Report

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NUDGE Study

Implementation toolkit: promoting the use of street litter bins

Keep Scotland Beautiful

ISM
Institute for Social Marketing

Contents

Inspiring change for Scotland's resource economy

Find out more at **zerowastescotland.org.uk**

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Acknowledgements

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1 Project Overview

The project involved a partnership between Zero Waste Scotland (ZWS), Keep Scotland Beautiful (KSB) and the University of Stirling, Institute for Social Marketing (ISM). KSB had overall responsibility for the delivery of the project and led on the intervention design, delivery and monitoring. ISM provided an advisory role and offered guidance and input on evaluation design, analysis and dissemination. The project was funded by Zero Waste Scotland (ZWS) through the Litter and Flytipping Innovation Fund.

This report is designed to provide an overview of the study along with practical guidance on setting up and implementing your own Nudge study based on outcomes learned during this project.

1.1. Background

As defined by Thaler and Sunstein (2008)[1], "A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting fruit at eye level counts as a nudge. Banning junk food does not." Examples of nudge interventions would include serving drinks in smaller glasses or painting lines or chevrons on the road surface to encourage drivers to slow down. In 2011 in Copenhagen, nudge was used to encourage better use of street litter bins: footprints were painted on the ground leading up to the bins and the bins were 'wrapped' in a bright colour. An experiment was designed to test the effect of the nudge, which involved distributing free sweets before and after the footprints and wraps had been applied, and counting how many of the wrappers ended up correctly in the bins. A 46% decrease was reported by the experiment team in the proportion of wrappers which ended up on the street (http://inudgeyou.com/green-nudge-nudging-litter-into-the-bin/). The experiment team claimed that the nudge worked in two ways: first of all, it made it easier for people to find the bins because they were more visible, and secondly the footprints prompted them to infer the intended, correct action, i.e. to use the bin. However, the experiment had not been replicated in a peer-reviewed study, and its replicability and claimed effectiveness in a different context had not been tested. The aim of this study was to replicate the anti-littering nudge intervention carried out in Copenhagen and to extend this work by examining the impact of longer term exposure and variations on traffic flow density on bin use.

1.2. Aim

To determine whether people's littering behaviour can be modified by using visual nudges using a single site before and after experimental design.

[1] R. Thaler and C. Sunstein. (2008). *Nudge*. Penguin Books.

1.3. Objectives

The project had three main objectives:

1. To develop and pilot a methodology for evaluating an anti-littering nudge intervention using a before and after design
2. To evaluate the immediate impact of the intervention on prompting correct use of bins
3. To evaluate medium and long-term wear-out of the intervention on bin use

1.4. Study design

A before and after single site (see Map 1 below) study comparing the intervention against a normal state baseline over four stages: baseline, one week, four week and eight week follow-up with two days of data collection at each stage.

Map 1: Project Site – Exit at the Marches Shopping Centre, Stirling

Public use litter bin

Public use litter bin (intervention)

Project boundary for counting discarded confectionery items

Confectionery distribution Point

The intervention consisted of two main features: painted foot prints leading up to the study bins (images 1b and 1c on page 6) to prompt the intended, correct action, and redesign of the bin itself (Green Topsy 2000) to enhance its salience within its immediate surroundings. The intervention bins and foot prints (design outlined in diagram 1 on page 6) remained in situ and were maintained throughout the study.

Image 1a: Original bins

Image 1b: Intervention process

Image 1c: Intervention design

Impact on littering was assessed by distributing free, single items of wrapped confectionery to people as they moved across the study site (images 1d and 1e) and measuring numbers of items correctly binned or discarded on the ground within the designated study area.

Image 1d: Discarded mint wrapper in study site

A number of measures were taken to reduce variability between the study stages. For example, KSB staff were positioned at the same point within the study site and selecting days and times (Thursday 12noon to 6pm and Saturday 10am to 5pm) to ensure comparable footfall conditions.

