HOW TO SYSTEMATICALLY TRIAL BEHAVIOURAL INTERVENTIONS TO CHANGE THE COMMON BEHAVIOURS WHICH CONTRIBUTE TO THE CLIMATE CRISIS:

A CASE STUDY ON USING THE NUDGE TECHNIQUE TO REDUCE FOOD WASTE IN A SCOTTISH SCHOOL

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ZERO WASTE SCOTLAND

WHAT IS A NUDGE? AND WHAT IS THIS GUIDE ABOUT?

WIDESPREAD PUBLIC BEHAVIOUR CHANGE WILL PLAY AN IMPORTANT PART IN ENSURING THAT WE MEET THE SCOTTISH GOVERNMENT'S KEY PLEDGE TO END THE NATION'S CONTRIBUTION TO THE CLIMATE EMERGENCY BY 2045.

This is because people's traditional habits are a major driver of waste, which is the single greatest cause of the carbon emissions behind the crisis. Scotland's successful carrier bag charge has already shown that it is possible to change people's wasteful behaviours and the damaging emissions they cause by motivating them to adopt a 'new normal' based on responsible consumption of the world's limited resources. The plastic bag charge used people's natural aversion to cost to change the way they behave. Another valuable approach to changing people's behaviour is to introduce a nudge. The nudge theory was first developed by

University of Chicago behavioural economist, Richard Thaler and Harvard Law School Professor, Cass Sunstein, who define it as:

"any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives.[1]

Not every problem in the world is caused by our behaviours and can be solved by a nudge. However, using behavioural insights can help us to understand how people actually act, which can help create more effective solutions. Using behavioural interventions alongside strategic level approaches (such as policy) can generate positive feedback to increase the effectiveness of both - to encourage large scale behaviour change to reduce emissions. Every context is specific so a

behavioural intervention that works in one setting might not work elsewhere. Therefore, it is important before implementing any behavioural intervention that it is researched properly to test how effective it is and what impacts it may have, both positive and negative. The aim of this guide is to provide a step-by-step case study showing how a behavioural intervention in real-life might work, to help anyone who is interested in trying this approach to reduce waste and emissions.

Many different frameworks have been created to aid the development of behavioural interventions like nudging. We chose to test the Organisation for Economic Co-operation and Development's (OECD) BASIC Framework[2] because it places more emphasis on first understanding behaviours to then develop effective solutions. You can access the free toolkit here for more detail.

[1]Richard Thaler and Cass Sunstein 2009. Nudge: Improving decisions about health, wealth, and happiness, (London: Penguin), p.6.
[2]OECD, Tools and Ethics for Applied Behavioural Insights: The BASIC Toolkit, (Paris: OECD Publishing, 2019), https://doi.org/10.1787/9ea76a8f-en.

The **BASIC** Framework breaks trialling an intervention into five stages (Figure 1):

Identify **B**ehaviours → **A**nalyse Biases → Design **S**trategies → Test **I**nterventions → Scale for **C**hange

Figure 1. **BASIC** *Framework Stages*

At each stage BASIC provides simple tools and methods for progressing your behavioural intervention pilot, as well as giving pointers to ethical considerations, which is important to consider when trialling interventions that may affect people's daily lives. This case study explains how we used BASIC to trial a nudge to reduce food waste in a school dining hall. At each stage there will be a brief summary of the theory, what we did in practice, what the results were, and some recommendations based on what we learnt. We focused on food waste because it is one of the worst causes of carbon emissions behind the climate crisis, which is why Zero Waste Scotland is leading work to reduce it by a third by 2025 under our Food Waste Reduction Action Plan[3]. However, it doesn't matter what context you are working in our experience and learning can help you pilot own behavioural intervention in any situation.

[3]Zero Waste Scotland, Food waste worse than plastic for climate change says Zero Waste Scotland (2019), https://www.zerowastescotland.org.uk/press-release/food-waste-worse-plastic-climate-change-says-zero-waste-scotland (accessed 29 May 2020).

