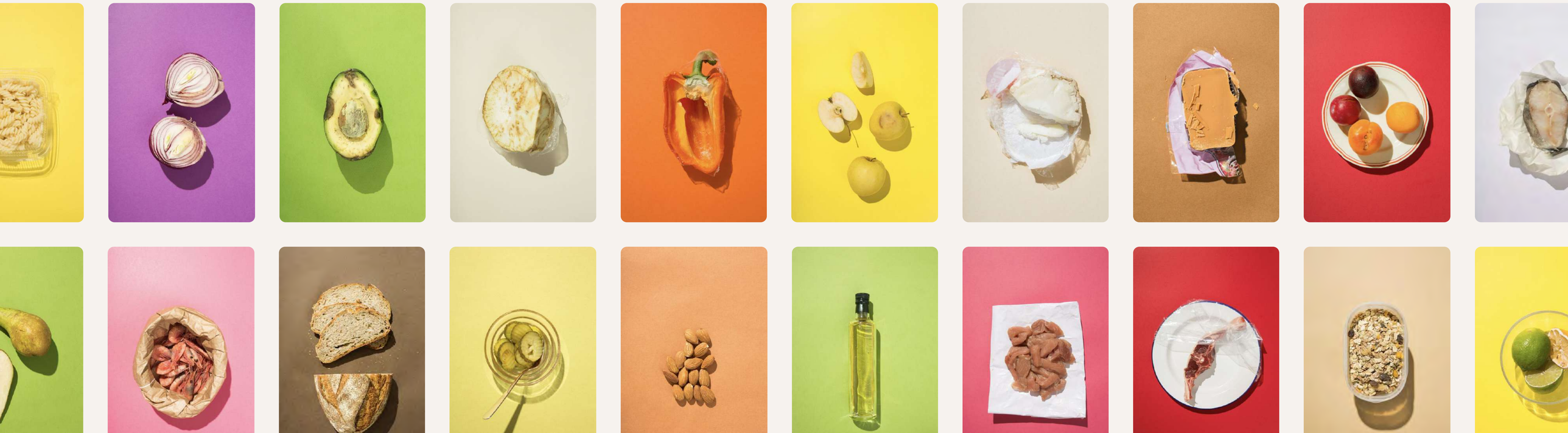
The Matvett Challenge – reducing food waste

Is it possible to change food waste habits in eight weeks?



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Summary and goal

Summary

We have set a goal to halve food waste in Norway by 2030. Much of this reduction needs to be made in households, which are responsible for over 40% of identified food waste, throwing away over 192,100 tonnes of edible food every year. This is equivalent to about 35 kg per person. Previous initiatives directed at households have generally taken the form of campaigns to convey information and change attitudes. We have got better at taking care of our food over the last two years, but the work that has been done needs to be scaled up. We are still throwing far too much food away in our homes.

In its report, the Food Waste Committee identified nudging as one of a number of recommended initiatives. For this reason, Matvett (the food and hospitality industry's organisation for preventing food waste in Norway) tasked Nudgelab with testing how using behavioural science and nudging could make it easier for households to throw away less food and contribute to a long-term reduction in food waste in households.

The goal of the experiment was to test interventions in a small sample (a nudge group and a control group) of households that represent a broadly composed target group from all over Norway. The objective was to learn whether it is possible to get people to actually change their behaviour so that they become aware of what they are throwing away, and over a period of eight weeks manage to reduce their food waste.

There were a total of 231 participants (117 in the nudge group and 114 in the control group). Of these, 72.7% were women, and the average age was 46. The results showed a reduced likelihood of throwing away food, increased use of strategies to not throw away food, increased self-efficacy and use of plans, a higher level of awareness of own food waste, a positive change in attitude and increased awareness around barriers that make it difficult to reduce your food waste. Many of the changes were significant, and where there were differences between the groups, the biggest change was in the nudge group, which indicates that the nudge initiatives had the desired effect. Experiences from the project will be used to find ways to help and inspire the entire population to throw away less food.

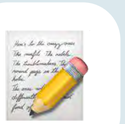
📚 Report from the Food Waste Committee – Recommendations for holistic initiatives and instruments 2023.

Goal and target groups

To change people's food waste habits in **eight weeks.**

Target group

The population in general, i.e. people of all ages and genders from all over Norway and in different living situations (alone or together with others).



Theoretical framework and method

How can we achieve behavioural change?

Understanding what is needed for people to manage to reduce their own food waste

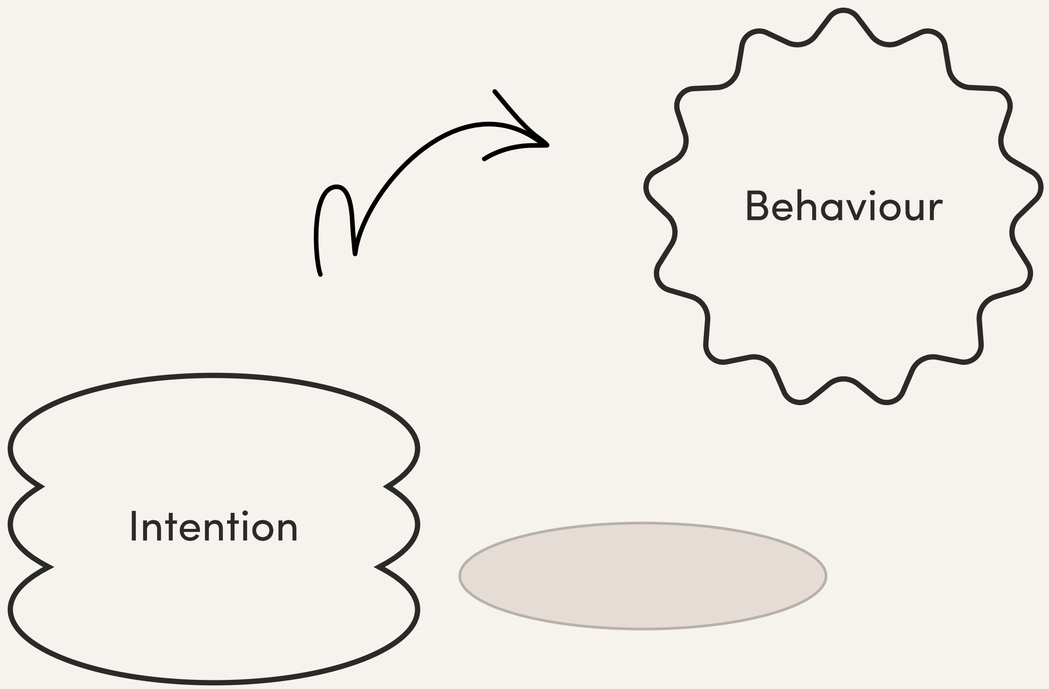
There are many reasons why we throw away food and drink. What happens most often in households is that food gets forgotten in the fridge or cupboard. The next most common reason is that food passes its expiry date, or that it was of poor quality when it was purchased. Other common reasons include buying too much food, miscalculating what is needed or forgetting what you already have at home. A change in plans in a busy life is also a key reason for food waste, according to surveys carried out for Matvett by NORSUS, the Norwegian Institute for Sustainability Research.

For the vast majority of people, wasting food is something that often just happens, and not something they actively do. No one intends to throw away food – it happens as an unintended consequence of competing motivations relating to food, such as wanting to eat something healthy, wanting something that is quick to prepare, wanting something different etc. Simply put, there is a gap between intention and actual behaviour. Also, many people are worried about getting ill from food that is not fresh or that has passed its expiry date, so a lack of knowledge about how to determine whether food is safe also contributes to food waste.

An important goal for Matvett is to help as many people as possible understand what they can do to throw away less food and make a conscious decision to that end. Through this experiment, our goal is to show people what they can specifically do to reduce their own food waste and create new and lasting habits.

Van Geffen et al., 2020. Food waste as the consequence of competing motivations, lack of opportunities, and insufficient. abilities

Reducing the gap between intention and behaviour



No one wants to throw away food, but we still do it. It is therefore important to understand what can help close the gap between intention (not wanting to throw away food) and behaviour (not throwing away food).

By identifying the relevant barriers, motivation and biases, it is possible to find ways to help people to throw away less food.

Theoretical framework

– for understanding what can help people to throw away less food.

People often do not act in line with their intentions and often fail to do what is needed to succeed. The Health Action Process Approach (HAPA) is a model of health behaviour that attempts to account for behavioural changes by demonstrating ways to reduce the gap between intention and behaviour. HAPA is a framework for behavioural change and intervention design, and was chosen as a framework for the Matvett Challenge because it helps us to understand how the different factors that contribute to behavioural change relate to each other.

HAPA suggests that a person's intention to perform a behaviour is affected by their perception of risk, their expectations about outcomes and their self-efficacy. There is great variation in the extent to which intention correlates with behaviour, but factors such as self-efficacy, creating plans and monitoring own behaviour increase the chances of behavioural change. Resources (social support) and barriers are significant at all stages in the model. HAPA also emphasises the significance of setting goals, trusting your self-efficacy and dealing with any barriers that may crop up. HAPA consists of three phases:

1. **The pre-intention phase** involves assessing risks and benefits relating to a decided behaviour.
2. **The intention phase** concerns considering how you can manage risk and achieve your goals. This involves trusting your own self-efficacy and social support.
3. **The action phase** is when you have changed your behaviour and have strategies to avoid falling back into old habits.

🔗 Health Action Process Approach, Ralf Schwarzer. https://www.besci.org/models/health-action-process-approach

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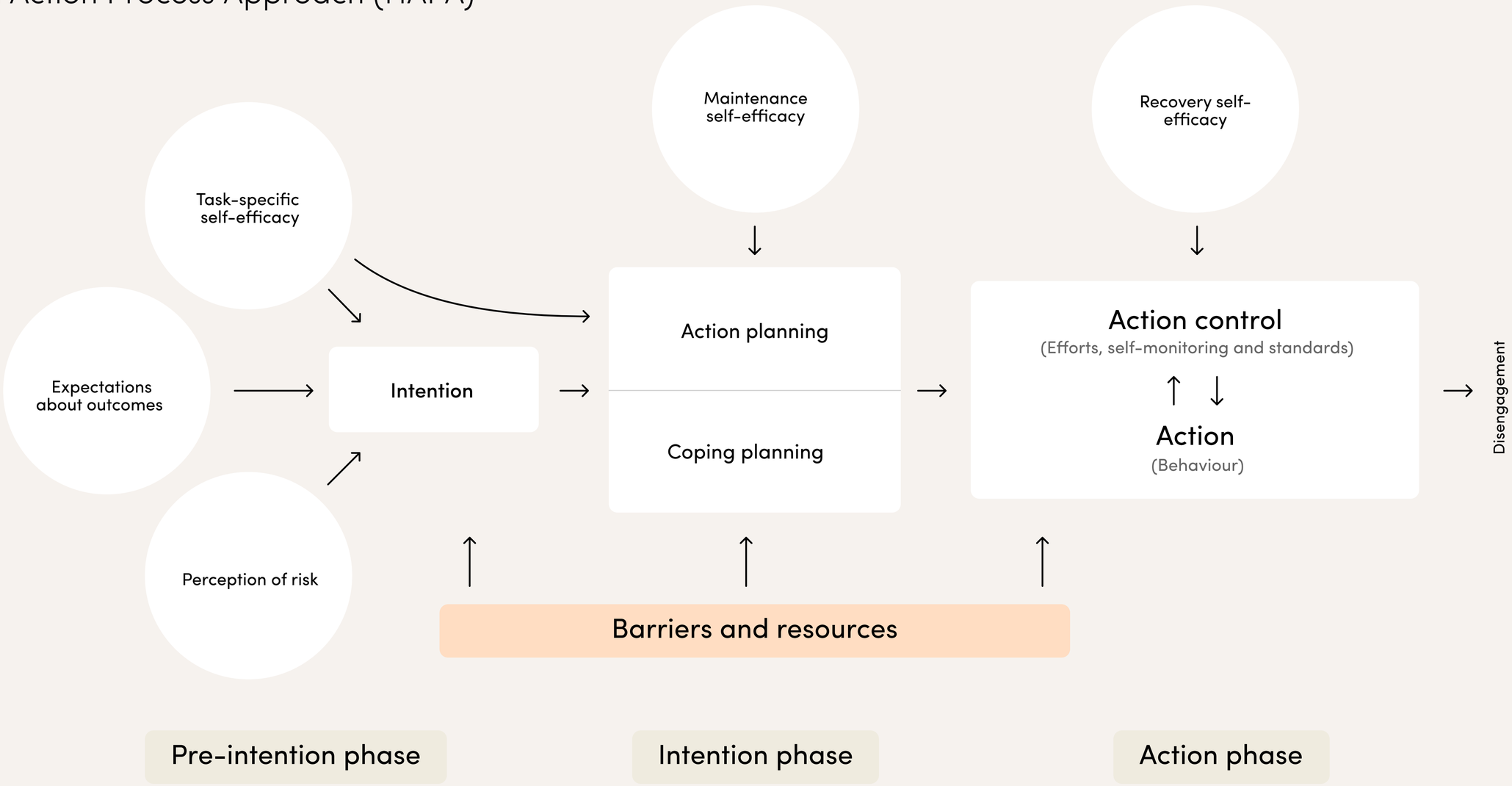
Theoretical framework

Health Action Process Approach (HAPA)

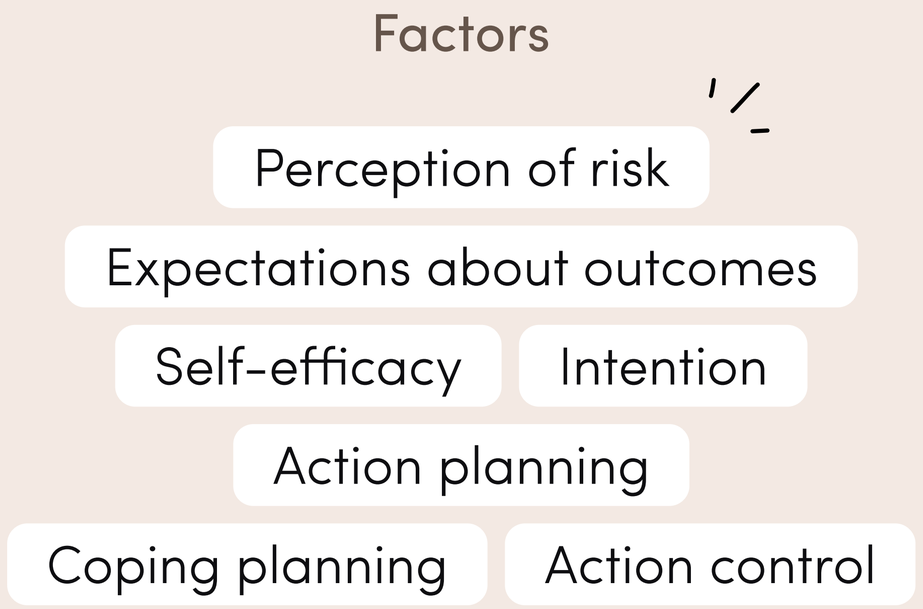


Factors involved in behavioural change

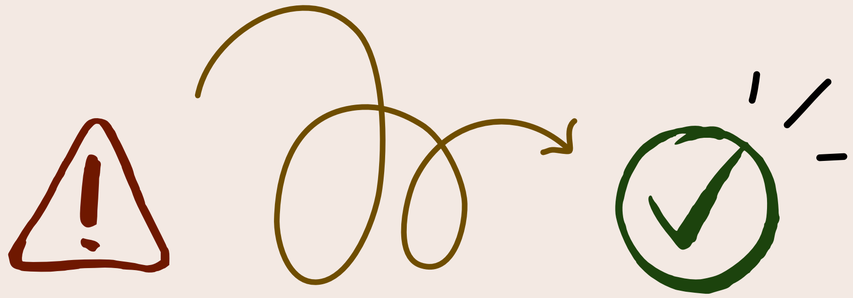
The following factors in the HAPA model are involved in behavioural change processes:

- **Self-efficacy** is belief in your own ability to perform a decided task.
- Intention concerns a person's motivation or plans to perform a specific behaviour.
- **Action planning** involves specifically planning where, how and when to perform a desired behaviour.
- **Coping planning** involves creating strategies to overcome expected or unexpected obstacles to performing a desired behaviour.
- **Action control** concerns endeavours to maintain the new behaviour over time and integrate it into daily life. This involves efforts, standards and self-monitoring.

🔗 Health Action Process Approach, Ralf Schwarzer. https://www.besci.org/models/health-action-process-approach



Factors that contribute to understanding how we can change our habits



- **Motivation** – having a desire to make a change and a clear goal.
- **Frequency** – the more regularly and the more often a new behaviour is performed, the quicker it can become automatic.
- **Context** – changing context that supports the new habit or that makes it easier to avoid something that leads to an undesirable habit.
- **Feedback** – receiving feedback about what you are doing is important to maintain your motivation and engagement.
- **Social support** – other people who encourage, hold you responsible or participate in the process make it easier to maintain new habits.

Motivation | Frequency | Context | Feedback | Social support | Self-control

📚 Lally, P., van Jaarsveld, C. H. M., Potts, H. W. W., & Wardle, J., 2010. How are habits formed: Modelling habit formation in the real world. European Journal of Social Psychology, 40(6), 998–1009 and Wood, W., & Neal, D. T., 2007. A new look at habits and the habit-goal interface. Psychological Review, 114(4), 843.

