attractive

Three key ways to make behaviors attractive are to: create environments that attract people's attention, personalize the experience, and provide incentives. The way incentives are offered and framed also influences how attractive they are, even when their actual value remains constant.

Energy monitors, which aim to reduce energy by **attracting people's attention to their energy use**, would belong in this category. Energy monitors can be effective for a few different reasons. Modern monitors often use visually appealing design to attract people's attention. They offer a highly personalized, easy-to-understand suite of feedback that allows people to see the immediate impact of their behaviors; this is also a timely intervention as we will discuss later in this section. Energy monitors increase the salience of energy usage for people in their homes, turning something that is often invisible into something people can see.

Energy monitors and feedback on energy use can reduce energy use in some contexts, but there are two important limitations. First, energy monitors can become less salient over time and fade into the background.[51] Second, energy monitors can backfire in certain contexts. For instance, people can get discouraged when they see the relatively small impact of their personal energy habits, absent more substantive market or policy changes (ibid). One potential strategy for mitigating this might be to publicize the larger collective impact of many people performing the energy-saving behavior.

**Personalized goals** are another approach to increasing the attractiveness of a behavior. In a trial of simulated laundry washing in the Netherlands, participants who selected personal goals for energy reduction reduced their (simulated) energy use more than participants who were assigned a goal – even though the assigned goal (20%) was the highest among choices available for personal goals (5, 10, 15, or 20%).[52] While the behavior was simulated, it held over repeated instances (20 cycles).

Another way to increase the attractiveness of behavior is by **creating rewards or making existing rewards or benefits more salient to the consumer**. This can help address the identified barrier of present bias – in which the environmental or cost-savings benefits of cold wash may be discounted because they appear farther in the future.

In P&G's In Use Learning Study, the researchers tested a flyer that made salient several benefits of washing with cold water: saving money, helping the environment, and protecting clothes.[53] The materials increased cold water cycles 22 percentage points in the condition that used the highest quality detergent (but only 13 percentage points for lower quality detergent). The fact that there was a difference in behavior by detergent type suggests that consumers are genuinely attuned to the quality of their wash – it is not just a misperception about cold water performance.

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[51] Hargreaves, T., Nye, M., & Burgess, J. (2013). Keeping energy visible? Exploring how householders interact with feedback from smart energy monitors in the longer term. *Energy policy*, *52*, 126-134.
[52] McCalley, L. T., & Midden, C. J. (2002). Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation. *Journal of economic psychology*, *23*(5), 589-603.
[53] Procter & Gamble. (2021). *Cold Water Learnings, Summary and Slides*.

Certain types of benefits may be more attractive to consumers than other benefits. Moreover, the appeal of a given benefit can vary by consumer characteristics.

In a randomized controlled trial in Los Angeles, CA, researchers spent three months testing two kinds of messages to reduce energy use. One message focused on the health and environmental impacts of residents' home energy use. For example: "Last week, you used 66% more/less electricity than your efficient neighbors. You are adding/avoiding 610 pounds of air pollutants which contribute to health impacts such as childhood asthma and cancer." The other kind of message focused on monetary savings. For example: "Last week, you used 66% more/less electricity than your efficient neighbors. In one year, this will cost you (you are saving) $34 extra dollars." Ultimately messages about the health and environmental impacts reduced energy, whereas messages about monetary savings did not.[54] The health and environmental messages were even more effective among families with children.

Another way to attract attention is to **change the physical environment to highlight a target behavior**. In Britain, BIT and Keep Britain Tidy added green footprints to the ground leading up to trash bins in parks and retail sites.[55] The footprints reduced littering by 16% in the three weeks following their appearance. Creating a highly salient signal in the environment changed behavior. An example of applying this to cold wash water could be stickers on the washing machine that point to the cold setting.

## Making the behavior social

Humans are social beings and we are heavily influenced by what those around us do and say, especially those we perceive as close to us. Three key strategies to make behaviors social are: highlighting social norms, leveraging networks, and using reciprocity effects. In a systematic review of the literature on behavioral insights and energy conservation, social norms tended to be more effective than commitment devices, goal setting, and labeling.[56]

One of the foundational studies on using social norms for behavior change focused on reducing home energy use. The utility company OPOWER presented their customers with

[54] Asensio, O. I., & Delmas, M. A. (2015). Nonprice incentives and energy conservation. Proceedings of the National Academy of Sciences, 112(6), E510-E515.
[55] Keep Britain Tidy - Center for Social Innovation. (2015). Case Study: Green Footprints A social experiment to nudge people towards responsible litter disposal. https://www.keepbritaintidy.org/sites/default/files/resources/KBT_CFSI_Green_Footprints_Case_Study_2015.pdf
[56] Andor, M. A., & Fels, K. M. (2018). Behavioral economics and energy conservation–a systematic review of non-price interventions and their causal effects. *Ecological economics*, *148*, 178-210.

energy bills that showed them how their energy use compared to their neighbors.[57] These **social comparisons** were effective in getting people to reduce their own energy use.