STAGE 1: BEHAVIOUR – IDENTIFYING AND DEFINING THE PROBLEM

THIS FIRST STAGE IS TO IDENTIFY IF THE PROBLEM YOU ARE TRYING TO SOLVE IS CAUSED BY BEHAVIOURS.

Nudges work best for behaviours which are frequent and 'fast thinking', meaning that they are unconscious, intuitive, automatic and error prone[4]. There is a range of tools in the BASIC Framework that can be used to assess whether or not the problem you are targeting is caused by behaviours which can be approached from one angle with a behavioural intervention, like nudge. Some problems you may find are not due to a behaviour we have a choice to do or not, so may be less suitable for a behavioural intervention– these may require greater changes to a system so require a different approach to solving them. At this point it is also important to engage with potential stakeholders, experts and citizens that have more insight into the behaviour.

Here are some questions you should keep in mind that will direct your pilot:
- What is your desired outcome?
- What are the behaviours driving the issue?
- What is the context shaping these behaviours?
- Which behaviour(s) should you target?

What we did
Teachers had observed large quantities of food being taken and not eaten by pupils in the school dining hall, so we decided that the focus of our nudge should be to reduce this "plate waste". Informal conversations with the catering manager and pupils on the school's sustainability committee helped to build a picture of what they thought were the causes of food waste. A visit to the school dining hall allowed initial observations of how it operated and provided an idea of which points to consider and focus on when designing our analysis methodology (Figure 2).

[4]Daniel Kahneman, Thinking, Fast and Slow, (New York: Farrar, Straus and Giroux, 2011) in OECD, The BASIC Toolkit, p.24: https://read.oecd-ilibrary.org/governance/tools-and-ethics-for-applied-behavioural-insights-the-basic-toolkit_9ea76a8f-en#page26

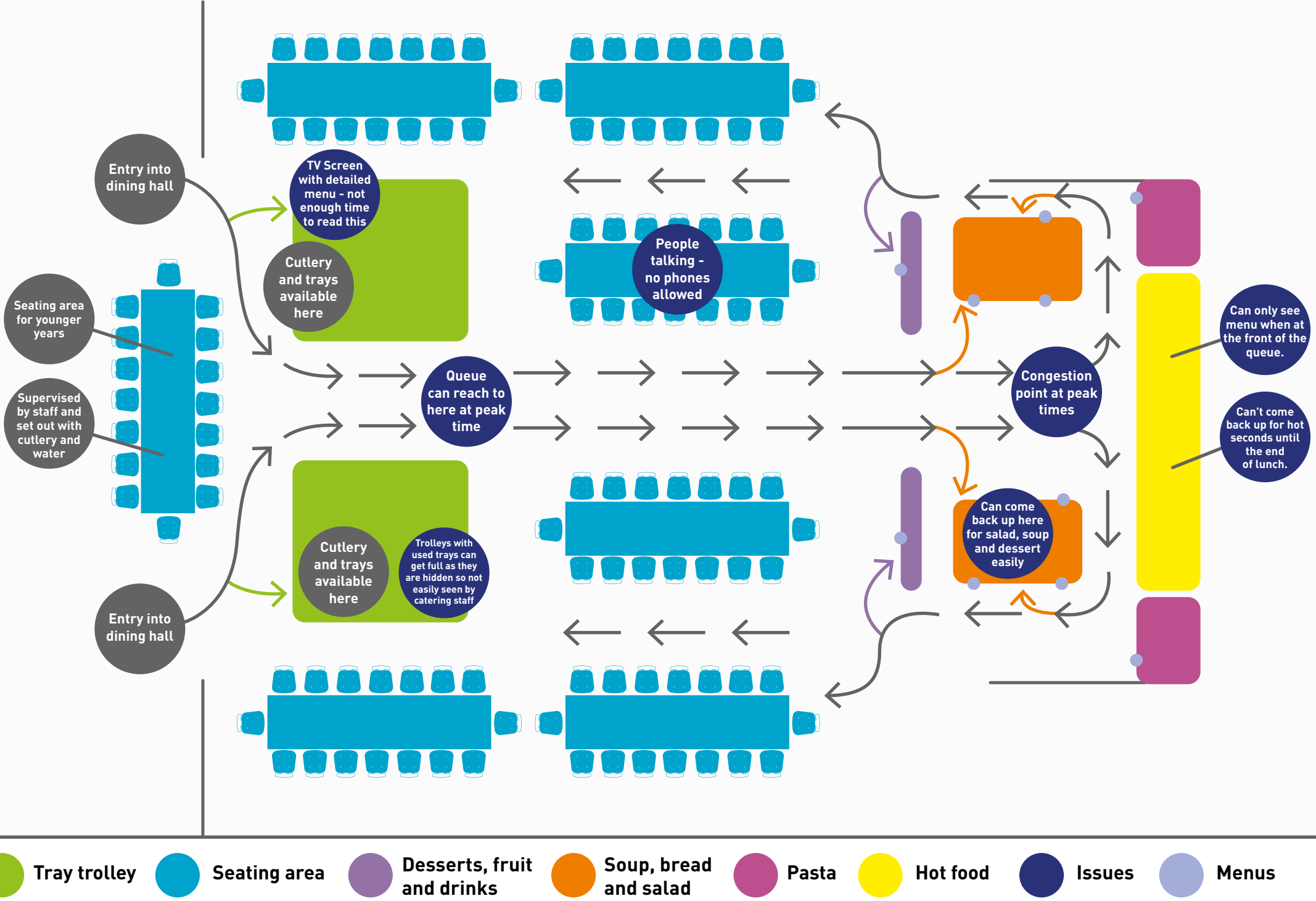**Figure 2.** Dining Hall Behavioural Flowchart