Using behavioural psychology and nudge theory

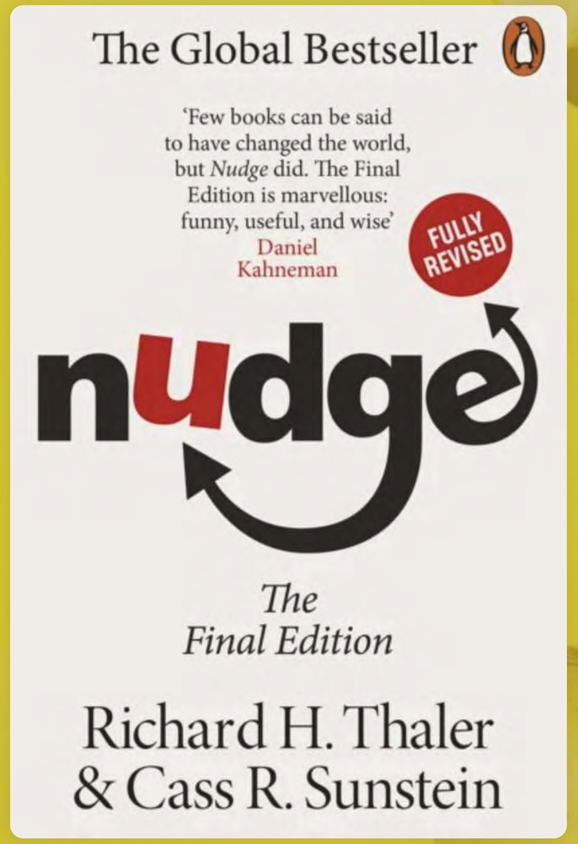
Nudge theory

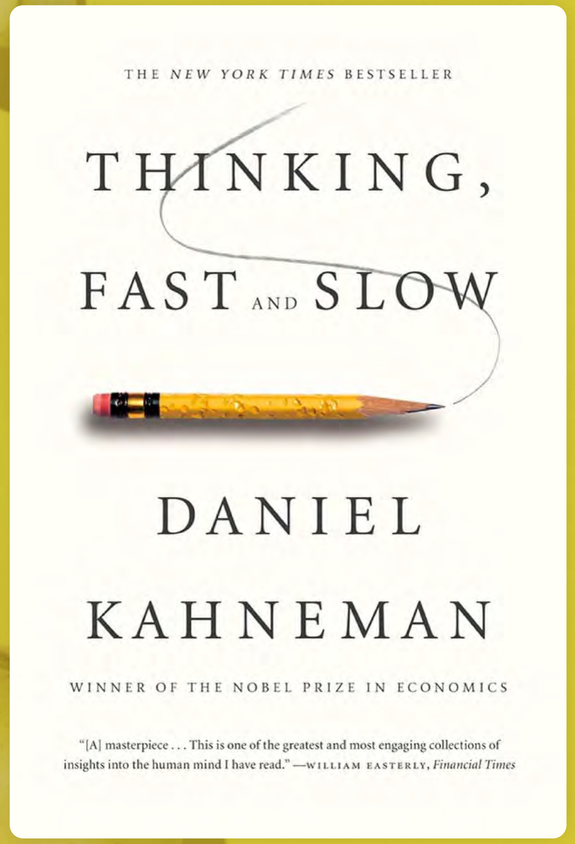
Many of the actions we carry out each day are unconscious – automatic processes controlled by our habits, feelings and impulses, affected by the situation we are in and the people around us. Nudging involves understanding the actual drivers of behaviour and how we make decisions. Much of it happens on autopilot – for example, the layout of supermarkets often affects our choices when shopping.

A **"nudge"** is an intervention whose objective is to affect people's actions in the desired direction without using force, punishment or financial reward. Nudging relies on the fact that people often base their decisions on the information that is available at the moment they make a choice, and that they simultaneously ignore information that is too complex or that does not make sense.

To increase the likelihood of desired behaviour in a given situation, all information should be simple and easily accessible at the moment a choice is about to be made. This means that we must take account of context, remove barriers and increase the motivation for the desired action. This will make it easier for people to do the right thing, which in this context is to reduce their food waste.

📚 Kahneman, 2011. Thinking Fast and Slow; Sunstein & Thaler, Nudge. 2008.





Behavioural mapping as a method

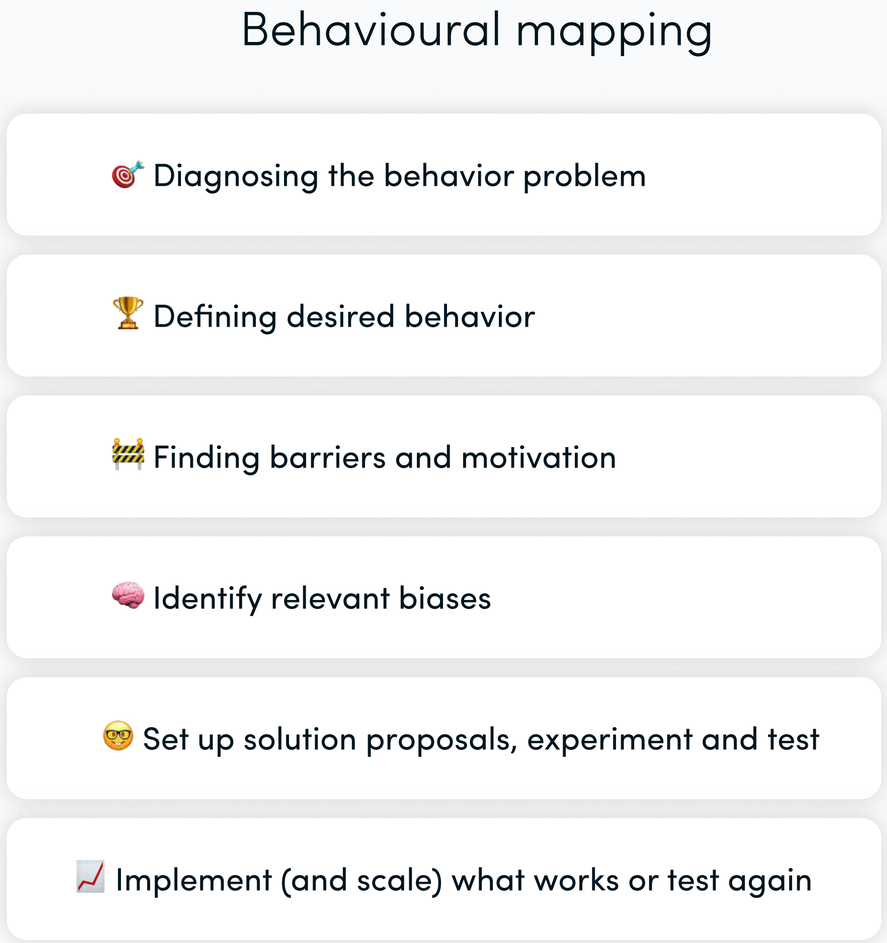
Behavioural mapping is a method that involves first identifying the behavioural problem and then identifying the desired behaviour. In this context, the behavioural problem is that households in Norway throw away too much food; the desired behaviour is for households to reduce their food waste. Hence, it is necessary to map barriers and the motivation for desired behaviour in order to understand the barriers that should be removed or simplified, and what motivates desired behaviour.

A survey is then carried out to understand the mental shortcuts (heuristics) and thought errors (bias) in play. For example, we have present bias – the fact that we choose immediate reward over long-term benefit. In this context, it may be that we choose to throw away food instead of keeping the leftovers and using them for a subsequent meal.

Having mapped the biases in play in the relevant context, it will be possible to find ways to counteract them or ways to reinforce motivations to desired behaviour. These then become nudge initiatives to be used in the experiment.

Once such initiatives have been developed, these are then tested over a specific period before evaluating the effect. An assessment is then made of whether it is necessary to make changes, repeat the test, reject certain initiatives or develop new ones.

📚 Irrational Labs 3B Framework, Designing for Behavior Change; Center for Advanced Hindsight, Behavioral Mapping.



Some relevant biases

A great deal of what we do each day is automatic. We make use of so-called mental shortcuts to save energy. This often means that we make good enough decisions, but it also makes us vulnerable, because it can lead to systematic thought errors (bias).

The more knowledge we have about what bias may be in play when trying to get people to throw away less food, the greater the chance of succeeding in helping people to actually reduce their own food waste.

📚 Sunstein & Thaler, Nudge. 2008.

Examples

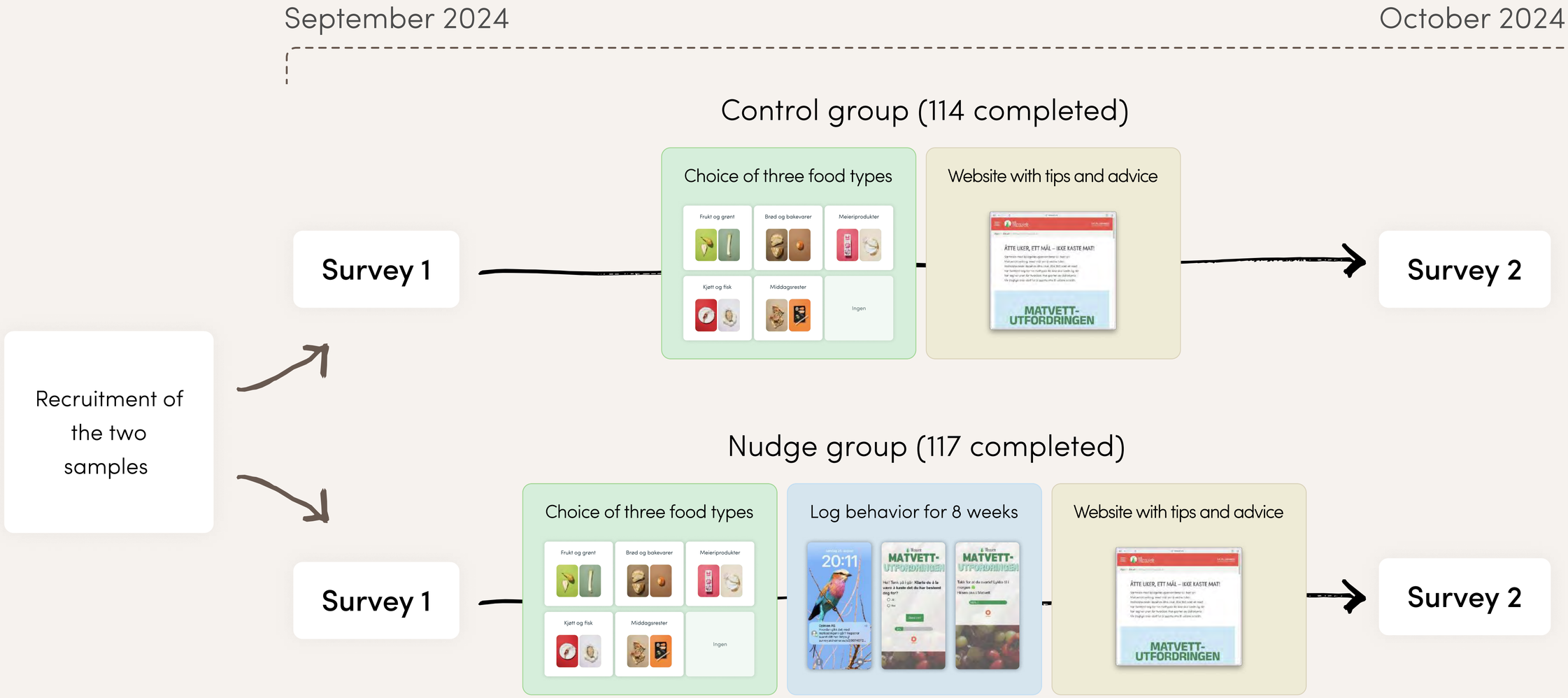
Self-control bias – the tendency for a person to overestimate their own level of self-control and self-restraint in future situations.

Loss aversion – the emotional impact of a loss is felt more intensely than the pleasure of an equivalent gain.

Social norm – the tendency to do the same thing as others in a specific situation instead of making your own assessments.

Recruitment and onboarding

Project timeline

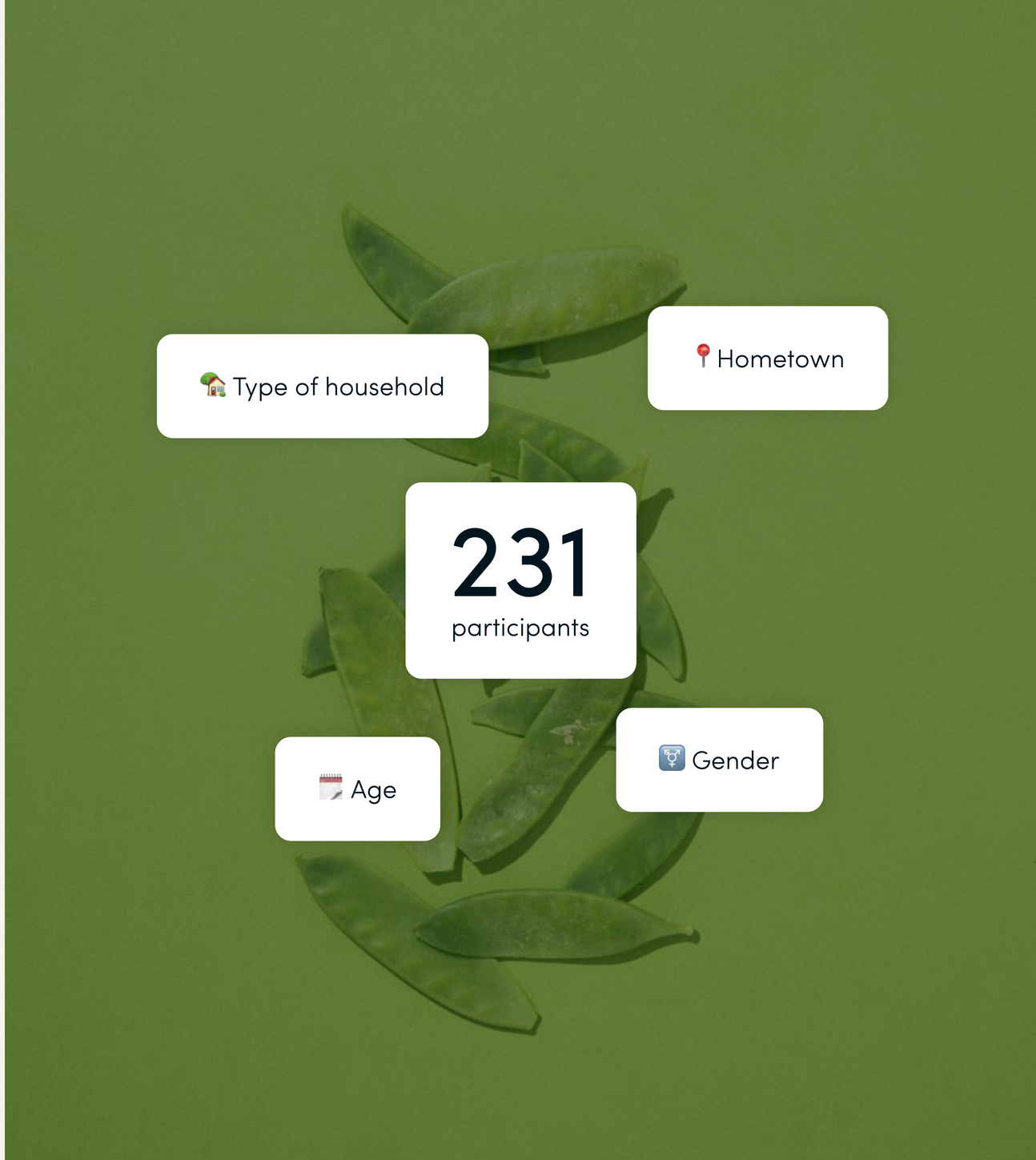


Recruitment process and selection criteria

The market research agency Opinion was responsible for recruiting and following up the participants during the process. The participants were recruited randomly to either the nudge group or the control group. A total of 150 people were recruited to each group. Of these, 231 participants completed the challenge and responded to the questionnaire both before and after the period of the experiment.

The selection criteria were that the participants had to have the main responsibility for preparing and/or clearing up after meals in their household, and that the samples should be representative with respect to variation in type of household (single-person households versus multiple-person households), age, gender and place of residence (city/district).

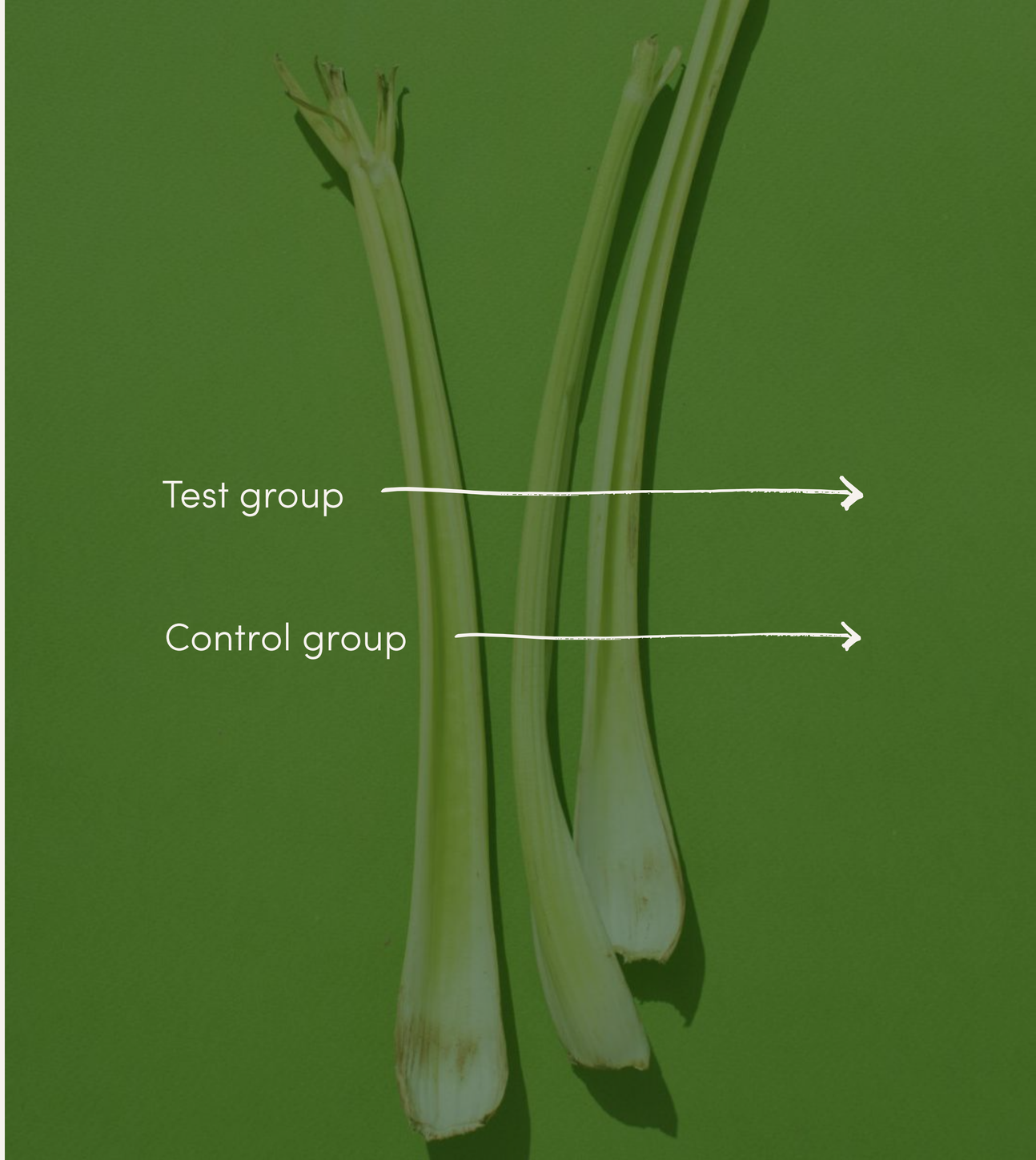
There is always a risk of selection bias in such surveys, i.e. that the people who agree to participate tend to be those who are keenest not to throw away food, and that the responses they give therefore do not represent what is typical for most Norwegian households. Even if this were the case with the Matvett Challenge, there is still much to learn from the results.