Diagram 1: Footprint designs

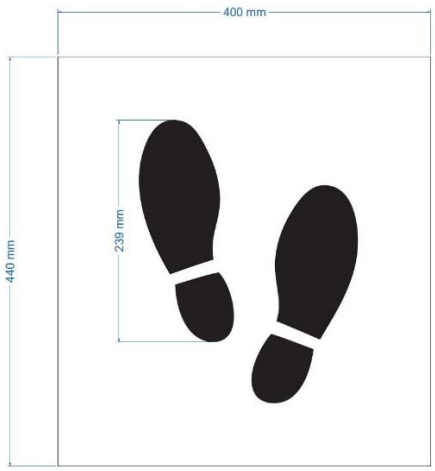

Image 1e: Distribution

A pilot phase was undertaken before the initial baseline study to evaluate the intervention and monitoring process, and to identify and eliminate any issues that affected our ability to implement the study design. In addition, it also provided us with an indicator of the length of time needed to distribute the required numbers of confectionery for each study day.

1.5. Initial findings

At time of writing the ISM have conducted a brief review of the observation protocols examining level of fidelity and an analysis of changes in discarding behaviour at baseline compared to the three subsequent follow-up periods (1 week, 4 week and 8 week).

Overall the findings look promising, and support the research proposition that discarding behaviour (i.e. dropping litter on the ground) is affected over the course of the intervention. Over the eight weeks, the number of items correctly disposed of into the test bins increased incrementally. By the eighth week follow up, correct disposal in the test bins had increased significantly by 14% compared to the baseline measurements (48%). Moreover, over the eight weeks of intervention, the number of items discarded (dropped on the ground) within the test area also incrementally decreased. By the end of the eight weeks, discarding on the ground had significantly fallen by 15% compared to the baseline (39%), thus suggesting that the intervention had resulted in less littering in the test area.

No real effect was noted with regard to the comparison bins (the four bins in the study area which were not transformed). Although by the end of the eight week intervention correct disposal into the observation bins had increased by 1%, this had fluctuated over the three weeks of follow up.

It should be noted that the above analysis combined the data for each wave (i.e. the Thursday and Saturday of each protocol consider together, not separately). ISM are conducting further analysis to examine patterns by study day.

2 Delivering your own anti-littering nudge project

This section aims to provide practical guidance for planning and executing similar studies in changing littering behaviour using innovative nudges. The advice is based on the process undertaken at the Marches Shopping Centre in Stirling and the lessons learned planning and delivering the project.

2.1. Key Preparatory tasks

- Assessing the study site for suitability

  There are number of issues to consider, for example; is there a high enough flow of pedestrians in the area to make an assessment? Is there an obvious distribution point that can capture passing traffic? Is the area subject to different conditions over time, i.e. are there events which may affect comparability between distribution periods? You might also give consideration to proximity and practicality, as the project team will require to make frequent visits, some early in the morning or late in the evening, for example to lay and maintain footprints.

- Deciding when to conduct the study

  It is worth timing the intervention to reduce the chances of problems, for example avoiding particular events or conditions that could affect comparability between your baseline and test results. In particular, weather can be a crucial factor for outdoor sites; wind and rain can make it difficult if not impossible to monitor discarded items and can discourage members of the public from engaging. Similarly, cold and wet conditions can create difficulties when trying to lay footprints and can be responsible for additional maintenance. So, if running your intervention in an outdoor location, think about trying to run your experiment in the spring or summer months where there is less likelihood of bad weather restricting the intervention and where longer daylight hours means you have scope to extend your distribution period if necessary.

- Negotiating access to the study site

  There may be multiple landowners to work with in your study. For this project, permission to distribute and monitor in the area was required from both Stirling Council and the shopping centre management.

- Arrangements for bin emptying and counting

  During the distribution periods, litter bins should be maintained by project staff responsible for monitoring. Arrangements and procedures need to be in place to maintain bins between distribution periods.

  Stirling Council maintained the litter bins at the study site. The agreement for the duration of the study was that bin keys and liners would be provided to monitoring staff for maintaining the bins during the distribution period. It was agreed that bins would be emptied by the local authority before each distribution period.

- Briefing and management of local staff to avoid overzealous policing.

  Conditions should not vary between distribution periods. It is advisable that no litter enforcement and, if possible, clearance activities are undertaken at time of distribution.