Entry into dining hall

Seating area for younger years

Supervised by staff and set out with cutlery and water

Entry into dining hall

TV Screen with detailed menu – not enough time to read this

Cutlery and trays available here

People talking – no phones allowed

Queue can reach to here at peak time

Cutlery and trays available here

Trolleys with used trays can get full as they are hidden so not easily seen by catering staff

Congestion point at peak times

Can only see menu when at the front of the queue.

Can't come back up for hot seconds until the end of lunch.

Can come back up here for salad, soup and dessert easily

Legend:
- Tray trolley
- Seating area
- Desserts, fruit and drinks
- Soup, bread and salad
- Pasta
- Hot food
- Issues
- Menus

Results

We found that the pupils had control over how much food they took and therefore a behaviour change could result in a reduction in plate waste. Additionally, a good relationship was established with the key stakeholders (the school and the catering team) which would be essential to the success of the project. This involved communicating a plan for each stage, their involvement, and the timeframe. At this point an agreement was drawn up between the school and Zero Waste Scotland to make sure both parties were happy going ahead with the trial and understood what was involved.

Recommendations

• Set out a time frame for the project and communicate this with stakeholders to make sure they are on board and so you have a planned deadline for each stage – make sure to factor in some flexibility.

• Communicate with other stakeholders who may be involved in the project and seek their guidance and approval.

• Start to explore current behaviours and their causes to determine if a behavioural intervention is appropriate - get to know the context of the pilot by visiting the location and talking with people who are regularly there.

STAGE 2: ANALYSIS – UNDERSTANDING WHY PEOPLE ACT AS THEY DO

IF YOU HAVE IDENTIFIED THAT YOUR PROBLEM CAN POTENTIALLY BE SOLVED BY A BEHAVIOURAL INTERVENTION, THE NEXT STEP IS TO UNDERSTAND HOW PEOPLE BEHAVE.

If humans were completely rational and logical in decision-making, there would likely be no need for behavioural interventions. However, in real life our decision-making process is affected by a whole host of things. BASIC suggests using the ABCD Framework[5] (Table 1) to help identify the reasons behind the behaviour you are trying to change.