Onboarding

The participants in both groups were emailed an invitation to visit a website providing information about the Matvett Challenge, why it is important for them to reduce their food waste, how they could do this and, importantly, information on downloading a plan which they could fill in with what they wanted to change and how they would do it.

The participants in the nudge group also received an offer to participate in a Teams meeting (lasting about ten minutes) in which the Matvett Challenge was presented. They were given a short introduction about the goal of the challenge, what would happen over the eight weeks and why Matvett is seeking to find ways to help Norwegian households manage to throw away less food. They were given the opportunity to ask questions about what would be involved. A total of 12 participants attended the Teams meeting.



Conducting the experiment

Choice of food categories

The participants chose three food categories they wanted to stop throwing away

The likelihood of forming new habits is higher if the behaviour a person wishes to change occurs quite often and is very specific. Therefore, the participants were asked to choose three food categories that were relevant to them. They were able to choose from among the food categories that are most frequently thrown away in Norwegian households: leftovers, fruit and vegetables, baked goods, dairy products, and meat and fish.

It was framed as follows: Over the next eight weeks, the goal is to reduce food waste in your household. Decide what you want to stop throwing away, and tick three of the following food categories (choose the ones you throw away most often):

1. Dinner leftovers
2. Fruit and vegetables
3. Bread and baked goods
4. Dairy products (milk, cream, yoghurt, cheese)
5. Meat and fish (both raw and prepared products such as sausages, pâté etc.)
6. None

📚 Hohle, S. M., Stensgård, A. E., 2024. Food waste in Norwegian households – Updated food waste figures and consumer surveys, with recommendations for the way forward. NORSUS. Report No.: OR.28.24; matvett.no.

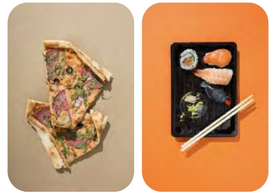
Fruit and vegetables

Bread and baked goods

Dairy products

Meat and fish

Dinner leftovers



None

The significance of making plans

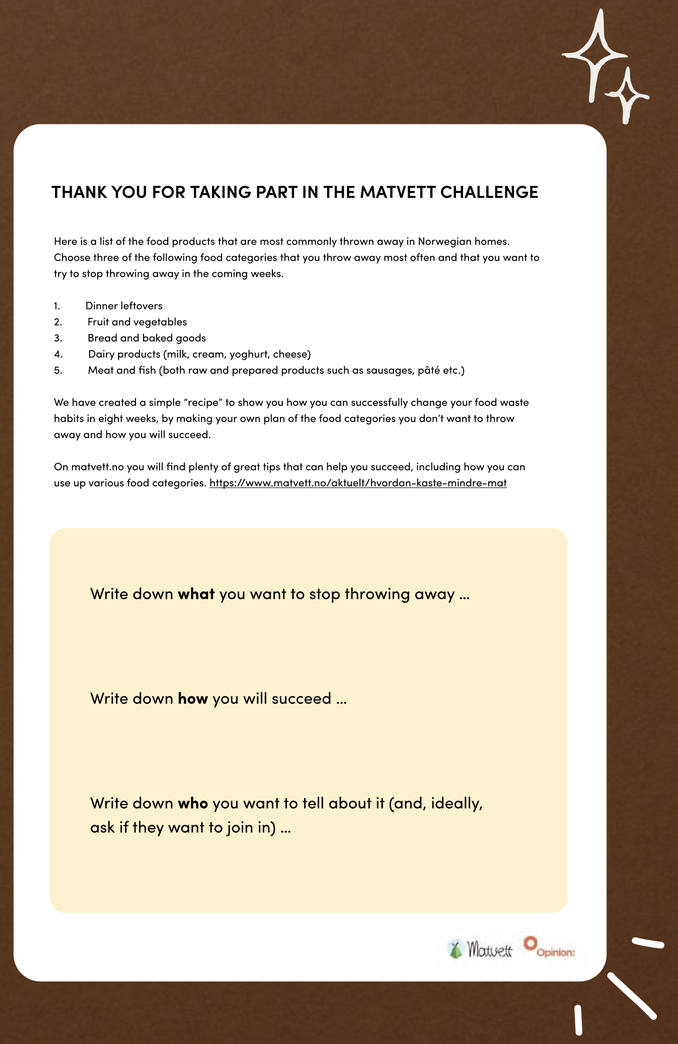
Research shows that the more specific your plans are – i.e. deciding when, where and how you will make a change – the greater your chances of succeeding. This is called implementation intentions.

Therefore, the participants in both groups were asked to choose three food categories they wanted to stop throwing away and then write down what they wanted to change, when and how.

This was a key part of the experiment.

In addition, they were asked to state who they would tell about it. The basis for this is research that shows that having an “accountability partner” increases the chances of achieving your goals.

Gollwitzer Implementation Intentions. Strong Effects of Simple Plans. 1999



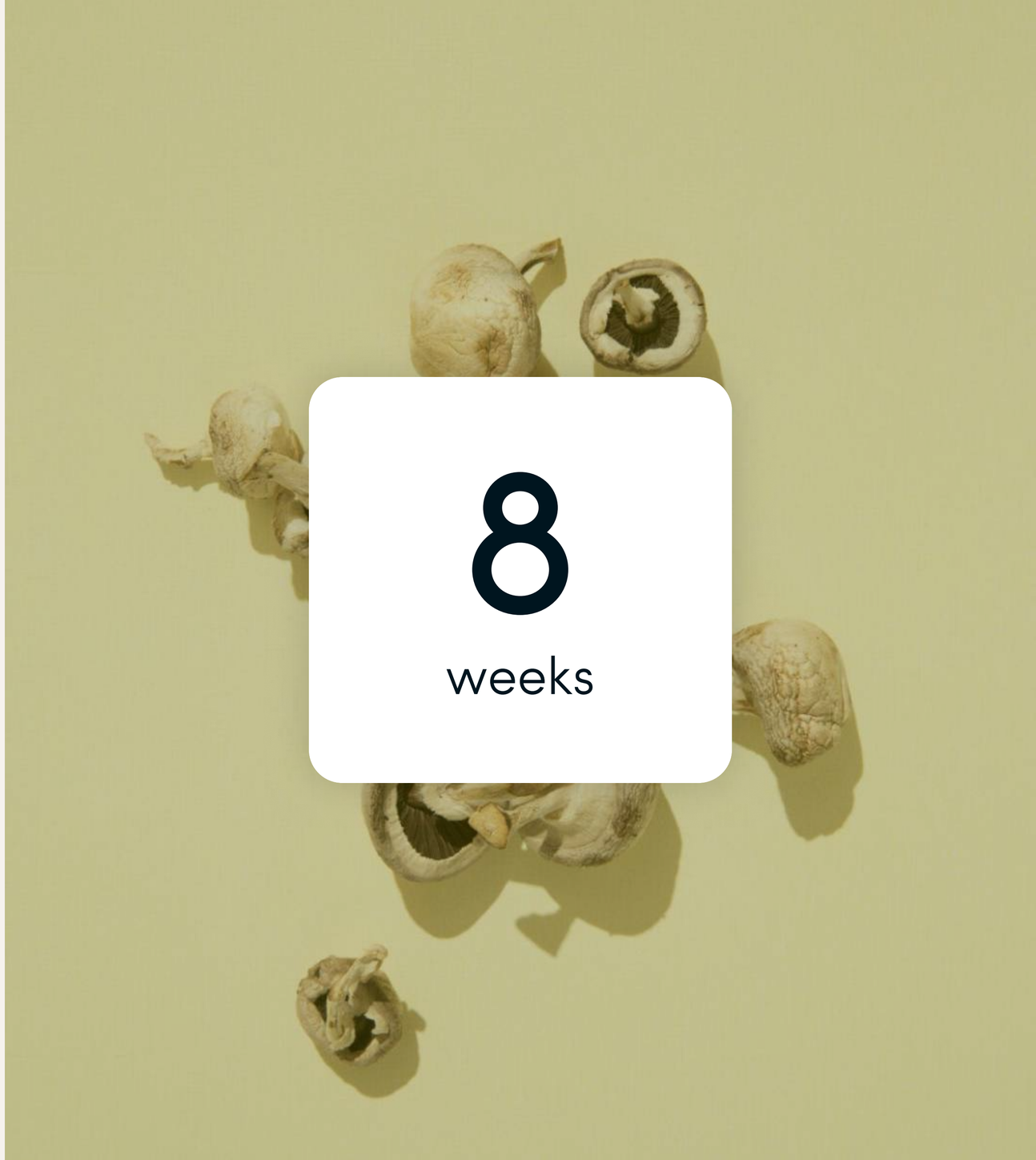
Duration of the experiment

The time it takes to form a habit varies greatly, but in a much-quoted study by Lally et al. (2010) it was found that it takes 66 days for new behaviour to become automatic, although there was considerable variation between the participants. The authors also found big differences between the participants, with some automating behaviour or forming habits after 18 days, and others taking 254 days.

This emphasises the fact that the time it takes to form a habit can be highly individual and that there are multiple factors affecting the process, especially how often a person performs the action.

In the experiment, we chose a test period of eight weeks, which we expected to be long enough to test whether the initiatives had any effect – not so long to cause too many participants to drop out, but long enough that any reduction in motivation (and whether the participants would manage to recover their motivation) would be detected during the test period. Our hypothesis was that 66 days might be slightly too long for the participants to receive daily text messages, and that there could be a negative effect in the form of increased disengagement.

📚 Lally, P., van Jaarsveld, C. H. M., Potts, H. W. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. European Journal of Social Psychology, 40(6), 998-1009.



Daily logging of behaviour

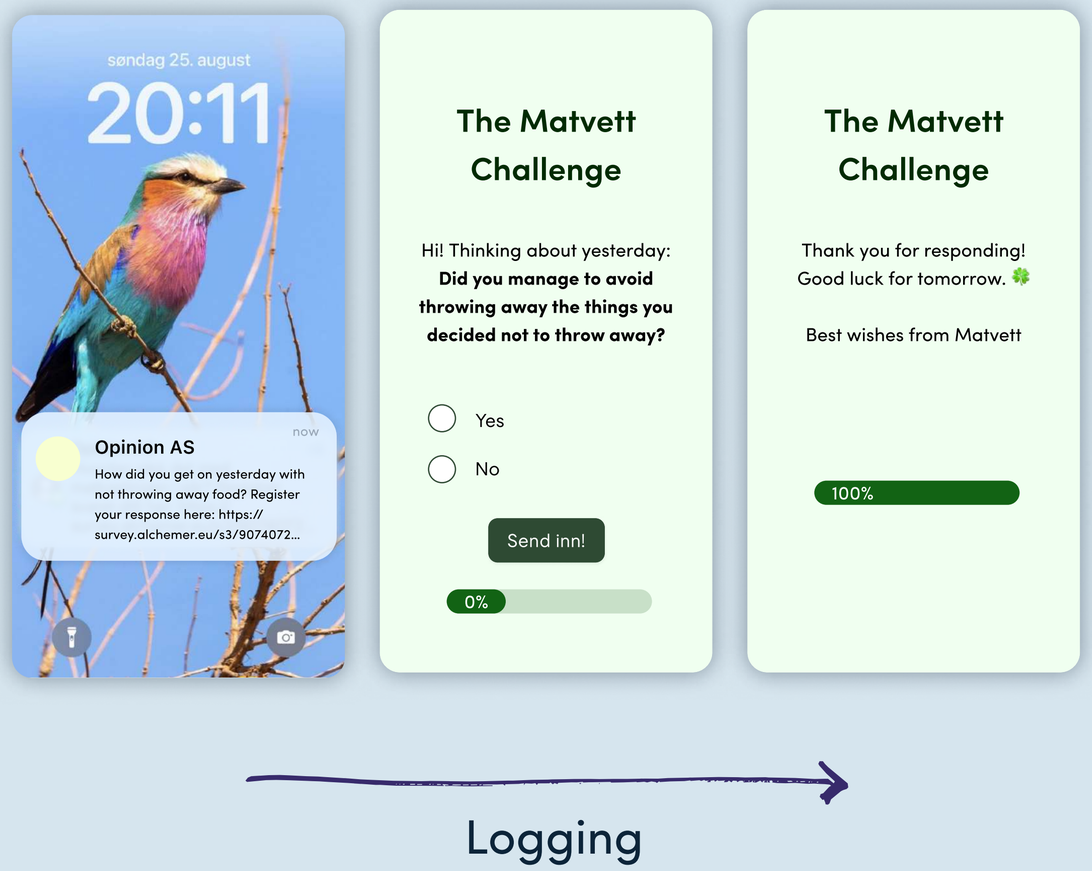
Logging via text message every day for eight weeks

Research shows that reminders increase the likelihood of behavioural change. Studies have shown that reminders act as signals that trigger desired behaviour, especially when combined with various strategies for establishing habits and reaching goals.

The participants in the nudge group received a text message daily (not at weekends) asking whether they had managed to avoid throwing away their selected food categories the previous day. This was the core of the experiment.

It was vital that they logged daily, to ensure that they actually remembered whether they had thrown away any of their selected food categories that day, as logging less frequently would have resulted in poorer data quality, something we wanted to avoid. This therefore compensated for the risk that some participants would perceive such frequent messages as bothersome.

📚 Martin S Hagger et al. 2020. Changing Behavior: A Theory- and Evidence-Based Approach.



Weekly motivational messages

Weekly motivational text messages

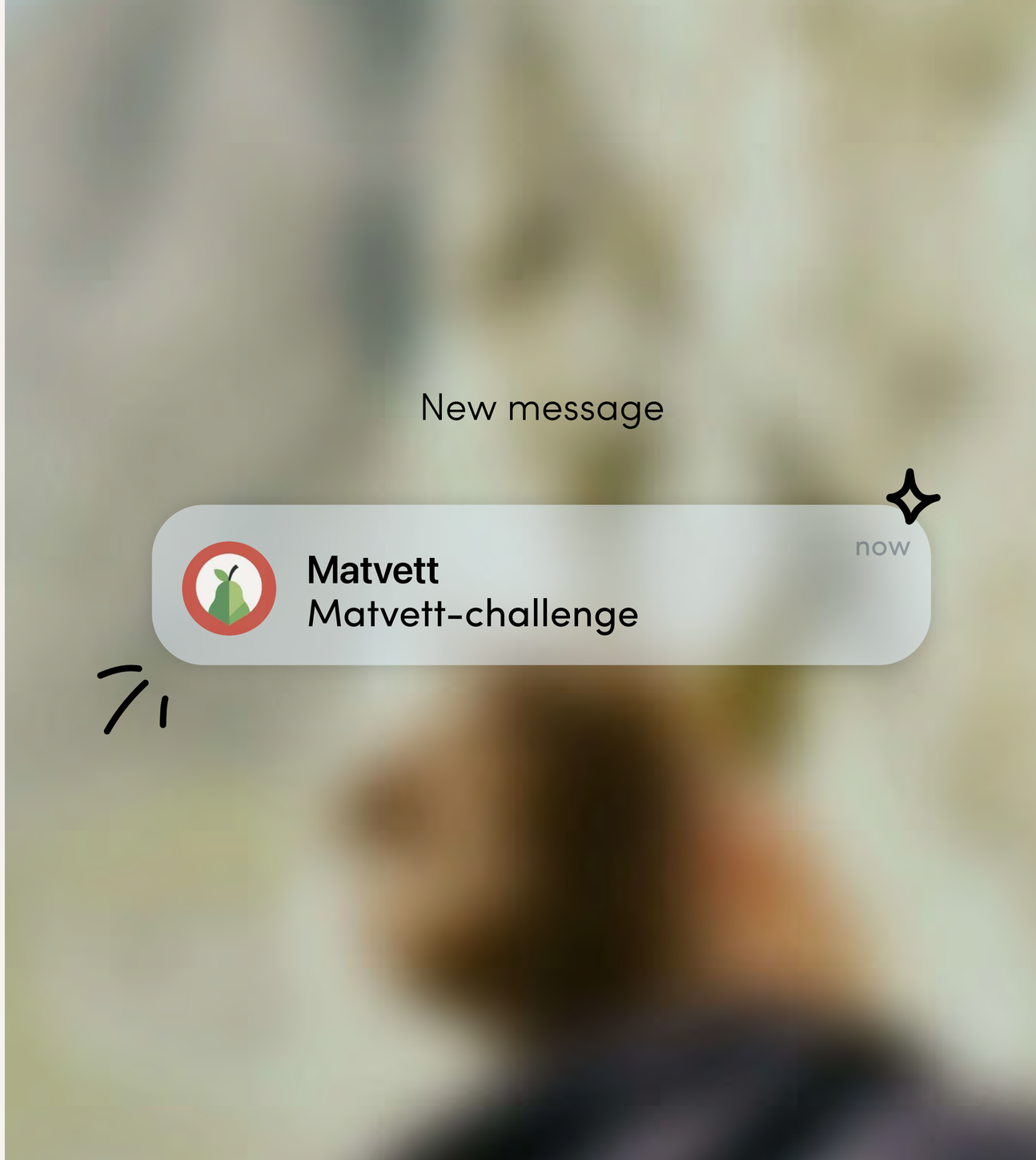
Each Monday (in line with the fresh-start effect), all participants in the nudge group were sent a text message whose contents were based on what it is we know from research that motivates behavioural change – that is to say, messages that reduce the gap between intention and behaviour and reduce the thought errors (bias) in play. These weekly messages were in addition to the daily logging of behaviour.

Maintaining motivation over time is challenging, irrespective of the habit a person wishes to form or break. The objective of the weekly text message (nudge) with motivational content was to reduce the chances of the participants dropping out and increase the chances of them being able to successfully achieve what they had decided.