This study also highlights the ways in which social norms are not a silver bullet. For instance, some utilities report that the program affects customer satisfaction. More importantly, social norms need to be applied judiciously so there is not a backfire effect. In this study, some consumers who were told they were doing *better* than their neighbors actually started to be less energy efficient.

There are two different types of social norms, **descriptive and injunctive norms**. Descriptive norms describe the way things are. For example, “You are saving more energy than 80% of your neighbors” or “700 people in your neighborhood wash their laundry using cold water.” Unlike descriptive norms, injunctive norms convey value judgment – some sort of social approval or disapproval about a behavior. For example, “You should wash laundry with cold water most of the time.” An example of a phrase that uses both descriptive and injunctive norms is: “You are saving more energy than 80% of your neighbors, **excellent work**!”.[58]

In another classic study on social norms, researchers tested descriptive social norms to encourage hotel guests to reuse their towels, thus saving on laundry-related energy and chemical use. The following message was printed on cards in hotel rooms:

> “JOIN YOUR FELLOW GUESTS IN HELPING TO SAVE THE ENVIRONMENT
> Almost 75% of guests who are asked to participate in our new resource savings program do help by using their towels more than once. You can join your fellow guests to help save the environment by reusing your towels during your stay.”

This descriptive social norm lead to towel reuse 48% of the time compared to 38% for an environmental-protection message or 36% for a message about the hotel donating a portion of energy savings to an environmental nonprofit.[59]

While our project focuses on the United States, it is worth noting the robustness of social norms in other countries. In the Netherlands, researchers leveraged descriptive social norms to reduce students' plastic water bottle usage, emphasizing that most other students were also trying to reduce their water bottle usage. Interestingly, the norm was effective only when paired with another message on the actual environmental costs of bottled water and safety of tap water.[60] Other researchers argued that the environmental impact information allowed people to attach greater meaning to their peers' behavior.[61]

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[57] Allcott, H. (2011). Social norms and energy conservation. Journal of Public Economics, 95(9-10), 1082-1095.
[58] Bonan, J., Cattaneo, C., d’Adda, G., & Tavoni, M. (2020). The interaction of descriptive and injunctive social norms in promoting energy conservation. *Nature Energy*, *5*(11), 900-909.
[59] Cialdini, R. (2005). Don’t throw in the towel: Use social influence research. *APS Observer*, *18*.
[60] Van Der Linden, S. (2015). Exploring beliefs about bottled water and intentions to reduce consumption: The dual-effect of social norm activation and persuasive information. *Environment and Behavior*, *47*(5), 526-550.
[61] Miller, D. T., & Prentice, D. A. (2016). Changing norms to change behavior. *Annual review of psychology*, *67*(1), 339-361.

In one interesting demographic trend, a US study mailed out home energy reports that leveraged both descriptive social norms on what people's neighbors were doing, as well as injunctive social norms using green stars if a household consumed less relative to the same month in the past year. The researchers found this messaging to be more effective for liberals than conservatives.[62]

In one of the few studies that focused on laundry (among other energy-saving behaviors), US college freshmen living in dorms were trained to be "eco reps".[63] After being trained as eco reps, these students were tasked with sharing their knowledge of better environmental habits with their dorm-mates during a school-wide residence hall competition on energy use. The idea here was to **leverage existing social networks** in order to promote a desired behavior.

In dorms that had eco reps, students reported more pro-environmental behavior and this correlated with lower energy use in those dorms. Unfortunately, the authors did not analyze the energy reduction by energy-saving activity, so we do not know exactly how much was driven by cold water wash.

## Making the behavior timely

People can react very differently to the same information depending on when they receive it. Three key strategies for making things timely are: bringing the long-term benefits of the behavior more saliently into the present, helping people plan their actions, and prompting people when they are most likely to be receptive. Interventions focusing on timeliness are a great way to address the intention-action gap – reaching people right at the moment of decision. A timely intervention can also be effective at interrupting automaticity or habitual behavior.

For an example of this from a different sustainable behavior, we can look at recycling. Like washing with cold water, recycling is an eco-behavior with an intention-action gap in that many people express a desire to recycle more than they actually do. A similar barrier is that failure to recycle can occur due to the habitual, automatic process of throwing away trash; you can know that recycling (or washing on cold) is important but when the time comes to take the action, habit takes over.

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[62] Costa, D. L., & Kahn, M. E. (2013). Energy conservation "nudges" and environmentalist ideology: Evidence from a randomized residential electricity field experiment. *Journal of the European Economic Association*, *11*(3), 680-702.
[63] Bloodhart, B., Swim, J. K., & Zawadzki, M. J. (2013). Spreading the eco-message: Using proactive coping to aid eco-rep behavior change programming. *Sustainability*, *5*(4), 1661-1679.