To study the behaviour, use methods where you can familiarise yourself with the behaviour as it happens. Some methods are more suitable than others. For example, research methods such as surveys may influence the way people behave if they know they are being studied or may not accurately capture behaviours as people do not remember or do not wish to share. Methods such as observation may be more suitable – but can be time consuming and impractical in some contexts. It is important to consider the ethics of what you are doing as behavioural interventions impact people's lives, so make sure you have guidance and

approval before you begin. The BASIC Toolkit has clear guidance on different ethical considerations for each stage. Being flexible with your methodology can be helpful as you may want to adapt methods as the project progresses. Consider how you are going to measure the success of your behavioural intervention - is there something you can measure or record which will allow you to compare before and after? It is worth thinking through the measurement carefully – if it doesn't work, or gives a misleading result, you will be unable to conclude whether your intervention is effective.

ATTENTION: People's attention is limited and they are easily distracted.
BELIEF FORMATION: People rely on mental shortcuts or intuitive judgments and often over/underestimate outcomes and probabilities.
CHOICE: People are influenced by the framing and the social/situational context of choices.
DETERMINATION: People's willpower is limited and subject to psychological biases.

Table 1. ABCD Framework diagnosis

[5]OECD, The BASIC Toolkit, p. 24: https://read.oecd-ilibrary.org/governance/tools-and-ethics-for-applied-behavioural-insights-the-basic-toolkit_9ea76a8f-en#page26

What we did

Informal conversations
To understand what normally happened informal conversations with those who were in the dining hall most - the catering manager and pupils on the sustainability committee, helped share ideas of what generally the pupils do.

Observations
To see how pupils behaved in the dining hall and potential points of choice and opportunities to put in a nudge, observations were conducted on two separate days at lunch time whilst sitting having a meal with teachers in the dining hall.

Food Plate Waste Weighing
To have a measurable outcome to find out if food waste had been reduced, combined waste from pupil's plates was weighed and recorded at every meal during the project by the catering team.

Visual Waste Assessment
To know the approximate number of diners, the types of food left uneaten and the percentage of clear trays, a visual waste assessment was conducted on three days - where the researcher counted the number of trays when they returned to the dishwash and gave an estimate of the type and percentage of food left on each tray.

Results

On average a total of 548kg of food per week was wasted from plates (combining breakfast, lunch and dinner) over the four week baseline measurement period. The visual waste assessment also identified that on average 39% of trays came back empty and 25% of plates contained unwanted sides such as potatoes – the most commonly wasted foods. Observations from the dining hall found it to a be a busy place with time spent waiting in long queues to be served, but then having to make quick decisions in the serving area. Most students were observed to accept the standard portion size, or in some cases to ask for more. We used the ABCD Framework to diagnose what was causing the behaviours we had studied (see Table 2 in the following section).

Recommendations

- You (and your stakeholders) may have ideas about how and why people behave the way they do, but it's important to properly study the behaviours to verify or rule out your instinctive assumptions.
- Make sure the stakeholders are happy with the methodology and know what their involvement is.
- Consider the ethics of the methods you are using, as you are studying and trying to change the behaviours of real people. Factor in enough time to seek guidance - consider getting a second opinion as this might highlight issues you have taken for granted.
- Make sure you make a risk assessment and keep this up to date as things change.
- Be open to including new methods as you observe the situation.
- Set a timeframe for this investigating period - it is important to have enough data to inform your intervention, but you do not want to run over into the time you need to test your intervention. Your knowledge may never be perfect – but you can act once it is "good enough".

STAGE 3: STRATEGIES – BEHAVIOURAL INSIGHTS FOR BEHAVIOUR CHANGE

HAVING GATHERED DATA ON HOW PEOPLE BEHAVE, THE NEXT STAGE IS TO DEVELOP BEHAVIOURAL INTERVENTIONS.

Using the data gathered so far and your diagnosis of the behaviour, you can begin to develop a intervention which targets each key element from ABCD. The BASIC Toolkit[6] has a great diagram to explain this using ABCD to design strategies and interventions.

What we did
We reviewed previous studies on nudge and food waste in schools and other catering facilities to identify some potential interventions. Using ABCD, the behaviours which we identified as possibly causing food waste were then used to generate ideas for potential nudge solutions (see Table 2). Our aim was to test "nudge" interventions, but we suggest you don't get too concerned about definitions and focus on what interventions might work in a given context.