  Due to the Stirling study location being a high priority area, it was not realistic to expect that litter clearance activities could cease for several hours at a stretch. Therefore agreement was sought with the local authority to ensure that cleansing operatives in the area were made aware of the study and would not remove discarded wrappers. This involved developing a good working relationship with local cleansing staff.

- Selecting and sourcing your confectionery item for distribution.

  Two main considerations were taken into account; uniqueness of the wrapper for ease of identification, and appeal of the confectionery item so that those receiving would be more inclined to consume the item on site.

  Generic mints with a blue and white wrapper were chosen. However, it is advised that confection with a wrapper that doesn't require tearing to open would be better rather than ones that you need to tear as this leads to having fragments on the ground, making counting more difficult.

- Developing and agreeing your intervention design

  Clearly there is considerable scope for creativity when devising your intervention design. In our case we sought to replicate and build upon the Copenhagen study which used brightly coloured footprints leading up to brightly coloured litter bins to promote bin salience. Green Topsy 2000 litter bins and green spray painted footprints were used in the Stirling study (see photograph).

- Arrangements for maintenance of the intervention bins over the study period

  Who will maintain the litter bins between the distribution periods and does the responsible body have the right equipment and keys to maintain the intervention bins if these are of a different design?

- Agreement to maintain the existing bin layout and signposting

  For the duration of the study, the positioning of the litter bins and any signposting should remain in place to avoid the potential for other confounding factors undermining the integrity of the study findings.

- Agreement on a communications embargo.

  A key component of any study is testing the nudge effect under 'normal' conditions across the full duration of the study. It is therefore important that the public are not made aware of, or sensitised to the intervention while the study is being conducted. In our case this meant gaining the agreement of local stakeholders not to promote their involvement in the study through the likes of local media prior to or during the 12 week study period.

- Selecting and briefing distribution and monitoring staff

  For monitoring staff, it was deemed important to have one person at all times patrolling the area. This helped to minimise any loss of discarded items due to slight wind gusts and shopkeepers conducting street cleaning in front of their own premises. Wrappers were picked up on each patrol as inconspicuously as possible. For this reason monitoring staff did not wear the same uniform as those distributing confectionery and communication was kept to a minimum. Bins were emptied on a regular basis to facilitate binning behaviour and to ensure accurate counting of discarded items, which included both full and partial wrapper fragments.

- Devising a rationale and script for giving out confectionery

  As with the communication embargo, the distribution process should seek to avoid giving out information regarding the study.

  For this project, the following message was devised to deal with enquiries from members of the general public; "In conjunction with Stirling Council, we are thanking people for visiting Stirling Town Centre". If further challenged, a card was available to hand out with the Keep Scotland Beautiful switchboard number. Switchboard operators were briefed on the study to verify distributor's identity. None were given out.

- Agreeing a dress code and uniform with appropriate messaging

  To identify distributors to the public, a distinctive coloured top with a standard message printed on the front was devised; purple hoodies (for comfort in the cold weather) with 'Thanks for Visiting' printed on the front in large bright letters (see photograph).

- Preparing an observation protocol to assess fidelity of delivery

  To enable assessment of factors that may have a confounding effect on the study results, a written record is required. To facilitate comparisons between observations we would recommend preparing a structured protocol to records the likes of weather conditions, staff feedback and experiences, lighting levels, crowd densities, unpredictable events, changes in street furniture, temporary stands and kiosks, other activities taking place on the concourse etc. A copy of the protocol used in the Stirling study is provided in Appendix 2. It was completed by monitoring staff on duty on the day. The same form was also used to record litter and bin counts. You may also find it helpful to use photographic evidence to record key events and conditions, and to use a plot map to record where discarded items were found. This kind of information can be helpful at a later stage when analysing your data.

- Carrying out a risk assessment

  Particular care is needed to ensure intervention staff are safe and that proper precautions are in place. In our case it was important for distributers to work in pairs and to have at least one monitor on duty at all times. Briefing staff on how to deal with enquiries from members of the public is also important, as is providing monitoring staff with proper protective equipment for emptying bins and undertaking bin counts.

  For templates and advice in carry out a risk assessment, a good reference point is the Health and Safety Executive. Website: http://www.hse.gov.uk/risk/ .