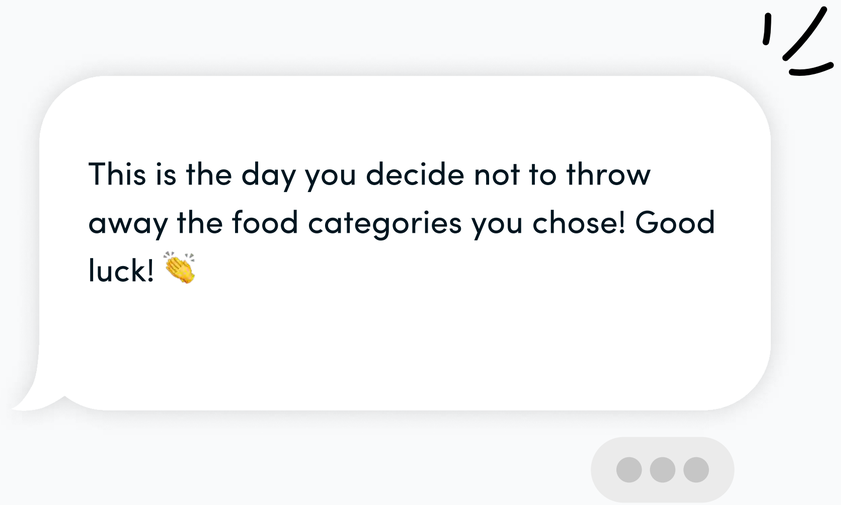
The goal of the Matvett Challenge was to help the participants form new habits and create a long-term effect. Typically, many people are highly motivated and adept at the start of a change process, but they then find that their motivation diminishes over time, which was also the case among the participants in the nudge group. Therefore, it is particularly important to receive help to keep motivation high in order to continue until the new behaviour becomes automatic.

The weekly messages specifically related to managing to not throw away food. The more relevant and personal the message, the higher the likelihood that it is perceived to be meaningful, which in turn motivates a person to successfully make the change they have decided on.

📚 Lally, P., van Jaarsveld, C. H. M., Potts, H. W. W., & Wardle, J., 2010. How are habits formed: Modelling habit formation in the real world. European Journal of Social Psychology, 40(6), 998–1009.



Week 1 – The fresh-start effect

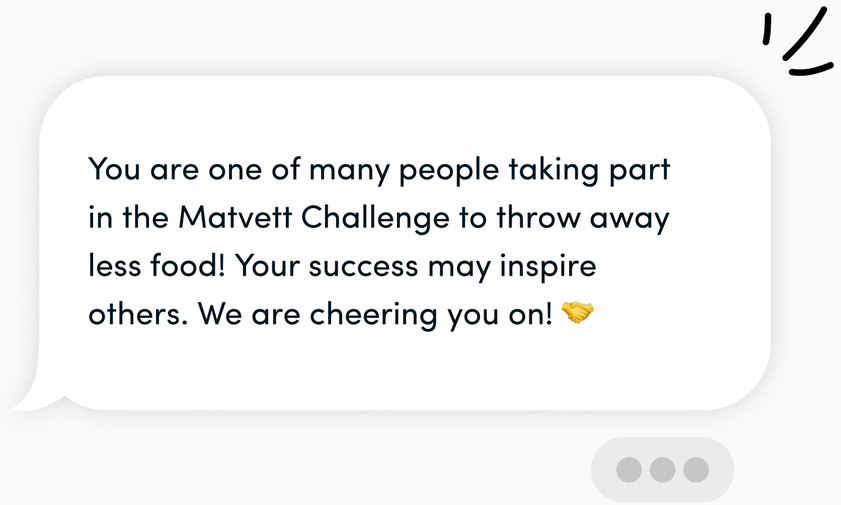


The fresh-start effect describes how people are more inclined to pursue goals and make positive changes at a time described as “a fresh start”, e.g. the start of a new week or new month, the first day of spring, New Year’s etc.

This was utilised in two ways: firstly, the messages were sent out at the start of each week, and secondly, the content was defined in the very first message that was sent out at the start of the Matvett Challenge.

📚 Dai, H., Milkman, K. L., & Riis, J., 2014. The fresh start effect: Temporal landmarks motivate aspirational behavior. Management Science, 60(10).

Week 2 – Social norm

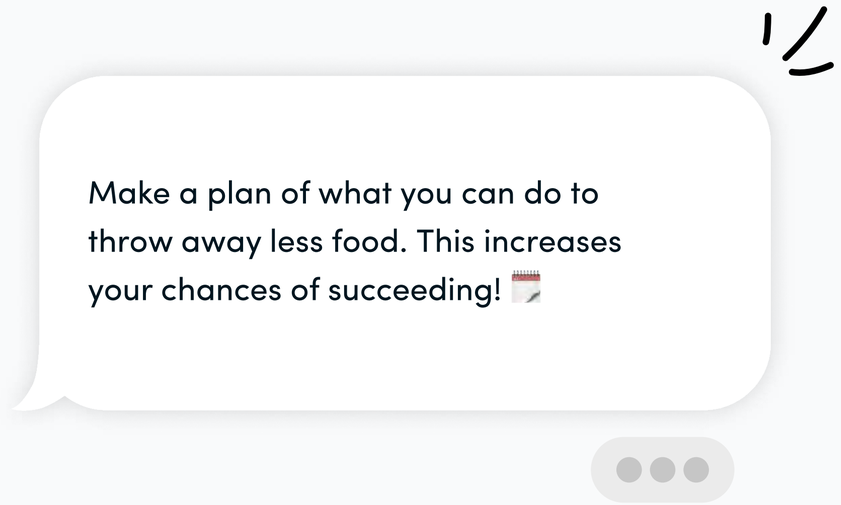


Social norm is the tendency to do the same thing as others in a specific situation instead of making your own assessments. We do not like to be different. Most people want to do “the right thing”, which is often considered to be what others in the same situation choose to do.

In this message, this knowledge is used to create a sense of community, a norm that this is something that “many people are doing”. The objective is to convey the sense of doing “the right thing” and to give everyone a feeling of belonging.

📚 Legros, S., & Cislaghi, B., 2020. Mapping the social-norms literature: An overview of reviews. Perspectives on Psychological Science.

Week 3 – Planning

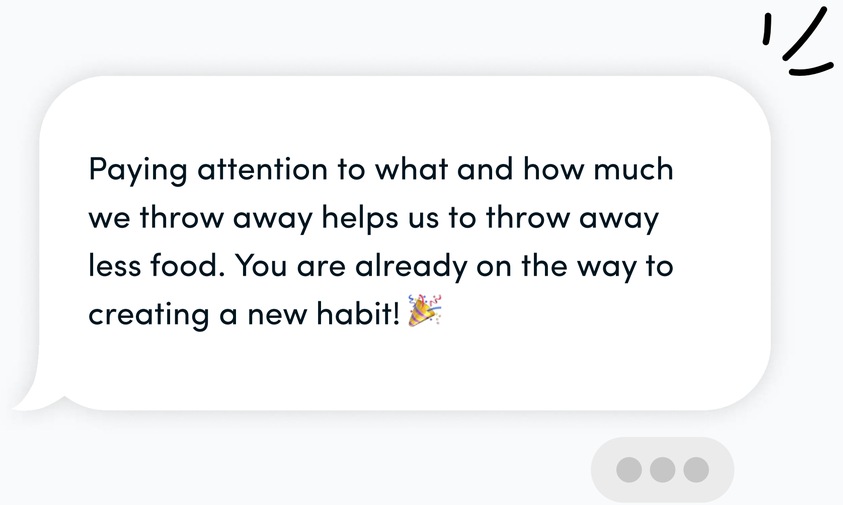


It is well known from research into behavioural change that making plans increases the likelihood of success in the changes a person wants to make.

This was utilised specifically by reminding the participants to make plans as to how they would actually stop doing what they had decided to stop doing, and that making plans would make it easier to achieve the desired change.

📚 Sniehotta et al., 2005. Bridging the Intention–Behaviour Gap: Planning, Self-Efficacy, and Action Control in the Adoption and Maintenance of Physical Exercise.

Week 4 – Self-monitoring



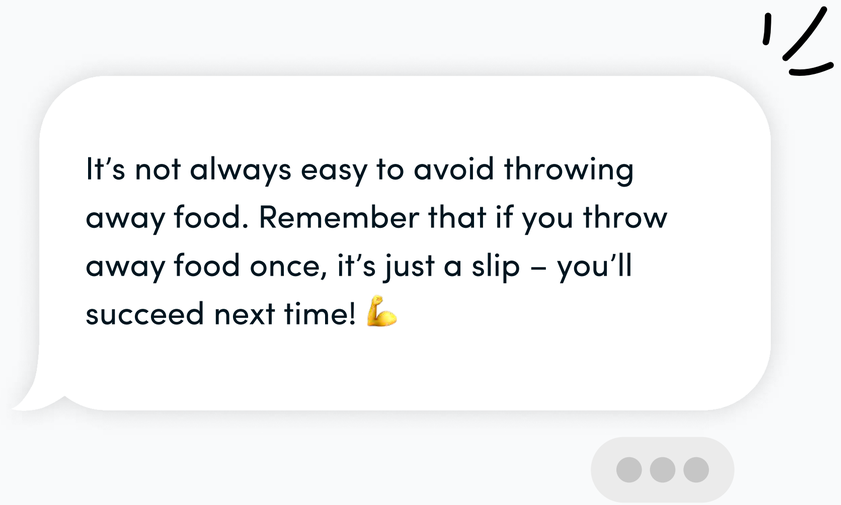
Self-monitoring involves being aware of what you do – monitoring your own behaviour. This is of great significance in following your progress towards the goal you have set.

Self-monitoring helps to increase our awareness of our own actions, and helps us to identify patterns that should be changed or strategies that work. Once a person reaches their goal (has established a habit) the need for self-monitoring is reduced, because new behaviour becomes automatic.

The participants were therefore told here about the significance of paying attention to what they do in successfully forming habits.

📚 Sniehotta et al., 2005. Bridging the Intention–Behaviour Gap: Planning, Self-Efficacy, and Action Control in the Adoption and Maintenance of Physical Exercise.

Week 5 – Self-control bias

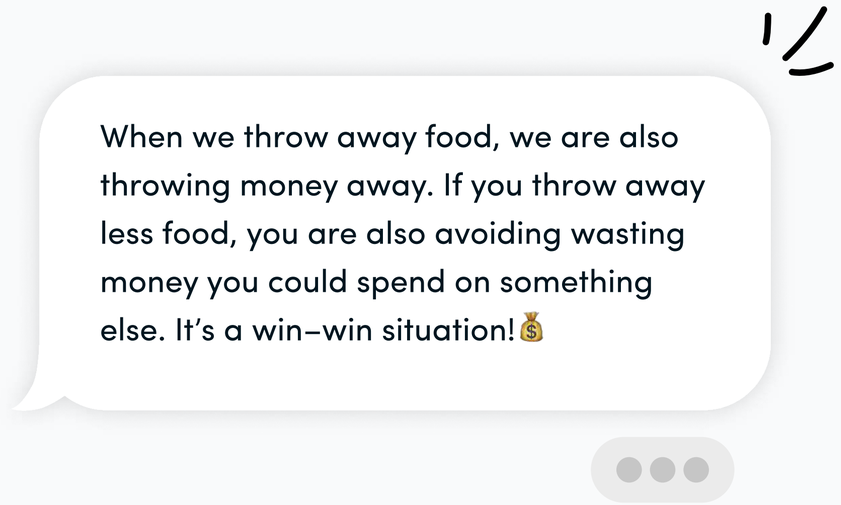


Self-control bias refers to the tendency to overestimate your own level of self-control and self-restraint in future situations. For many people, it can be difficult to endure changing something, as it demands a lot of energy until it becomes automatic.

Therefore, the participants were reminded that if they did not completely manage to do what they had decided to do, it would be smart to see it as just a slip and that it does not mean that they will not succeed. This is the purpose of this message.

📚 Carden & Wood, 2018. Habit formation and change.

Week 6 – Loss aversion

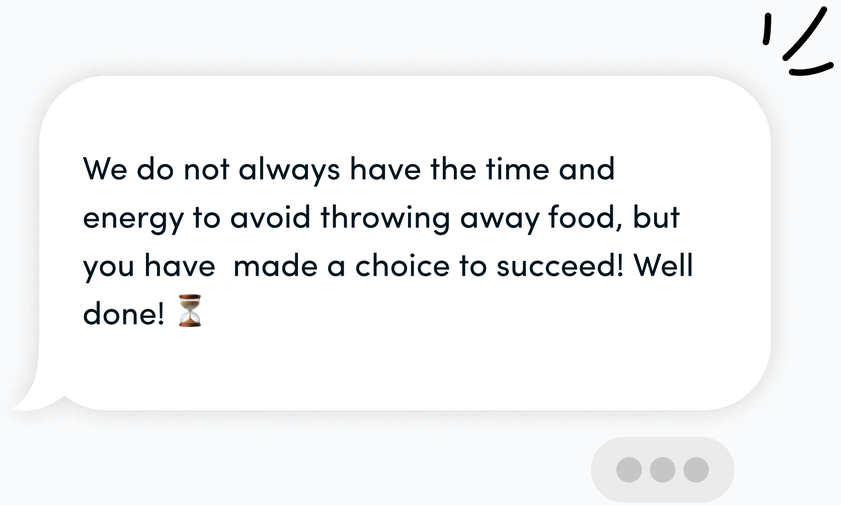


Loss aversion describes how the emotional impact of a loss is felt more intensely than the pleasure of an equivalent gain. To put it another way, we prefer to avoid loss rather than achieve a benefit of the same size.

This knowledge was used to remind the participants that when they throw food away, they are "losing" money. Reminding people that throwing away food is effectively a waste of money can be a driver to help them successfully reduce their food waste.

📚 Kahneman, D., & Tversky, A., 1979. Prospect Theory: An Analysis of Decision under Risk. Econometrica; The Norwegian Food Safety Authority

Week 7 – Present bias

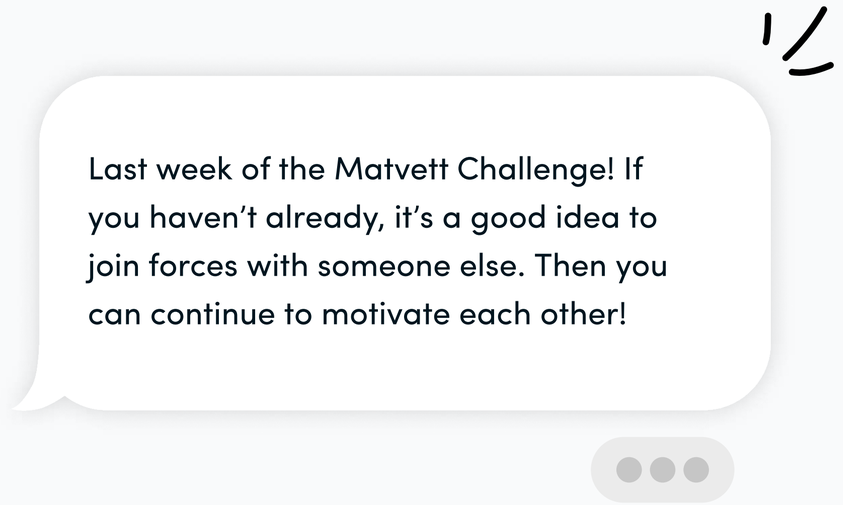


Present bias – the tendency to choose an immediate reward over a greater long-term benefit – plays a major role in throwing away food.

For example, we often forget or lose the desire to use food products we already have, because something else appears more tempting or more suitable in the immediate situation. The objective of this message was to remind the participants that they had made a choice and that what is easiest to do in the moment must not be allowed to "win".

📚 O'Donoghue, T., & Rabin, M., 2015. Present Bias: Lessons Learned and to Be Learned. American Economic Review.

Week 8 – Involving others



Because it can be difficult to successfully stop throwing away food, it is a good idea to join forces with others in order to be able to talk about how to succeed, share experiences and help each other out.

So-called accountability partners help each other to achieve goals and maintain habits. The idea is to provide support, encouragement and motivation, while also helping each other to successfully do what you have decided to do. This provides both personal responsibility and a form of (positive) pressure to achieve the goals, because you have a common goal. Research has shown that joining forces with someone else to reach your goal increases the chances of success.

📚 Oussedik, E., Foy, C. G., Masicampo, E. J., Kammrath, L. K., Anderson, R. E., & Feldman, S. R., 2017. Accountability: a missing construct in models of adherence behavior and in clinical practice. Patient Preference and Adherence.

Message sent after the challenge was completed

Here we utilised a social norm (conformity bias) by creating a form of group affiliation: the participants belonged to a group in which everyone had been through the same challenge, and there were many participants who had taken up the challenge of throwing away less food.

The objective was to simply reinforce the identity that they may have now formed, of being someone aware of their own food waste and the importance of not throwing away food. In this way we wanted to motivate them to continue to be aware of what they throw away and above all to maintain new habits.

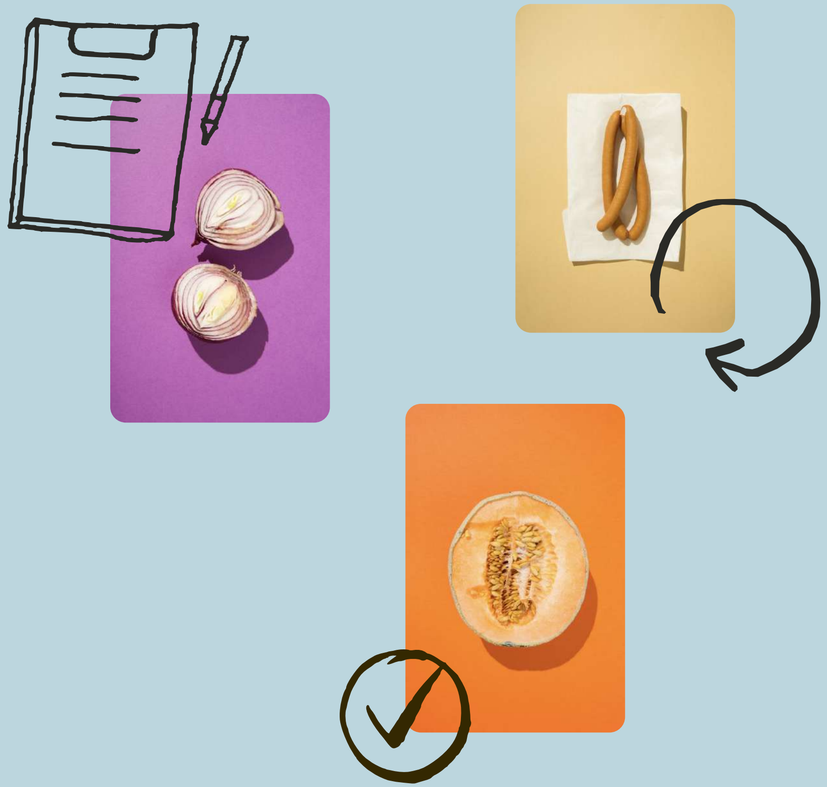
📚 Legros, S., & Cislaghi, B., 2020. Mapping the social-norms literature: An overview of reviews. Perspectives on Psychological Science.