Results
The following nudges were suggested and discussed with the teachers and the catering manager to find out which ones they thought were most suitable:
- Create a clearer menu and pre-order system.
- Improve understanding of flexible portions and ability to go up for seconds.
- Introduce an educational nudge focused on providing information about the impacts of food waste.
- Ask diners to clear their own plates into the food waste bin.
- Reduce the size of plates/remove trays/change default portion size.
- Change timings of lunch.

This resulted in agreeing to trial two written prompt strategies which were then formally proposed to the school and a new agreement was drafted which considered the ethical implications of the two nudges.

1. **Written and verbal message prompt - reminder of flexibility of portions.**
2. **Written message prompt - the impacts of food waste.**

We chose these interventions because they fitted in the time and space allowed for the project. The trade-off between practicality and expected impact is worth considering carefully in your own context. If you have less time constraints, you may consider trialling more complex ideas which might be part of pre-planned wider changes for example. This could complicate measurement as you are not comparing like-for-like but may expand the options which are considered feasible.

Recommendations
- You might generate a lot of ideas, but they might not be feasible or realistic - make sure the stakeholders involved have agreed to the interventions you've chosen to pilot.
- Learn from previous examples that address similar issues, but don't assume that a behavioural intervention that has been successful elsewhere will be effective in all situations.
- Make sure the interventions address the behavioural issues you have identified – there's no point in studying the behaviours if you stick to ideas you had before the research.

[6]OECD, The BASIC Toolkit, p. 70: https://read.oecd-ilibrary.org/governance/tools-and-ethics-for-applied-behavioural-insights-the-basic-toolkit_9ea76a8f-en#page72

	DIAGNOSIS	POSSIBLE SOLUTIONS
ATTENTION	• Pupils don't know about asking for a different sized portion. • They have not thought about going back to the salad bar again. • Time pressures of waiting in the queue and making fast decisions. • Busy school day – pupils are not paying attention when making choices, they're talking with friends.	• Change default portion of sides so smaller amounts are given as standard. • Have information in the dining hall where its relevant and timely – before pupils take their food. • Make the information attention grabbing.
BELIEF FORMATION	• Food is always available in the dining hall so pupils can take as much as they like. • Pupils assume the portion size given is the right amount. • Pupils don't pay for food upfront, so they don't appreciate the costs. • Pupils don't know/are unsure of the environmental impacts of food waste.	• Give pupils messages from their peers so the information feels more relevant. • Highlight those pupils who are doing the right thing and only taking what they will eat. • Make the nudge a conversation starter in the dining hall. • Highlight the scale and impact of food waste.
CHOICE	• Pupils don't know what the menu is before or have too much choice. • They're disappointed if they don't like the taste. • Pupils suffer loss aversion of having to wait in a queue – so they take all their food in one go. • Pupils copy what other people choose.	• Frame choices to take the right amount for each pupil – make it appealing. • Provide menus ahead on time and information on portion sizes. • Highlight how reducing food waste benefits the planet and the school.
DETERMINATION	• Pupils are unaware of the scale of food waste that they are creating – so they have no incentive to act.	• Get pupils to choose a meal in advance. • Engage pupils in making choices to help achieve whole school goals. • Give students feedback on how much food waste is created each week – and show them how their actions make a difference.

Table 2. ABCD Dining Hall Analysis

STAGE 4: INTERVENTION – TESTING BEHAVIOURAL INTERVENTIONS

WITHIN BEHAVIOURAL SCIENCE THE IDEAL WAY TO TEST AN INTERVENTION WOULD BE A RANDOMISED CONTROLLED TRIAL WHERE A GROUP IS DIVIDED INTO A CONTROL GROUP AND A TEST GROUP.