Researchers ran a study in the UK where they placed stickers on trash bins reminding people to recycle food waste (for municipal composting) instead of putting the food waste in the trash bin. These prompts increased the collection of food waste for recycling by 21%.[64] The authors suggest this may work by serving as a **persistent reminder which could disrupt an automatic habit**.


This study also illustrates how multiple dimensions of the EAST framework can be combined to enhance the effectiveness of an intervention. This sticker was *timely*, as it was placed at the best moment for people to be influenced by it. It was also designed to be visually appealing so that it *attracted* attention, and it was *easy* to understand so that it minimized cognitive burden. The authors also suggest that people seeing this sticker on their neighbors bins as well may have signaled an injunctive norm that food recycling was the *socially* ideal behavior.

Another aspect of timeliness relates to delivering interventions when the target population is most receptive to change. The **fresh start effect** indicates that people have higher intentions to follow through on goals and more success following through after key temporal landmarks such as the New Year, the start of a semester, or a birthday.[65] We are more likely to change habits and behaviors during periods of transition, which disrupt and reshape our existing patterns. Such major transitions could include having a child, moving, or buying a new washing machine.

We can apply this timeliness lens to the study where eco reps encouraged more sustainable behaviors among college freshmen.[66] We see that the intervention was timed to coincide with a “fresh start”, making it more likely to change behavior and create new habits.

## Closing thoughts about effective interventions

**Effective interventions rarely leverage just one of the EAST dimensions – they often apply multiple principles**. An intervention meant to attract attention might also be easy-to-understand, social, and timely--such as the food recycling (composting) sticker discussed above.

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[64] Shearer, L., Gatersleben, B., Morse, S., Smyth, M., & Hunt, S. (2017). A problem unstuck? Evaluating the effectiveness of sticker prompts for encouraging household food waste recycling behaviour. Waste management, 60, 164-172.
[65] Dai, H., Milkman, K. L., & Riis, J. (2014). The fresh start effect: Temporal landmarks motivate aspirational behavior. *Management Science*, *60*(10), 2563-2582.
[66] Bloodhart, B., Swim, J. K., & Zawadzki, M. J. (2013). Spreading the eco-message: Using proactive coping to aid eco-rep behavior change programming. Sustainability, 5(4), 1661-1679.

When designing interventions, it is rare to be able to address *all* barriers with a single intervention. Rather, interventions will **prioritize certain key barriers**. The goal of the intervention is to help ensure a sufficient level of capability, opportunity, and motivation to perform the behavior.

**Context is key.** An intervention that works well in one context might not work quite so well in another. Also, some behavioral principles can have unintended consequences if misapplied. For example, while a campaign that encourages adolescents to walk to school could be effective in some cases, this initiative could be ineffective or even harmful if local routes are unsafe. Since small changes in context can have a dramatic impact on effectiveness, it is important that initiatives are adapted for new contexts, pre-tested, and evaluated (ideally through randomized controlled trials). While we can have a good idea of what might work, and why, based on theory and previous evidence, we cannot know for sure unless we test in our context.

When testing interventions, it is important to consider that **there can be heterogeneity in how people respond.** For instance, in a study in Finland, emails with savings tips and peer comparisons were only effective for people who were already monitoring their energy consumption.[67] Unfortunately, evidence that would allow us to predict heterogeneous responses by demographic categories is weak. For example, a systematic review on the determinants for green innovation adoption across marketing journals found that demographic effects tend to be “ambiguous” and in many cases marginal.[68]

[67] Ruokamo, E., Meriläinen, T., Karhinen, S., Räihä, J., Suur-Uski, P., Timonen, L., & Svento, R. (2022). The effect of information nudges on energy saving: Observations from a randomized field experiment in Finland. *Energy Policy,* 161, 112731.
[68] Flores, P. J., & Jansson, J. (2022). SPICe—Determinants of consumer green innovation adoption across domains: A systematic review of marketing journals and suggestions for a research agenda. *International Journal of Consumer Studies*.

# 4. Conclusions and next steps

In summary, multiple capability, opportunity, and motivation barriers hinder consumers from washing their laundry with cold water. To date, only four interventions to promote cold water wash have been evaluated. However, behavioral science theory and evidence from other sustainability behaviors suggest several promising intervention approaches to make cold water wash seem easy, attractive, social, and timely.

The findings from this evidence review will form the basis for Phase 2 of this project, solution concept design. Together with WWF, P&G, and Ketchum, we will develop a list of behaviorally informed intervention concepts to encourage cold water wash, which could be implemented and evaluated.

This review has highlighted key gaps in the evidence base about laundry temperature selection that WWF, P&G, and its partners could help fill. Although laundry is an important contributor to household energy consumption, laundry behavior was largely absent from many academic studies of household sustainability behaviors. Only a few studies evaluated barriers, enablers, or interventions for cold water wash with little attention paid to differences by consumer demographics. Further research on this topic will make an important contribution to evidence, practice, and sustainability goals.