Results

Overview of the main results

- Lower likelihood of throwing away food
- Increased use of strategies to not throw away food
- Less other food thrown away in addition to the chosen food categories
- Other members of the household helped to reduce food waste
- Increased belief that they can manage to throw away less food
- Increased use of planning
- Increased awareness of own food waste
- Positive change in attitude
- Monitored own food waste habits
- Greater awareness of barriers that make it difficult to reduce own food waste

Description of the results



Both the control group and the nudge group were random samples with similar demographic variation. In the cases where there are no significant differences between the groups, the results are presented jointly for the two groups. In all cases where there are differences, these are specified.

All the participants (the control group and the nudge group) were asked to choose three food categories to stop throwing away and to make plans as to how they would succeed. This is a probable explanation for the fact that both groups had many positive changes in the final measurement. This indicates that choosing specific goals, specifying what they would change and how they would implement the change helps people successfully change their food waste habits.

However, the findings show better results (where there are differences) in the nudge group. This indicates that the nudge interventions had a desired effect in the form of greater positive changes among the participants in this group.

A little about the participants

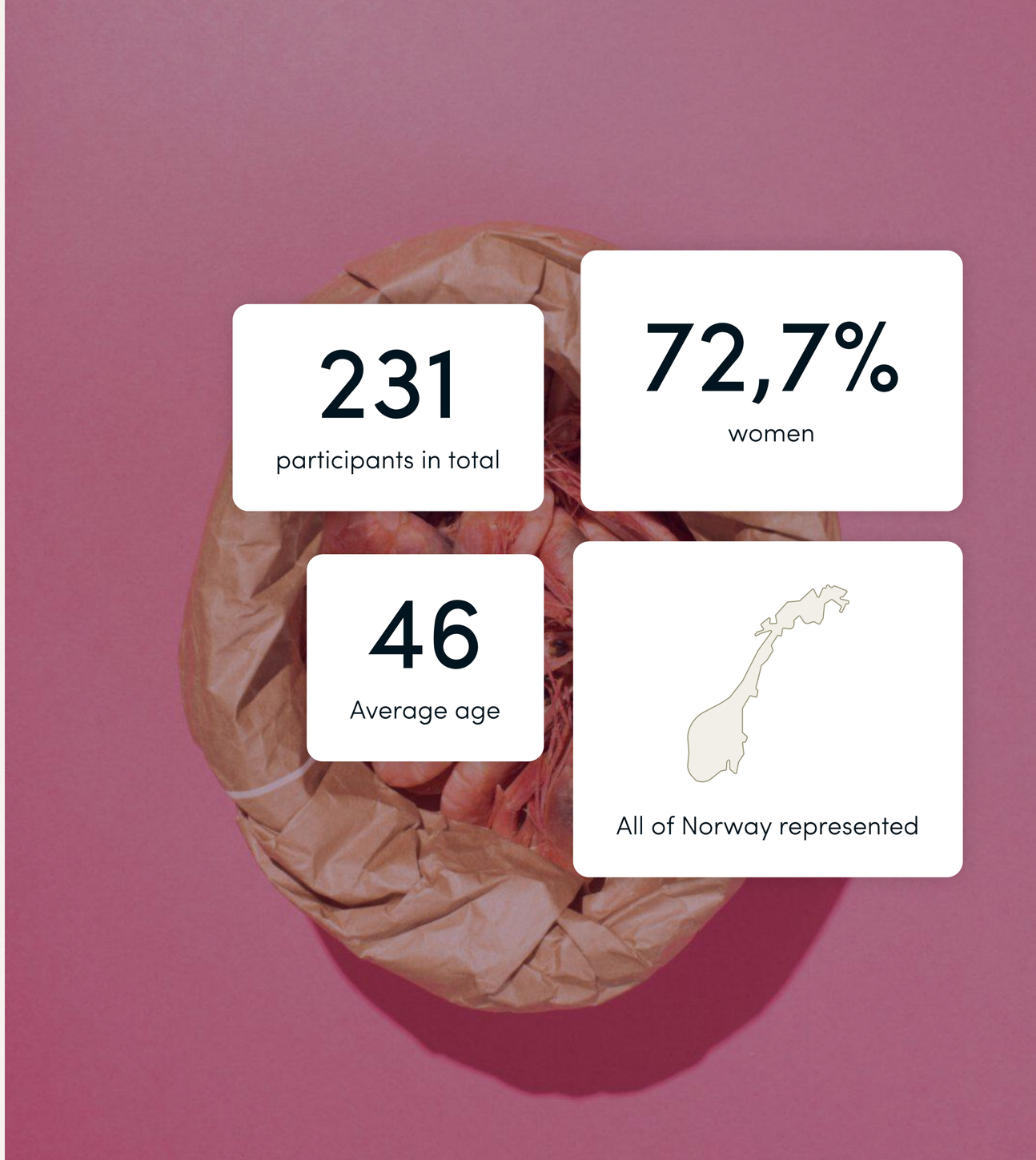
The two groups

A total of 231 people (72.7% of which were women) participated in the Matvett Challenge, 117 in the nudge group and 114 in the control group. The average age was 46 (17–82 years). The participants were from all over Norway.

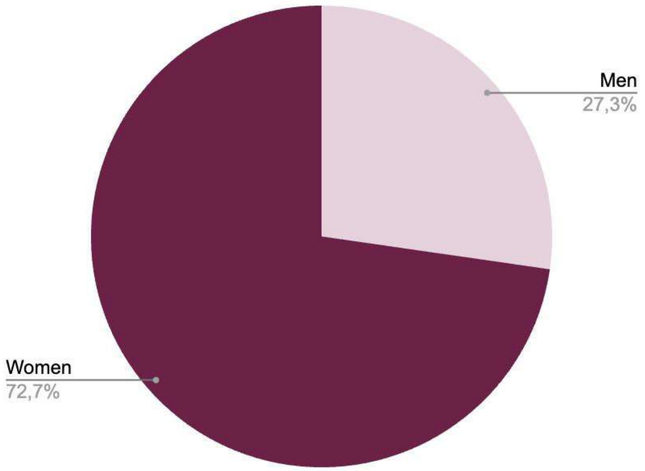
20% of participants responded that they live alone, 38% that they live with children and 32% that they live with a spouse/partner without children.

The selection criteria – having sufficient responsibility for preparing and/or clearing up after meals in the household – were met by all participants in both groups. In total, 95% of participants responded that they were responsible for making half or more of meals and 97% responded that they were responsible for clearing up after half or more of meals.

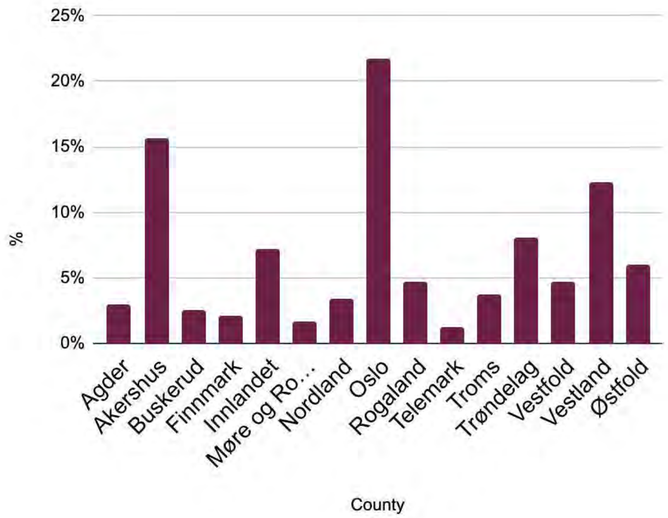
The participants reported that they consumed many of the relevant food categories every day. Only a few participants responded that they rarely consumed these categories.



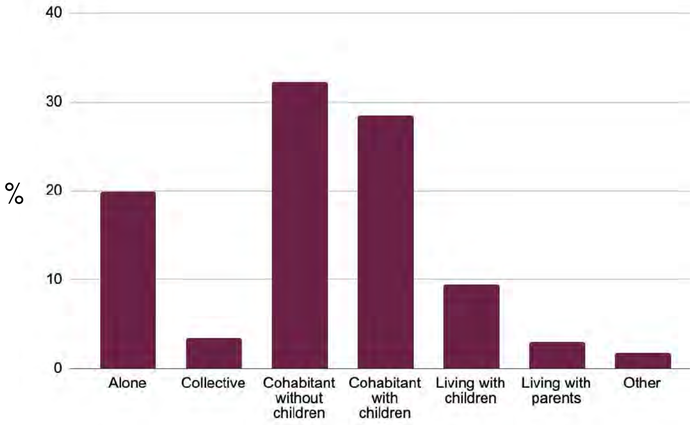
Gender



Location



Living situation




Changes in food
waste habits

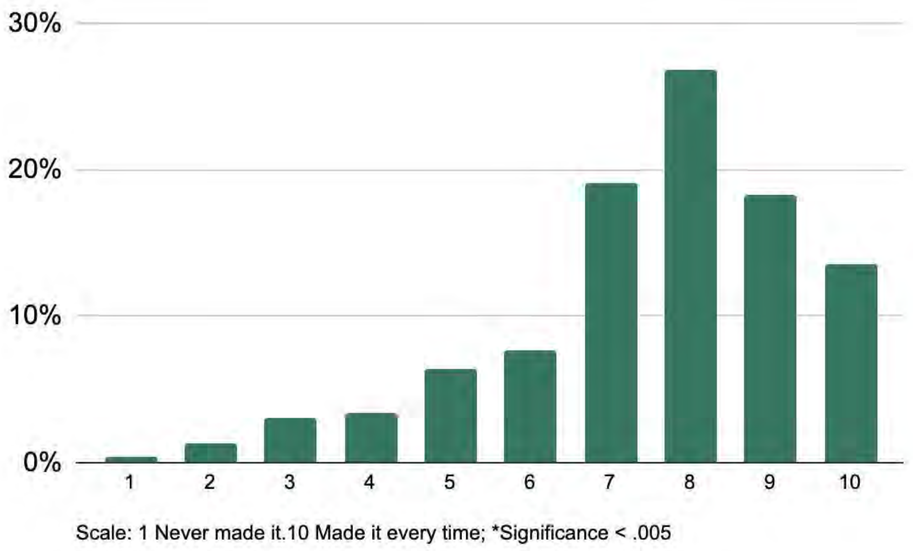
The participants were successful in throwing away less food

Across both groups, 85% of the participants responded that they were successful in throwing away less food in their household more than half the time (score 6–10). 59% responded that they were successful almost every time (score 8–10).

The participants in the nudge group threw away less food than those in the control group ($t(227) = 2.57$, $p = 0.011$). It is reasonable to assume that this is due to the way they were followed up during the challenge.

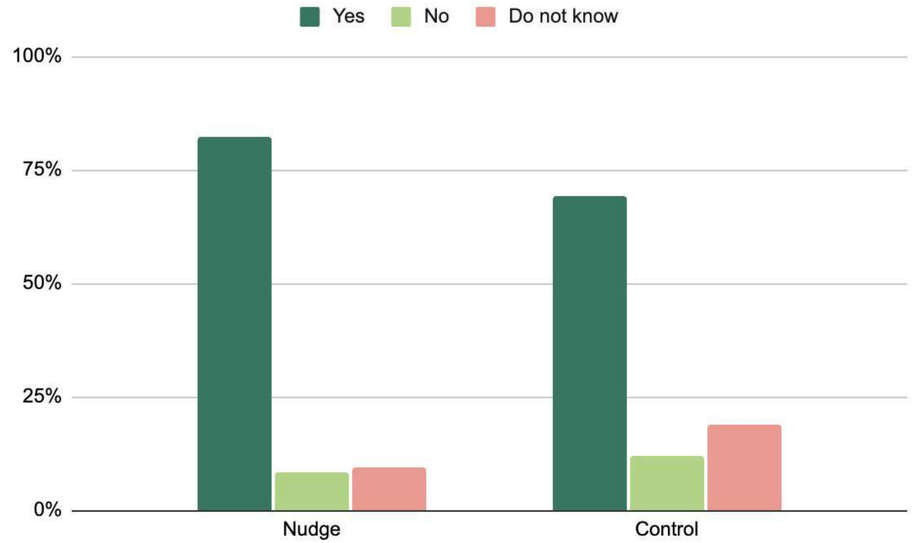
In both groups, the participants were highly motivated to reduce food waste and reported a high level of intention – an average of 4.7 out of 5 before starting and 4.8 afterwards. This represents a considerable ceiling effect – i.e. it is not possible to score much higher.

Perception of successfully completing the experiment



Scale: 1 Never made it.10 Made it every time; *Significance < .005

More participants in the nudge group threw away less “non-chosen” food categories in addition to the food categories they had chosen to focus on



Reduced likelihood of food being thrown away

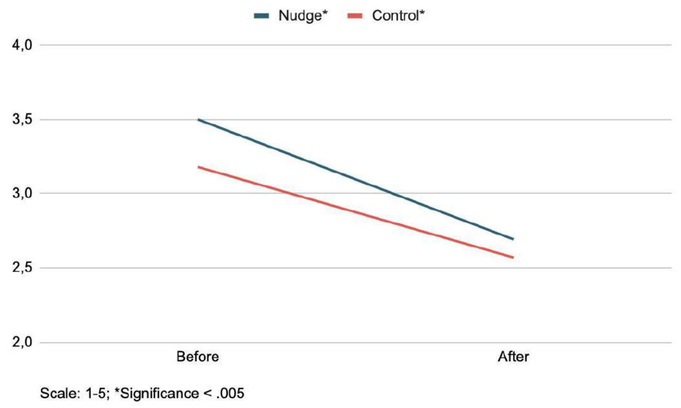
Based on a scale for self-reported food waste, the participants were asked, both at the start and the end of the challenge, how likely it was that five different situations related to throwing away food would occur in their household. The scale for food waste incidents is shown to be more linked to the amount of food thrown away, compared with other self-reporting methods. The results showed that for four of these situations there was a significant reduction in the likelihood that food would be thrown away after the end of the experiment period. The changes were significant both for the nudge group ($t(116) = 8{,}362$, $p < 0.001$) and the control group ($t(113) = 7{,}489$, $p < 0.001$). In particular, the chance of discovering unopened food products in the cupboard/fridge/freezer that would then have to be thrown away was considerably reduced.

A positive change has occurred in that the participants are now more likely to consume leftovers and to use or eat food products before they pass their expiry date.

As to the question of whether a person eats more than necessary to avoid throwing away food or having leftovers, there was no change for either of the groups.

J. Aschemann-Witzel, A. Giménez, G. Ares, 2018. Convenience or price orientation? Consumer characteristics influencing food waste behaviour in the context of an emerging country and the impact on future sustainability of the global food sector.

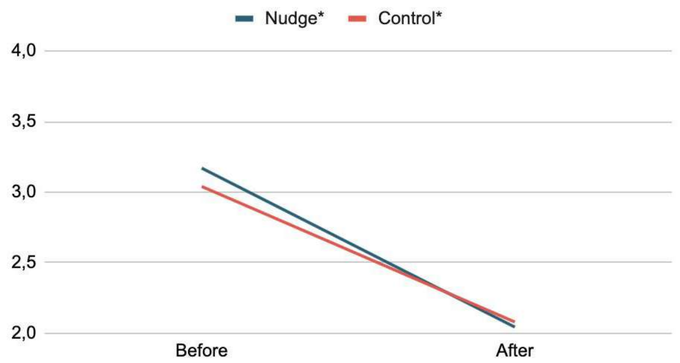
Reduced likelihood of throwing away unfinished food products that have passed their expiry date



Scale: 1-5; *Significance < .005

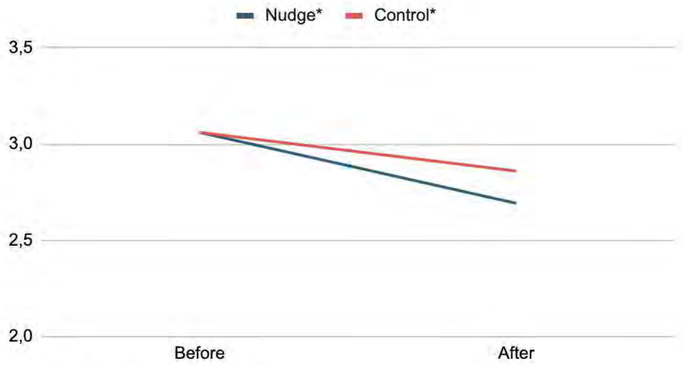
Reduced likelihood of food being thrown away

Reduced likelihood of discovering unopened food products in the cupboard/ fridge/freezer



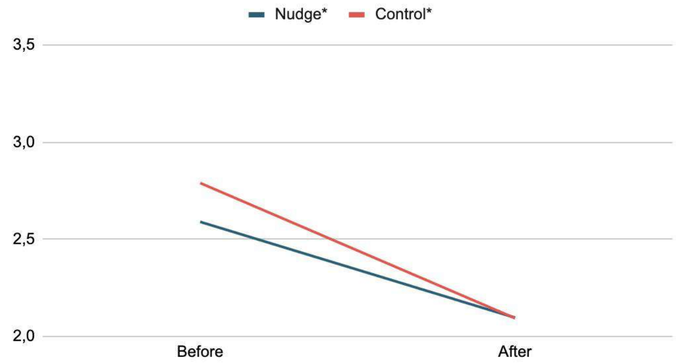
Scale: 1-5; *Significance < .005

Reduced likelihood of not consuming leftovers



Scale: 1-5; *Significance < .005

Reduced likelihood of failing to use food products bought on special offer



Scale: 1-5; *Significance < .005

Reduction in throwing away all food categories

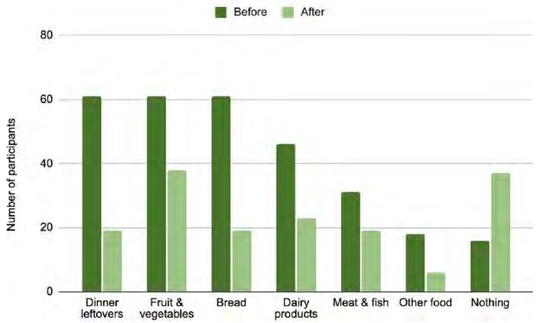
The food categories most often chosen were also those most often thrown away. These were dinner leftovers, fruit and vegetables, and bread. This coincides with the product groups that are most often thrown away in Norway. It is therefore natural to assume that these have the greatest potential for waste reduction.