However, in a real-world situation this is not always possible, instead quasi-experimental design can be applied which uses a baseline data recorded before the intervention, acting as the control group which allows for 'before' and 'after' comparisons. It should be noted that these comparisons are limited as factors other than the behavioural intervention may have an impact over time on the results - for example in schools' seasonality, holidays, timetables and exams may influence food waste. When designing how to test your intervention make sure you have considered the ethics of your methods[7] and that you have a realistic plan and a clear definition of your intervention and your desired outcome (success).

What we did
With two nudges to trial we decided to plan to run them around the school's Easter break, with one before and one after. This way we could test which one worked better and have a break in between to evaluate how the first nudge went and plan the second.

Intervention 1: *Reminder of flexibility of portions - 4 weeks (Figure 3.)*

Week 1
Posters put up

Week 2
Moved position of the same posters + 2 days visual assessment

Week 3
Put up new posters

Week 4
Teacher changed posters to new

Figure 3. *Intervention 1 implementation (Orange for days observations took place)*

[7]OECD, The BASIC Toolkit, p. 132: https://read.oecd-ilibrary.org/governance/tools-and-ethics-for-applied-behavioural-insights-the-basic-toolkit_9ea76a8f-en#page134

The first intervention posters were designed as 'memes' to make them relevant and attention grabbing for the pupils (Figures 4-8). The posters were first shared with the school sustainability committee to find out their opinion and get their help to design them.

Figures 4-8. Examples of Intervention 1 - meme posters

The posters were displayed in the dining hall at points where they could be seen from the queue, as previously identified in the behavioural flow diagram (Figure 2). Plate waste data continued to be collected by the catering staff to allow comparison with baseline data.

The planned second intervention posters used the food waste data collected to make pupils aware of how much they wasted and what that causes in equivalent carbon emissions (Figures 9-12). Unfortunately, due to the school closure in light of the Covid-19 pandemic, the second intervention could not be carried out. Instead, an online survey was sent to pupils to find out their opinions on the meme posters, eating in the dining hall, climate change and the proposed second intervention posters.

Intervention 2: Causes and consequences of food waste - postponed

Figures 9-12. Example Intervention 2 - posters

Results
Observations
When the meme posters were first displayed, it was observed that they caught the attention of the pupils, with lots of pointing and discussing. Teachers observed a reduction in engagement with the posters over the week as the novelty wore off as pupils got used to seeing them three times a day at meals. New meme posters with similar messaging were introduced after a couple of weeks, which were observed to regain more attention with pupils stopping to read them.

Waste weighing and visual waste assessment
Waste weight recordings found no significant reduction in food waste after introducing the meme posters compared to days in the baseline period with the same menu. However, analysis was difficult as we had no figures on how many people ate in the dining hall each day. From the visual waste assessments conducted on comparable days, there was a marginal increase of 3.6% of plates returned empty during the nudge meme posters trial. However, as a subjective method and with no associated reduction in the weight of waste, we cannot conclude that this nudge reduced food waste.

Survey
In total, 94 pupils responded to our post-intervention survey. Overall there was a positive response to the memes, and most pupils remembered seeing them. However, only a small number said they had changed any of their behaviours after seeing the meme posters. Pupils found the second nudge posters shocking as they had not realised how much food was wasted - with 37% saying they would probably change what they did in the dining hall after seeing them. This survey is not the same as testing it as a nudge itself but does show there is potential.

Recommendations
- Be flexible in your approach and use your observations to improve the intervention - but also make a note of when any changes are made as they may be reflected in the measurement data.
- Be sure to continue collecting comparative and consistent data throughout your experiment so you can determine the success of each intervention.
- Consider other external factors that might have influenced your measurement data, especially if a control experiment isn't possible.
- Make sure if you are designing a written nudge to pay close attention to the wording so it does not just provide information but has a clear call to action which people can follow.
- The difference made by the intervention might be quite subtle - so do not be disheartened as impactful changes in behaviour can take a long time.
- It is important to pilot a behavioural intervention to find out what works and what doesn't. You might want to try another intervention, so build on what you have learnt or adapt these learnings for other projects.