The results showed a reduction in throwing away all food categories (including dairy products, fish and meat), but the greatest reduction was for the categories chosen most often.

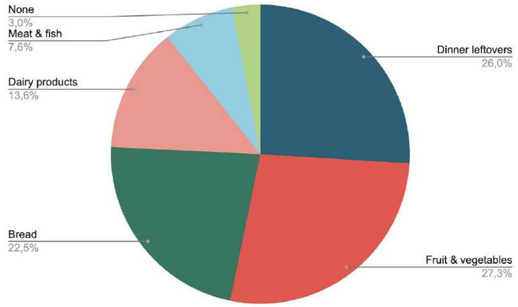
On average, all participants threw away 1.9 of the five food categories at the start, and only 1.3 at the end of the challenge. The changes are significant ($t(230) = 7.04$, $p < 0.001$).

📚 Hohle, S. M., Stensgård, A. E., 2024. Food waste in Norwegian households – Updated food waste figures and consumer surveys, with recommendations for the way forward. NORSUS. Report No.: OR.28.24

Significant reduction in throwing away food in all categories



Distribution of food categories chosen by the participants



Increased use of strategies to avoid throwing away food

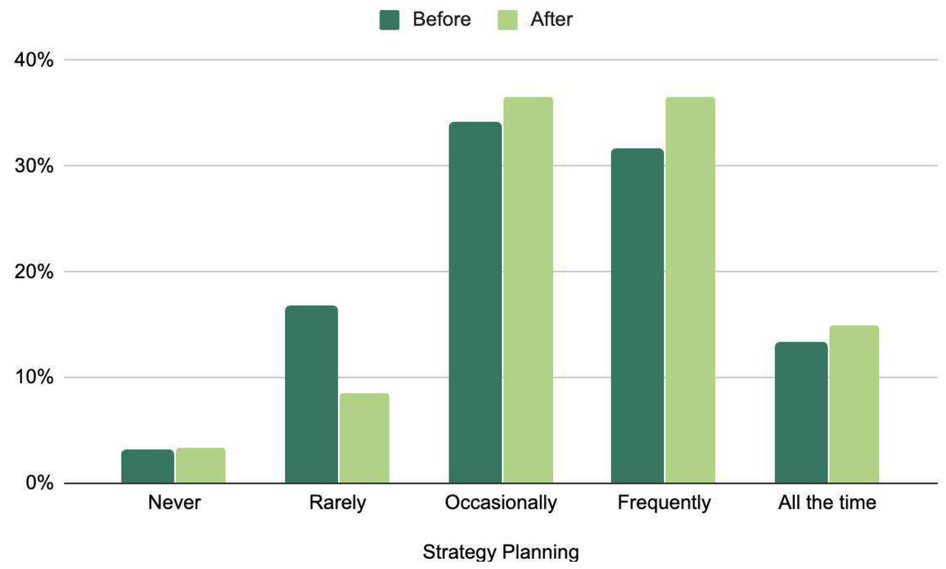
All the participants were asked how often they used the following strategies to avoid throwing away food:

1. Planning meals for the week.
2. Checking what food products were in the fridge etc. before going shopping, to avoid buying unnecessary products.
3. Using a shopping list to avoid buying too much food.
4. Freezing leftovers and/or food about to go out of date.
5. Preparing meals using leftovers.

The results from the year's survey of food waste in Norwegian households indicate that for the vast majority of participants it is difficult to avoid creating leftovers, and that helping people to have a Plan B for leftovers is of great significance for managing to reduce food waste. The survey showed that those participants who stated that they threw away a lot were far less frequent users of strategies to avoid throwing away food compared with those who stated that they threw away a small amount of food.

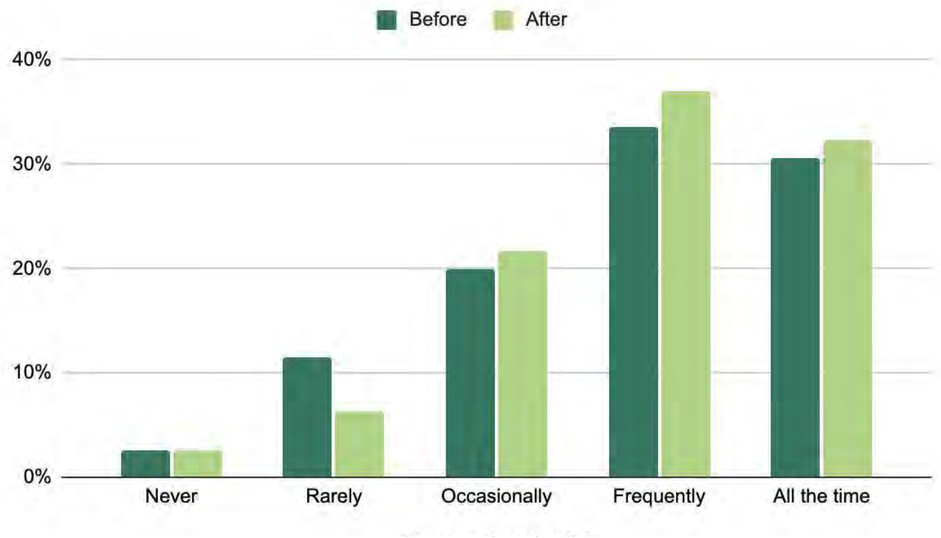
Therefore, the results – that both the participants in the nudge group and in the control group stated that they utilised an increased number of strategies after participation in the challenge (significant difference) – are very promising.

More participants plan meals for the week as a strategy for avoiding throwing away food

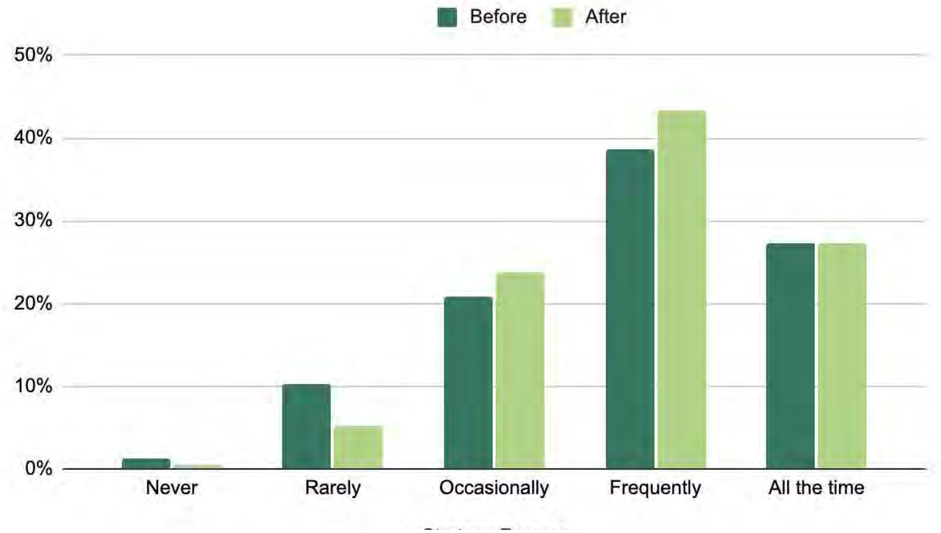


Increased use of strategies to avoid throwing away food

More participants use a shopping list as a strategy for avoiding throwing away food

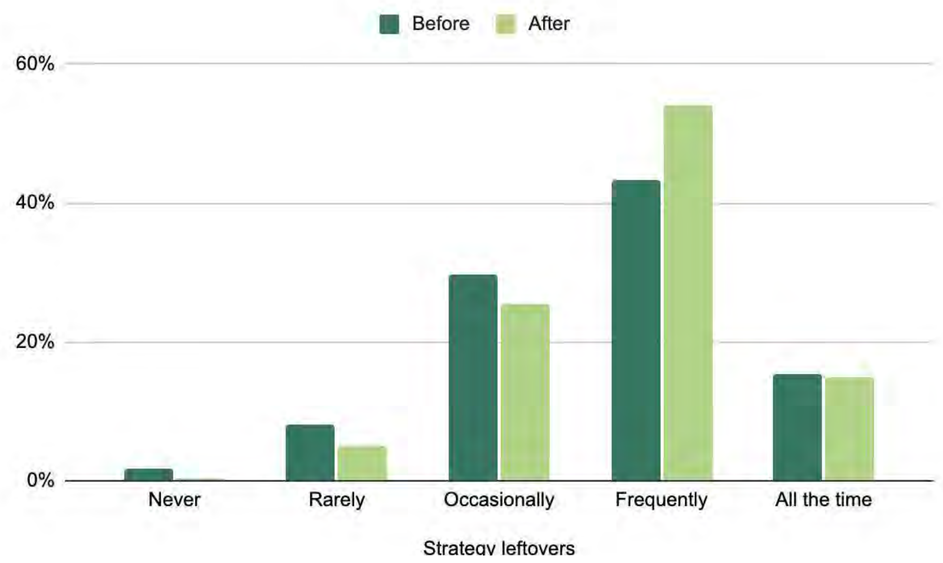


More participants freeze leftovers as a strategy for avoiding throwing away food

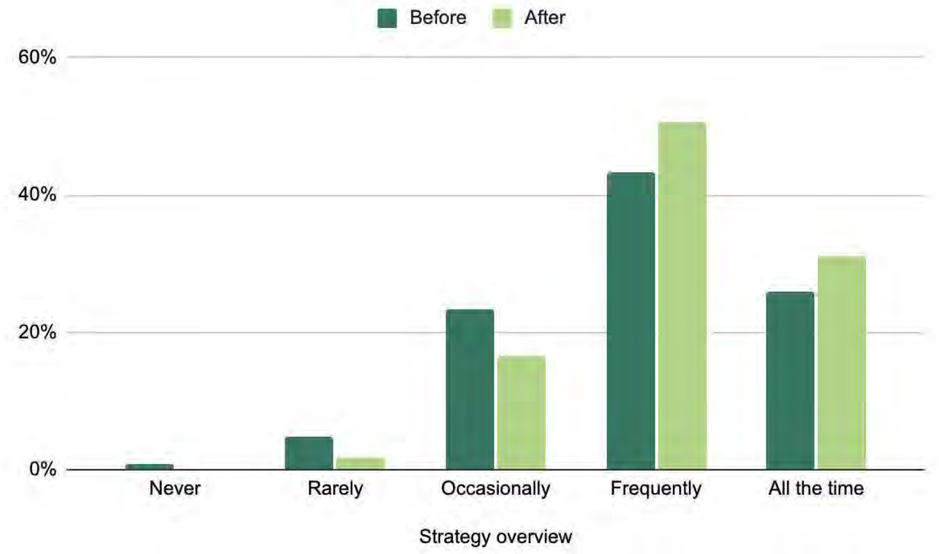


Increased use of strategies to avoid throwing away food

More participants prepare meals using leftovers as a strategy for avoiding throwing away food



More participants check to see which food products are in the fridge before going shopping as a strategy for avoiding throwing away food



Other members of the household became involved in the challenge

9 in 10

involved other household members in the Matvett Challenge.

It can often be easier to make changes together with others. The participants were recommended to tell their family and friends about the challenge in order to have an accountability partner. This is important to support each other, encourage and motivate.

Of the participants who lived together with someone else (about 76%), around 9 in 10 reported that others in their household helped them to throw away less food.

Most participants threw away less other food in addition to the food categories they had chosen

The spillover effect involves a change in one type of behaviour leading to changes in another related behaviour. This can occur in many areas, including health, environmental and social behaviour. Therefore, one hypothesis was that choosing certain food categories may also result in throwing away less other food.

The results confirmed the hypothesis. As many as 3 in 4 participants reported that they threw away less other food in addition to the three categories they had chosen. This indicates that even though the participants only chose three specific food categories to begin with, increased awareness was created that led to a reduction in throwing away food products that they initially were not focusing on.

It may be perceived as a limitation to not ask people to reduce their food waste overall, but as the results show, succeeding with a specific type of behavioural change can have a positive spillover effect.

📚 Dolan, P., & Galizzi, M. M., 2015. Like ripples on a pond: Behavioral spillovers and their implications for research and policy. Journal of Economic Psychology, 47, 1–16; Locke and Latham, 1981. A Theory of Goal Setting & Task Performance.

3 of 4

participants reported that they threw away less other food in addition to the three categories they had chosen.

Changes in attitudes and self-regulation

Increased awareness of own food waste

The results showed increased awareness of own food waste after participating in the challenge. The change was significant for both groups ($t(230) = -5{,}697$, $p < 0.001$).

It is particularly interesting that all the participants reported that they became significantly more aware of how much food they threw away in the household and that this is the issue that drives the changes most. However, the scores also showed that they became more aware of the environmental consequences and that they saved money by not throwing away food. This can contribute to increased motivation for continuing new habits.

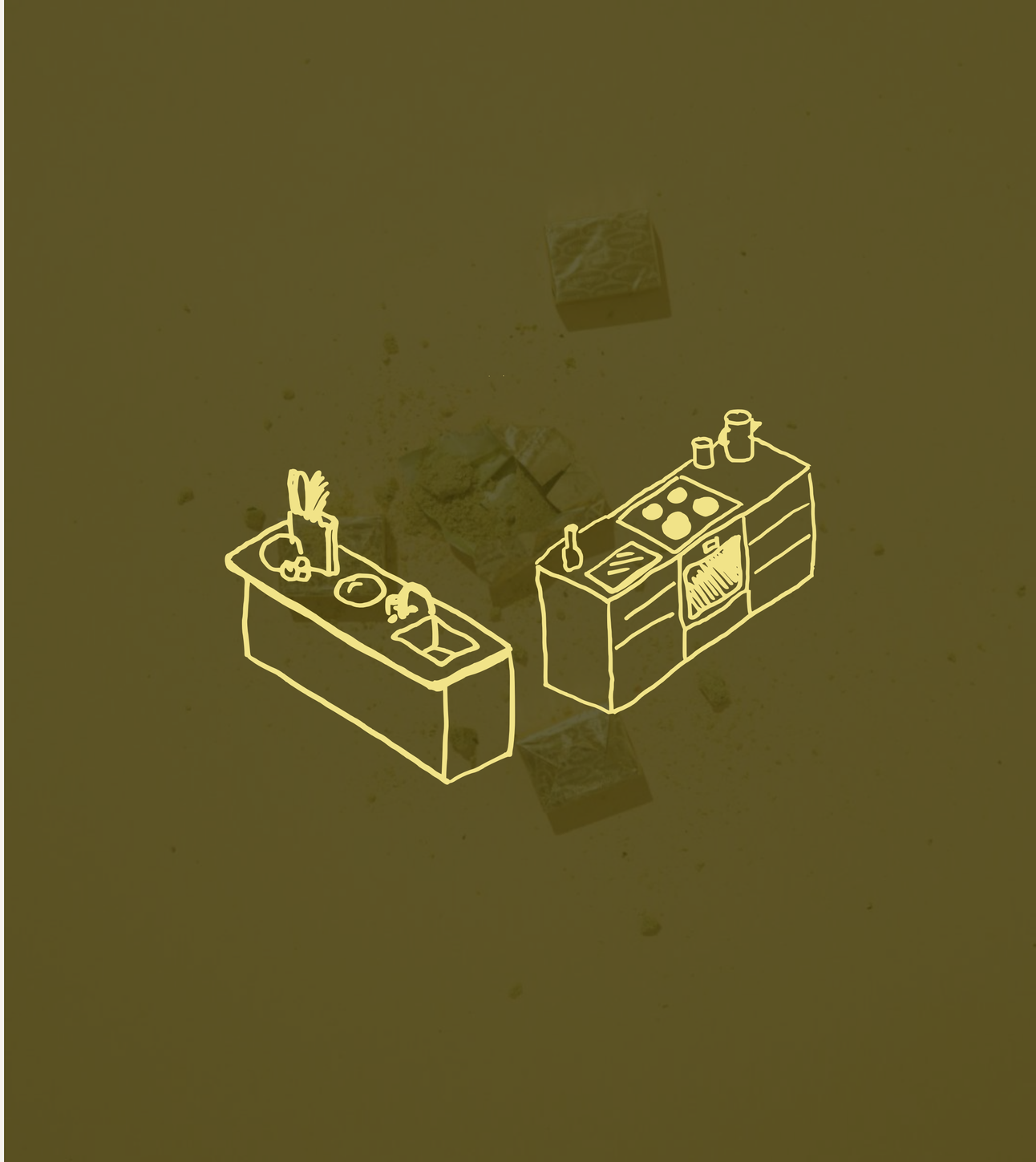
Positive changes in attitudes

The results also showed a small significant positive change in attitudes ($t(230) = -2{,}808$, $p < 0.005$). However, only those in the nudge group showed a change in attitudes. This indicates that daily reminders (the nudge interventions) were what contributed most to the change in attitude.

Achieving a change in attitude in eight weeks is a really interesting finding. It can be linked to cognitive dissonance, which proposes that when a person's actions do not correspond with their attitudes, it creates an inner conflict (dissonance). To reduce this dissonance, the person will often justify their attitudes in accordance with their actions.

In practice, this means that when the participants reduced their own food waste, it may have contributed to them changing their attitudes in order to make them more in line with what they were actually doing (throwing away less food). This can often be more effective than trying to influence attitudes directly, as actions are often easier to change than attitudes. It is simply more specific than managing to change established thought patterns.

📚 Leo Festinger, 1957. A Theory of Cognitive Dissonance. Maio, G. R., Haddock, G., & Verplanken, B., 2019. The Psychology of Attitudes and Attitude Change (2nd ed.). London: SAGE Publications.



Increased self-efficacy and increased use of plans

Many studies have shown that higher self-efficacy and planning predicts behavioural change. Believing that you can reach the goal you have set yourself has a major influence on whether you actually succeed.