STAGE 5: CHANGE – IMPLEMENTING BEHAVIOURALLY INFORMED INTERVENTIONS

THE FINAL STAGE IS TO EVALUATE HOW SUCCESSFUL THE BEHAVIOURAL INTERVENTION WAS AT SOLVING THE PROBLEM AND CONSIDER WHAT TO DO NEXT.

If your intervention pilot was successful, then you might want to think about how you would run it long-term. If it has not been successful then reflect on what you would change if you were doing it again, and what aspects did work that you might want to use. If there are opportunities to use the intervention more widely, consider where you could trial it again before scaling it up. It is important to consider how you would monitor the effectiveness of the intervention long-term as effects may diminish over time, and how you would identify any unexpected side effects. You may want to share the knowledge you have gained from your pilot, so others can learn from the experience. This can be just as valuable if your pilot was unsuccessful as others can also learn from this.

What we did
With the data gathered from the first nudge and the survey we were able to evaluate what we felt worked, what we thought we would change, and future opportunities. With this information we created a pack for the school with the results and materials so if they wanted to run their own intervention in the future, they had all the information and could share the project with the pupils. We also wrote this guide to share our reflections with others.

Limit the amount of food you waste

Figure 13. If you did the following things select how much you think it will help reduce climate change?

Results

What worked

- We built a good relationship with the school and catering team by making sure they were involved and consulted at all stages of the project.
- We started a valuable conversation in the school around the damaging impact of food waste on the climate crisis by raising awareness with the catering team, staff and pupils.
- The waste weighing and recording process was simple and easy to do.
- Meme posters were good at grabbing attention as they were funny and relevant to the pupils.
- We were able to adapt to a changing situation with the school closure, by having a good relationship with the school which gave support to gather feedback from an online survey.

Reflections and opportunities

- The majority of the pupils who were surveyed understood what the message was from the meme posters - but only 14% said they had changed any of their behaviours, which didn't amount to a significant measured reduction in food waste.
- From the survey of the second posters 37% of pupils said they would be more likely to change, and 15% said they might. There is an opportunity to try this approach when suitable. From the graph (Figure 13) we can see that there is also an opportunity for education on the impacts of food waste.
- The waste weighing could be continued by the catering team, and the sustainability committee are keen to continue with projects like this.
- Online survey results could be used to develop future projects with the school.

CONCLUSIONS

WITH THIS GUIDE WE HOPE TO HAVE GIVEN YOU AN INTRODUCTION TO HOW USING THE BASIC FRAMEWORK WORKS IN PRACTICE.

From this case study we have shown that trialling a behavioural intervention takes a significant amount of time, planning and work to effectively implement and evaluate the intervention. We have demonstrated that piloting a behavioural intervention offers valuable insights and is useful to understanding what's driving behaviours, what works to change those behaviours and what ideas, or approaches need further development. Although the nudge we trialled was not successful in significantly reducing food waste, we have shown that trials can start a conversation around the problem and provide steppingstones to future engagement to create new ideas to solve the issue. It is important to remember that even if the behavioural intervention is successful, nudges are very context specific so they may not always be transferable to other settings with the same results. In conclusion, nudges may not be the solution to all our problems and efforts to drive behaviour change need to be delivered alongside other interventions such as education, policy and infrastructure.

Our key takeaway points:
- Work collaboratively with stakeholders to spot opportunities and limitations for change.
- Collect data to create a good baseline in order to determine impact.
- Understand your audience – through observations or interviews – and develop your behavioural intervention to fit their interests.
- Test interventions one at a time, so any change can be attributed to a particular intervention – and you can reflect on the process.
- Be prepared to be flexible and adaptable – with the methodology and with the intervention itself.
- Be reflective – whether a success or not, take what you learnt forward and use it to develop behavioural interventions or other projects.
- Consider ethical concerns at each stage of the project, to make sure you have thought about the impacts the behavioural intervention might have.

Further information
For more information on this project or how behavioural interventions can help organisations reduce waste and emissions to help meet targets to end the climate crisis please email Zero Waste Scotland at
research@zerowastescotland.org.uk

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