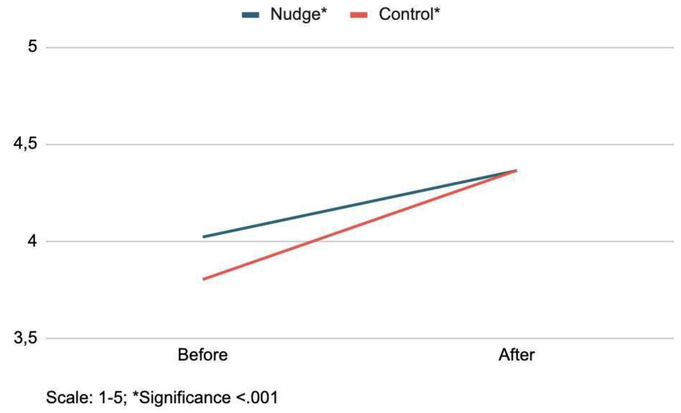
The results show that the participants' self-efficacy increased significantly in both groups ($t(230) = -7.605$, $p < 0.001$). Over the eight weeks, the participants also developed a number of plans as to how they could avoid throwing away the food categories they had chosen, as well as plans for managing difficult situations, such as when there was a lack of time and when staying in a holiday home or cabin.

In connection with planning, it is particularly interesting to see that creating plans for what you will do if you meet obstacles was something the participants did significantly more after participating in the challenge ($t(230) = -5.53$, $p < 0.001$).

This shows how important it is to have plans for both how to change your behaviour and what you will do if something prevents you from making the changes you have decided to make. This is in line with the findings from this year's consumer survey, which showed that those people who throw away the least food often have a Plan B for leftovers.

Hohle, S. M., Stensgård, A. E., 2024. Food waste in Norwegian households – Updated food waste figures and consumer surveys, with recommendations for the way forward. NORSUS. Report No.: OR.28.24; Bandura, 1977. Self-efficacy: Toward a Unifying Theory of Behavioral Change; Michaelsen & Esch, 2023. Understanding health behavior change by motivation and reward mechanisms: a review of the literature.

Increased belief that it is possible to reduce your own food waste



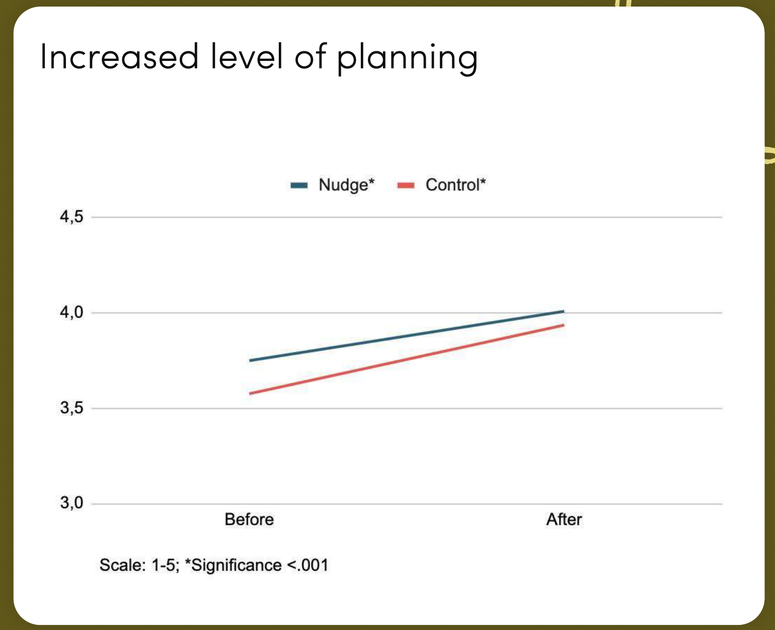
Scale: 1-5; *Significance <.001

Specific goals and concrete plans result in behavioural change

The effect of creating so-called implementation intentions is known from research into health behaviour change, and the results from the Matvett Challenge show that it also works when the goal is to reduce food waste.

The fact that the participants in the control group also had higher self-efficacy and created more plans after eight weeks shows that something as simple as asking people to choose a specific goal and giving them a “recipe” of how to achieve it can contribute towards more people actually managing to throw away less food.

Naturally, there is a certain risk that answering the questionnaires is in itself the factor that has had the greatest effect on the control group. However, based on the results it is clearly relevant to test how the use of implementation intentions (i.e. choosing specific food categories that you want to stop throwing away) can contribute to achieving the desired effect in the population in general.



Higher degree of self-monitoring

Action control consists of three components: efforts, standards and self-monitoring. The results show significant differences between the control group and the nudge group for self-monitoring, where the participants in the nudge group monitored their own behaviour to the highest degree ($t(233) = 3{,}298$, $p < 0.001$). There was no difference between the groups for efforts and standards.

The results indicate that the daily reminders and weekly motivational messages contributed to the members of the nudge group becoming more aware of their own behaviour compared with those in the control group, who did not receive such follow-up during the process.

Research shows that self-monitoring – continually observing and evaluating own actions in relation to a desired goal – is a key component of behavioural change, partly because it helps to identify deviations and thereby makes it possible to adjust behaviour during the process in accordance with what a person wishes to achieve. It is a question of managing to connect goals with actions, where self-monitoring reduces the distance between the goal and the actual action, which is important in order to reduce the effects of the intention–behaviour gap.

Schwarzer, R., 2008. Modeling Health Behavior Change: How to Predict and Modify the Adoption and Maintenance of Health Behaviors; Lally, P., & Gardner, B., 2013. Promoting habit formation. Health Psychology Review, 7(sup1), S137–S158. Carver & Scheier, 1982; Michie et al., 2009.

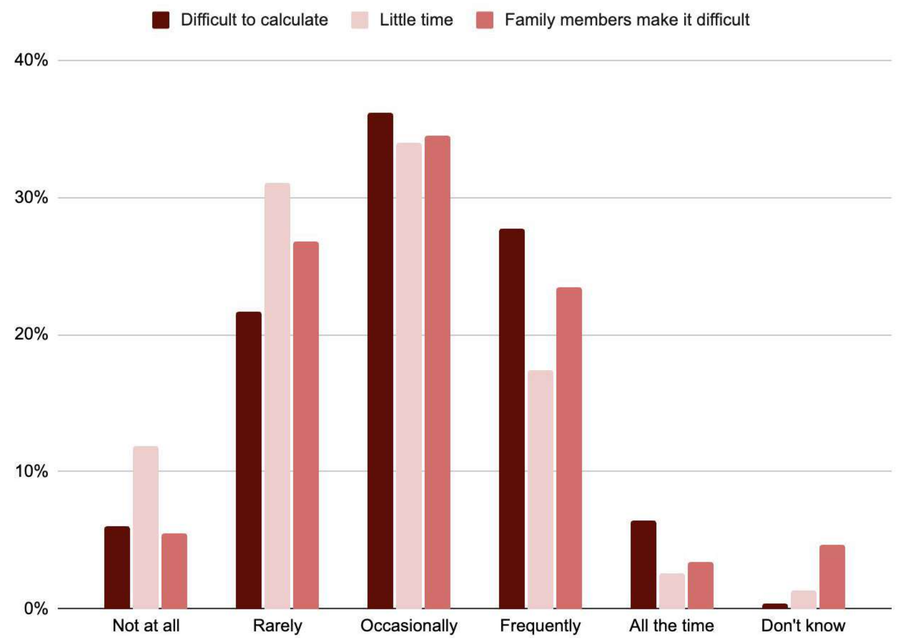
Barriers

Additional barriers were identified

After the Matvett Challenge finished, the participants were asked an open question about which barriers made it difficult to reduce food waste. In addition to the most common barriers (difficult to work out the right amount of food; family members, often children, who do not finish their food or who are fussy eaters; a busy day), the majority of participants also mentioned other barriers they experienced:

- Some food products spoil quickly or are difficult to store.
- The quality of food quickly decreases when it is stored.
- Unforeseen circumstances, like having to suddenly travel away or receiving an unexpected visit or a dinner invitation.
- Difficult to keep an overview of the food you have.
- Difficult to come up with creative solutions as to how to combine leftovers or food products.

Overview of how often the participants experienced typical barriers that made it difficult to avoid throwing away food



Unforeseen events constantly happen, meaning that we have to throw away food.

– Participant

Leftover vegetables quickly become unusable.

– Participant

When we have leftovers from different meals that cannot be combined, it’s more difficult to eat them.

– Participant

The participants’ experience of being part of the Matvett Challenge

Participants' experience of taking part in the Matvett Challenge

"Positive weeks, thinking actively about it makes me more proactive. I'm trying to be more proactive, but I think shopping from time to time makes it difficult. Larger quantities and long-term planning."

Kjell, 51 år

"I've become more conscious of not throwing away food, and I'm making more of an effort not to."

Peter, 33 år

"I've become more aware. It's good to have someone pushing me."

Caroline, 60 år

"I've become more aware of what I throw away, and it's helped me to make proper-sized portions. I divide up dinners and freeze them into portions, or store them in the fridge and eat them for dinner the following day."

Emma, 32 år

"I had to start somewhere, so I focused on dinner leftovers and things for dinner, which are the things we were throwing away most. It's going much better now, and we're prioritising eating up leftovers when we have enough of them instead of buying and making something new."

Jan, 35 år

"I've become more aware of the menu for the week – what can be used the following day, using up leftovers, and not making a new dinner every day. Not taking out loads of bread, not buying loads of fruit and vegetables, but instead buying vegetables and fruit every other day rather than once a week."

Eva, 42 år

"I haven't thrown ANY food away, and I'm really pleased about that."

Anine, 20 år

Participants' experience of taking part in the Matvett Challenge

"I've really focused on not throwing away anything, and I've managed to not throw away food. I'm proud of myself."

Henrik, 62 år

"I've got better at not throwing away bread – both at taking less bread out of the freezer, and also at making croutons from stale bread. Everyone has got better at eating up dinner leftovers on another day. It's still a bit difficult to work out how much dinner to make, when there's a big variation in how many of us there will be for dinner from day to day."

Tanja, 52 år

"I've become more aware. In the past, I didn't throw away much, but it's good to think about it every day. I clear out the fridge every Monday, and then I make dinner from the leftovers – pie, soup or salad."

Kari, 72 år

"I've become more aware of what I have and what I use. It's become a bit of a sport 😊 and it's actually been really fun. I've collected vegetable peelings in the freezer and tried to make vegetable stock, which was really good. It was a really good challenge and made me much more aware."

Anne Karin, 64 år

"I've become more aware of what and how much I throw away. I've always thought it was a shame to throw away food and have been reasonably aware of it, but even more so now over these last few weeks. It's almost become a competition with myself, managing to avoid throwing away food. I think I'll continue this challenge and carry on being just as, if not more, aware of what gets thrown away."

Anita, 43 år

"Yeah, it's easier to think about using food products and not buying too much in 😀"

Børge, 61 år

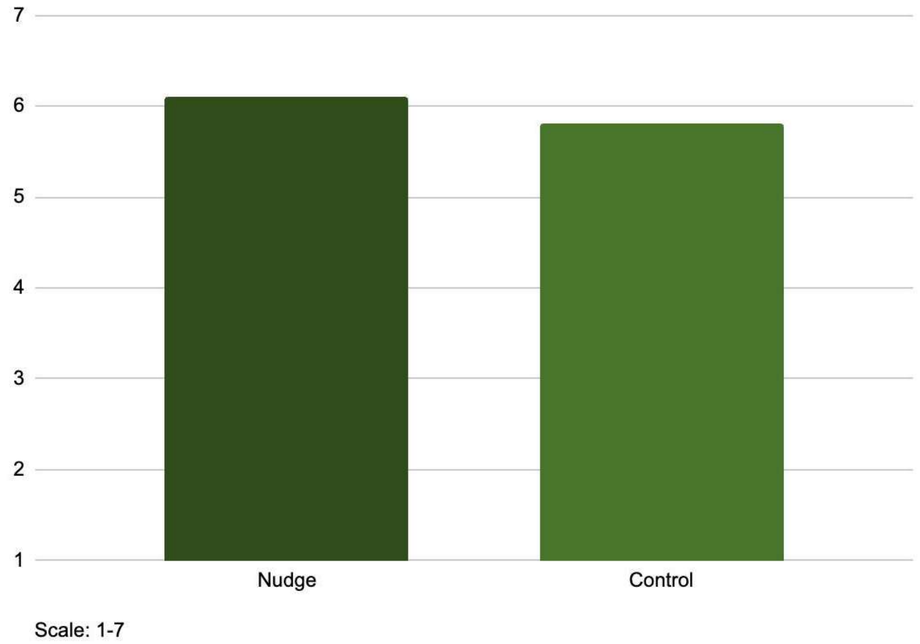
Satisfaction with own efforts

After the challenge had ended, all the participants were asked: “How satisfied are you with your own efforts to not throw away the food categories you chose (on a scale from 1 = Very dissatisfied to 7 = Very satisfied)?”

The results showed that the participants in the nudge group were more satisfied (6.1) than the participants in the control group (5.8), but overall they were very satisfied with their own efforts.

The difference may relate to the nudge interventions – those participants in the nudge group were followed up through the process and, as a result, may have had greater success. Alternatively, another theory could be that they are more satisfied because they have invested more in the challenge.

The participants in both groups are highly satisfied with their own efforts



Limitations

Possible limitations of the experiment

One limitation of the experiment is that the sample comprised around 70% women. However, according to figures from Statistics Norway, women still have the main responsibility for making food in the home, which may explain this skewed distribution.

Another limitation is that the data is based on self-reporting. The optimum solution would have been for the participants to have weighed and taken photos of their own food waste, but this was considered to be too great an encroachment on the participants' everyday life, leading to few people wanting to take part in the challenge and resulting in a dropout rate that was too high.

A dropout analysis shows that 22% of the participants in the nudge group and 24% in the control group dropped out during the process. Whether this has affected the representativeness is uncertain, but a dropout rate of around 20% in an experiment is considered to be moderate and is acceptable in the given context.

The experiment lasted for eight weeks and this period was therefore too short to indicate anything about lasting effects. However, in order to determine whether the positive changes the participants reported prove to have any long-term effects, all the participants have been asked whether they would be prepared to complete another survey in six months' time.

Daily text messages (albeit not at weekends) for logging behaviour may have been a little too often for some of the participants. A couple of feedback messages were received stating that the time that they received the messages was not convenient.

🔗 H.S.Arnesen SSB analysis 2023/7 Arbeidsdeling i hjemmet: Er likestilte par mer fornøyde?

Risks of using questionnaires

Validity and reliability are vital to ensure that questionnaires provide meaningful and reliable data. High validity and reliability contributes to increased quality and trust in the results provided by questionnaires. The use of questionnaires always involves some form of risk, and it is important to be aware of and work to reduce such risk. This was key to the project and particularly concerned:

- **Self-report bias** – respondents answering the way they believe is socially acceptable or that presents them in the best possible light.
- **Misunderstandings** – respondents misunderstanding the questions, leading to inaccurate answers.
- **Selection bias** – the possibility that those who choose to answer may have different characteristics to those who do not answer, which can create skewed results because those answering are not representative of the target group.

To reduce the risk of misunderstandings and bias, valid scales were used, as well as thorough reviews and assessments of both the wording and the order of the questions on the questionnaires.

Recommendations

Recommendations – How to achieve a national reduction in food waste in households

In order to achieve significant and long-term reduction in food waste among Norwegian households, a number of measures and strategies are recommended. The results of the Matvett Challenge show that nudging is an effective method of creating increased awareness of your own food waste and achieving actual behavioural change. It is gratifying that even those who participated in the control group changed their habits and reduced their food waste. This means that it is fully possible to achieve good results in households by utilising the various strategies used in the Matvett Challenge.

Nevertheless, a national rollout requires a dedicated strategy and adapted measures, as it will not be possible to scale up this project in the same format.

There now follow some thoughts on how such an upscaling could be set up and implemented. This is merely a proposal and cannot be seen as a detailed plan.

Overview of recommendations

1. Establishing a national intervention programme
2. Collaborating with the local-government sector
3. Using existing digital platforms
4. Using specific short-term goals
5. Implementing awareness campaign(s)

1

Establishing a national intervention programme

The programme should build on the success of the Matvett Challenge and encourage all households to choose specific food categories they want to throw away less of. The goal is to engage the entire population through making the measures simple, relevant and implementable. The intervention programme should be adapted to different groups in the population (age, language, culture etc.).

It is about making everyone aware of their own food waste by starting with something as simple as just a single food category, as well as giving them good planning tools and tips as to how they can monitor their own behaviour.

Below are suggestions as to how various actors and platforms can be involved to make such a national approach to upscaling possible.

2

Collaborating with the local government sector

The municipalities and the Association of Local and Regional Authorities (KS) should be key partners in the work of creating a national strategy. The involvement of the municipalities will be crucial in reaching residents – for example, in collaboration with waste collection companies, green certification schemes or sustainability projects in schools or individual municipalities.

It will also be particularly important in order to be able to communicate with residents through direct and accurate channels.

If possible, providing feedback to each municipality's residents on the reduction in food waste based on objective data (waste collection data) would be an optimal solution. Implementing a variant of the Matvett Challenge, utilising self-reporting in addition to surveys, would also be relevant.

3

Using existing digital platforms

In addition to collaboration with the local government sector, the intervention programme should establish collaboration with supermarket chains. Their loyalty programmes/apps could offer a standardised scheme with rewards in the form of bonus points, without extensive adaptations – for example, by sending reminders, offering challenges, creating a community etc. with the goal of reducing food waste in households.

Visible messages in supermarkets could also work, as they could function as simple and regular reminders at the point of sale. It is important for Matvett to maintain a unified message. Therefore, it is vital to find common solutions as to how changes can be implemented across the supermarket chains, at the same time as the chains can put their own twist on the marketing material.

In the same way, hotel chains could use their benefit programmes to create awareness and engagement by inviting their members to participate in their own schemes and awarding bonus points for reducing food waste.

Canteen operators could also direct similar campaigns towards employees in collaboration with the owner companies.

Student welfare organisations are relevant collaboration partners to reach young people running their own households for the first time, who often lack knowledge about how to look after food and have limited storage options etc.

4

Using specific short-term goals

To reinforce the effort and ensure that households sense the urgency of the goals set for reducing food waste, it is recommended that specific goals be set at both individual and municipal level. For example: “30% reduction in food waste in Asker municipality by the end of 2025” – and, ideally, what that would mean for each individual resident of Asker municipality.

Specific short-term goals create a greater sense of responsibility, which is more motivating, thereby increasing the chance of success. The results from the Matvett Challenge show that the vast majority of participants involved other people in the challenge, and they also threw away less food in food categories other than those they had chosen. This indicates that if a person starts to focus on a target group and only one food category, there is a great likelihood of a substantial ripple effect.

5

Implementing awareness campaign(s)

Launching various measures in the intervention programme should be supported by a national campaign focusing on engaging various relevant target groups, both people in general and smaller groups.

The various relevant arenas are:

- Collaboration with municipalities and waste collection companies
- School campaigns in connection with sustainability projects etc.
- Campaigns in housing associations and through student welfare organisations
- Supermarket and hotel chain loyalty programmes
- Collaboration with canteen operators and the owner companies
- Collaboration with large organisations that have a focus on sustainability with their employees

The campaign(s) should include PR work and facilitate regular newsflashes based on the results from the feedback systems.

The Matvett Challenge

What do the participants' food waste habits look like **six months** on?

Results

About the follow-up survey

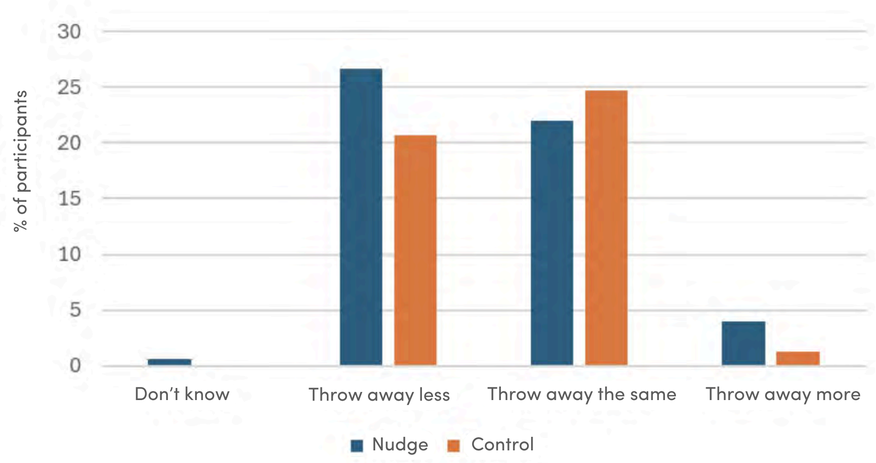
The Matvett Challenge delivered a number of positive changes: participants were less likely to throw away food, adopted more food waste-reducing strategies, felt more confident and became more aware of how much food they were throwing away.

If Norway is to reach its target of halving food waste by 2030, it is vital that interventions have a lasting effect. With this in mind, we set out to see if participants had maintained their new food waste habits after the challenge. After about six months, we checked back with all participants who had agreed to be contacted, to evaluate any behaviour changes over time.

A total of 150 out of 231 participants (nudge group = 80, control group = 70) responded to the follow-up survey, which represents a response rate of 64.9 %.

Most respondents were women (70 %), the average age was 46.5, and all Norwegian counties were still represented, suggesting the follow-up sample closely reflects the original.

Participants are still throwing away less food after the challenge



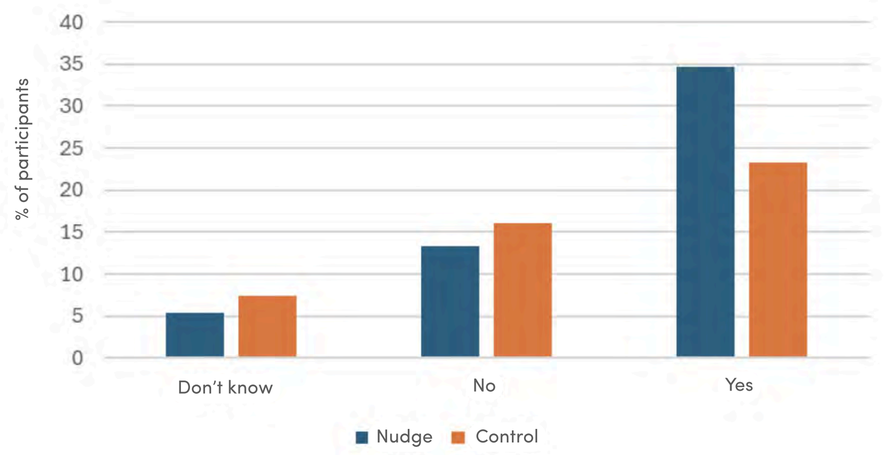
Are participants throwing away less, the same amount or more food than at the end of the challenge?

Overall, roughly half of the participants (47.3 %) are now throwing away less of the selected food types than they were at the end of the challenge, while nearly as many (46.7 %) are throwing away about the same amount.

There was no statistically significant difference between the nudge and control groups. However, as the figure shows, a larger share of the nudge group now report throwing away less food than they did during the challenge. Fewer than 10 % of the participants have reverted to their old food-waste habits.

This also means that the majority of the participants are still throwing away less food – and many are now throwing away even less than at the end of the challenge.

Participants are now throwing away less food – and not just the food types they initially chose



Are participants still throwing away less food after the challenge – beyond the three categories selected?

The figure shows that more than half (58 %) are also wasting less of other foods – not just the items targeted during the challenge.

This suggests that although participants focused on three food types during the intervention, their participation led to broader, longer-term reductions in overall food waste beyond these initial categories.

This means that the spillover effect (i.e. that changing one type of behaviour leads to changes in another, related behaviour) has generally had a lasting effect. This in turn suggests that asking people to focus on one or a few foods to stop throwing away over time can lead them to waste less food generally.

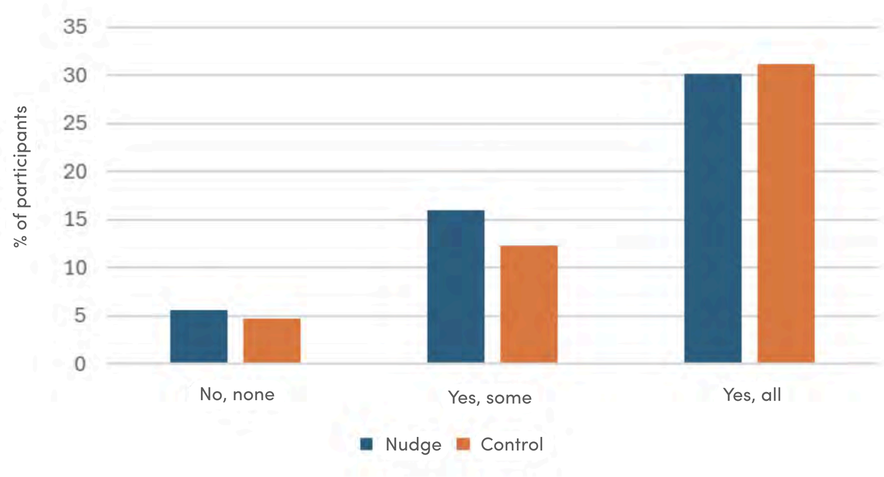
Involvement of other household members has continued

A very high share of participants who live with others (89.6%, N = 106) say fellow household members help reduce food waste.

Motivational theories highlight relatedness as a basic psychological need. Feeling connected to others and working towards a common goal can boost intrinsic motivation, which is crucial for sustaining behavioural change. Feeling supported at home and pursuing common goals can strengthen responsibility and commitment to cutting food waste.

In a community working towards the same goal, mutual support and reminders can reinforce efforts, narrow the gap between intention and action, and increase the likelihood of lasting behaviour change. This is called having an “accountability partner” – a person with whom you share goals and responsibilities.

📚 Self-Determination Theory, Ryan & Deci, 2000



Are other household members still helping participants to cut food waste after the challenge?

Small decrease in self-regulation over time

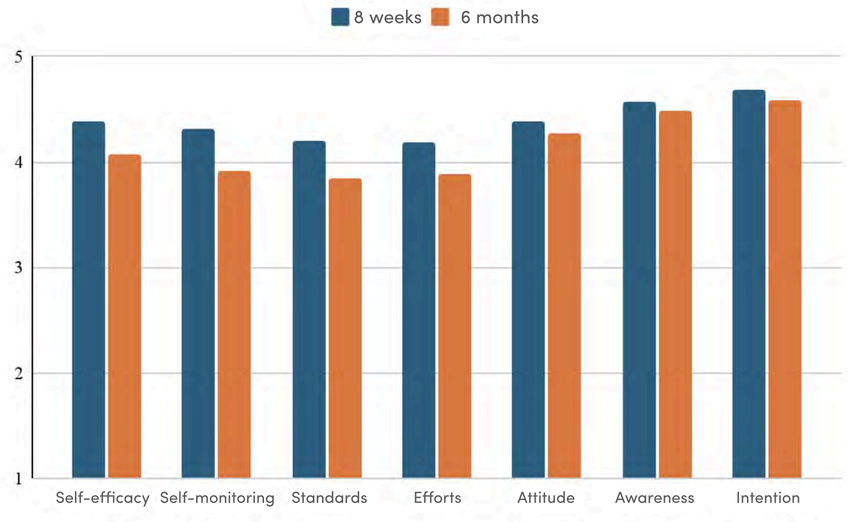
On follow-up, there was a slight decrease in self-regulation – defined as self-efficacy, standards, efforts, and self-monitoring (action control) – with no differences between groups (see figure).

Self-regulation may tail off after an intervention ends. Lasting behavioural change depends on people's ability to sustain self-regulation. Some may relapse once the intervention ends (with less support around them), while others may develop habits that require less self-regulation. The decrease six months after the Matvett Challenge therefore reflects a realistic appraisal of the participants' own behaviour over time.

It is encouraging that the overall level remains high, suggesting the gains made during the challenge have largely been sustained. Participants still believe they can avoid food waste, track their behaviour, stick to the standards they have set and make a deliberate effort to sustain their new food habits. This indicates that the intervention has had an effect.

When it comes to awareness and intention to waste less food, the results show no change over time. This suggests the challenge has had a lasting impact on participants' attitudes, and that their intention to reduce their own food waste remains very high.

📚 Galla, B. M., & Duckworth, A. L. (2015). More Than Resisting Temptation: Beneficial Habits Mediate the Relationship Between Self-Control and Positive Life Outcomes. J Pers Soc Psychol, 109(3), 508-525.



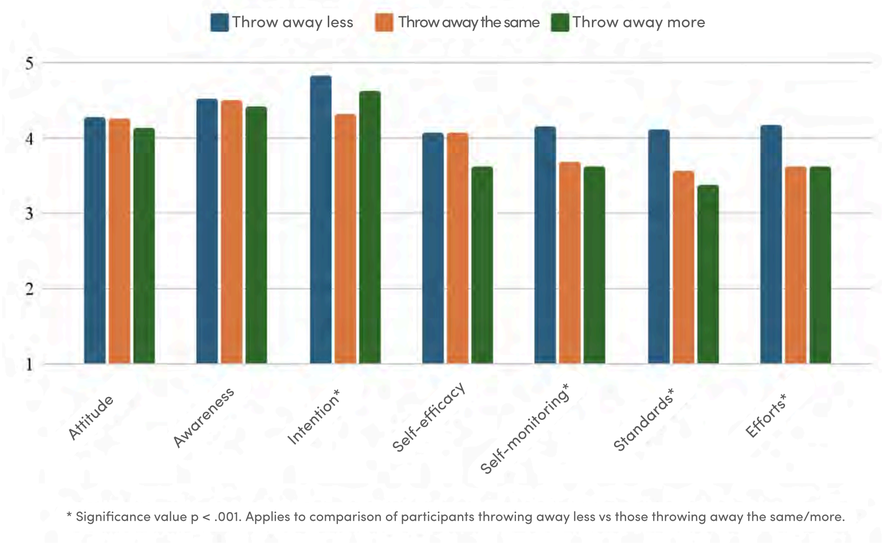
Changes in self-regulation, attitudes, awareness and intentions from immediately after the challenge to six months later

Those who waste the least are also the most aware of their own food-waste behaviour

Participants who reported wasting less food six months after the intervention maintained higher scores for self-regulation factors, such as action control, standards, efforts and self-monitoring. By contrast, those reporting no change or increased waste showed a sharper decline in these variables. These differences are significant and suggest that lasting behaviour change is linked to the capacity to regulate one's own behaviour over time. This, in turn, suggests these participants not only intended to change their behaviour, but also more extensively used strategies to act on that intention.

Self-regulation involves being able to pursue one's goals over time despite everyday challenges, temptations and ingrained habits. Those who succeed in reducing food waste appear to have developed or maintained structure around their behaviour – for example, by monitoring consumption, setting clear standards for what to throw away and committing the necessary effort. This is consistent with behaviour-change theory, which holds that lasting change requires more than awareness and the right attitude – it also demands specific skills and tools to translate intentions into action, consistently over time.

Participants who were less able to sustain change showed the sharpest decreases in self-regulation. This aligns with prior research that finds behaviour-change effects often fade once supporting structures are removed.



Difference in self-regulation scores between those throwing away less food after six months and those throwing away more or the same amount of food

Those throwing away the least also report using more waste-prevention strategies

The results also showed that those who reduced their food waste the most generally report being less likely to throw away food, as well as using more strategies to prevent food waste. These strategies are: plan, freeze food, use a shopping list, eat leftovers and check what food you have before you go shopping.

This suggests the challenge had a lasting impact by strengthening participants' strategic skills and everyday habits around food waste. The most successful seem to have adopted specific measures – meal planning, shopping lists and eating leftovers – that can become ingrained daily habits.

This is consistent with self-regulation and implementation-intention theory, which shows that adopting specific action plans increases the likelihood that intentions are translated into practice. Repeated use of these strategies can turn them into habits, reducing reliance on willpower and increasing the likelihood of sustained behaviour change.

The role of self-regulation in food-waste behaviour

To test whether self-regulation predicts changes in food-waste behaviour over time, we ran a logistic regression within the Health Action Process Approach (HAPA) framework. We measured self-monitoring and action control (efforts and standards) from the end of the challenge (T2).

Taken together, these self-regulation factors separate participants who, six months on, reported throwing away less food from those reporting that they were throwing away the same amount or more food. The overall model was statistically significant, $\chi^2(3) = 19.58$, $p < .001$. Among the individual factors, effort to achieve one's own goals, in particular, predicted lasting behaviour change*. This means that a participant reporting high effort (e.g. 4.5 on a scale of 1–5) was 2.37 times as likely to be throwing away less food six months later than a participant making a moderate effort (e.g. 3.5).

In short, higher effort at the end of the challenge significantly increased the likelihood of sustaining the new behaviour six months later. This suggests that an early intervention is a strong predictor of lasting change. It also underlines the need to support self-regulation – efforts, follow-up and specific goals – early in the change process to increase the likelihood of sustained behaviour change.

* The analysis was conducted based on the entire sample. "Throws away the same or more" are combined into one group (coded = 0, "Throws away less" = 1). Each one-unit increase in effort at T2 increased the likelihood of reporting throwing away less food six months later by a factor of 2.37 (95% CI [1.27, 4.44]), given the model controls.

Social support helps people reduce their food waste in the long run

Many of the 106 participants living with others reported that social support from household members helped them reduce food waste. When we investigated whether social support affected the participants' behaviour, we found that higher social support correlated with stronger self-regulation, which was in turn linked to less waste. In other words, when participants felt supported at home, they:

- put more effort into reducing food waste **(efforts)***
- kept better track of their own food waste **(self-monitoring)***
- kept closer track of whether they were achieving their own goals **(standards)***

This suggests that social support does not change behaviour directly; rather, it strengthens the psychological skills that make successful change more likely. Social support therefore serves as an important catalyst for developing and sustaining new habits.

*Efforts: (b = 0.46, p < .05, 95% CI [0.14, 0.96]); Self-monitoring: (b = 0.50, p < .05, 95% CI [0.17, 1.01]); Standards: (b = 0.67, p < .05, 95% CI [0.31, 1.17]).

Summary of results of the follow-up survey

- **Spillover effect** – More than half are still throwing away less of other food types, in addition to the ones they chose during the challenge, indicating a lasting positive effect.
- **Social support** – A high percentage of participants living with others reported that other household members help them to reduce food waste. Such support helps strengthen self-regulation, which in turn leads to less food waste.
- **Self-regulation** – There was a slight drop in self-regulation after six months, but the overall level remains high, suggesting a lasting effect of the increase during the challenge. Those who reduced their food waste maintained higher self-regulation scores.
- **Awareness and intention** – Awareness and intention to waste less food show no change over time, indicating a lasting effect on participants' attitudes.
- **Use of strategies** – Participants who have further reduced food waste report a lower likelihood of throwing food away and use more strategies to achieve their targets.
- **Effort predicts lasting change** – Higher effort to achieve the food waste reduction target towards the end of the challenge predicted sustained behaviour change six months later.

Lasting effect on food waste – About half of the participants reported that they are throwing away less food now than when the challenge ended, and almost as many are throwing away about the same amount. Fewer than 10 % have reverted to their old habits.

Recommendations based on the follow-up survey

The number of nudges can be reduced without compromising the effect

- We still recommend testing a single weekly reminder or message to help maintain engagement and progress; however, the evidence suggests the intervention can be effective even without weekly messages.

Consider extending the duration of the trial period

- Longer durations may give participants more time to establish and reinforce new habits.

Exploit the spillover effect

- Start with clearly defined, limited goals: Encourage households to reduce waste for specific food types.
- Motivate extension of trial periods. When ready, encourage extending these learnings to more foods.

Strengthen self-regulation

- Focus on practical skills. Develop measures that teach specific strategies for avoiding food waste (e.g. planning, freezing, eating leftover meals).
- Promote self-efficacy. Provide tools that boost confidence in reducing food waste.
- Encourage efforts and self-monitoring. Encourage early and sustained efforts, and enable people to monitor their own food waste.

Involve others

- Encourage participants to involve others. The findings show that social support has a positive effect in the form of increased self-regulation. Measures that encourage joint efforts can enhance this effect.
- Develop different types of communities for people living on their own. People who live alone often throw away more food, and can benefit from initiatives such as virtual communities/chat groups where they can share experiences and provide mutual support.

Maintain awareness and intention

- Continuous information work. Maintain ongoing campaigns and communications that keep food waste on the agenda – at both individual and community level (municipalities, counties etc.).
- Facilitate seamless communication. Use nudging and formulate messages in an accessible and engaging way.

Prevent relapses

- Boosters for self-regulation. Develop measures that can “reactivate” efforts and self-monitoring if motivation wanes.
- Motivate as you go. A communication process designed to help participants sustain their commitment throughout the process.

nudgelab in collaboration with **Matvett.**

Norsus has contributed to the work and **Opinion** has been responsible for recruiting the two committees.

Photo by **Colin Eick** (taken from Matvett's Brukopp encyclopedia).
Design and illustrations by Travers.