- Thinking through how long you need to distribute

  Some thought needs to be given to when and for how long you need to distribute your confectionery items. This is important to ensuring you have given out enough items to record a meaningful effect and that you buy enough of your test confectionery in the first place – remember you can't change the item you decide to distribute half-way through the process as this could confound the study findings.

  All study sites and tests will be different so it is important you undertake some initial pilot work to estimate how many items you need to give out to get a reasonable number of items binned and discarded and to calculate how long it will take to achieve these numbers. Calculating a target number for your study site will require the skills of a qualified statistician but as a rough rule of thumb in the Stirling pilot study we distributed 2000 items over the two pilot study days, 548 of which were accounted for (i.e. either correctly binned or discarded on the ground) giving us a 29% conversion rate which was sufficient to allow us to undertake a meaningful analysis. If you find that your conversion rate is lower, then you may need to give out more items to undertake your analysis, or conversely, if your rate is higher then you may need to give out less.

  It is also important to stick to the same days and distribution period in order to retain comparability between stages as traffic flows and types of traffic can vary throughout the day depending upon the site selected.

- Running an initial pilot

  As well as allowing you to estimate how many items you need to give out and how long this will take, running a pilot also has a number of other uses. For example it will allow you to:

  - Assess the feasibility and acceptability of the proposed distribution approach.
  - Determine the effective distance between the distribution point and positioning of the test bin(s) and any mediating factors which might affect this decision.
  - Determine the study area size and boundaries for assessing discarded items and the number of people necessary to monitor the study area
  - Assess procedures for counting binned and discarded items.
  - Test and refine your observation protocol.

Appendices

Appendix 1 – Project Checklist

Assess study site for suitability	☐
Negotiate access to the study site	☐
Arrangements for bin emptying and counting	☐
Briefing and management of local staff to avoid overzealous policing etc.	☐
Select and source confectionery item for distribution	☐
Develop and agree the intervention design	☐
Arrangements for maintenance of the intervention bins over the study period	☐
Agreement to maintain the existing bin layout and signposting	☐
Agreement on a communication embargo	☐
Select and brief distribution and monitoring staff	☐
Devise a rationale and script for giving out confectionery	☐
Agree dress code, uniform with messaging	☐
Prepare draft observation protocol to assess fidelity of delivery	☐
Carry out a risk assessment	
Run an initial pilot	☐
Calculate sample size required	☐
Check for upcoming events in area that might spoil the study	☐

Appendix 2 – Protocol Template

Nudge Study Fidelity Protocol and Count Record Form: Day Session

Name: ----------

Session date: ----------

Week day:

Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Study wave:

Baseline	
1 week follow-up	
4 week follow-up	
8 week follow-up	

Fieldwork day:

Day 1	
Day 2	

Distribution times: Write in times when confection is actively distributed: ……

……..

Session No (01-16)
(please write in)

1. Test Bin(s) – see site plan

1.1 Remained sited in original position?	Yes ☐ No ☐ Unsure ☐	Comments:
1.2 Remained empty/ accessible throughout? *(ie. not over-flowing or covered at any point during the intervention period)*	Yes ☐ No ☐ Unsure ☐	Comments:
1.3 Remained visible as per intended design? *(ie. visibility of bin not compromised in anyway, for example due to vandalism)*	Yes ☐ No ☐ Unsure ☐ N/A ☐	Comments:
1.4 Foot prints remained in place as per intervention design? *(ie. visibility not compromised in anyway, for example by people congregating around them)*	Yes ☐ No ☐ Unsure ☐ N/A ☐	Comments:

2. Observation Area – see site plan

2.1 Structural integrity and layout remained intact? *(ie. architectural layout and signposting of local area was unchanged)*	Yes ☐ No ☐ Unsure ☐	Comments:
2.2 Observation bin(s) remained in original position?	Yes ☐ No ☐ Unsure ☐	Comments:
2.3 Observation bin(s) remained empty/ accessible throughout? *(ie. not over-flowing or covered at any point during the intervention period)*	Yes ☐ No ☐ Unsure ☐	Comments:

3. Distribution – see site plan

3.1 Carried out by designated KSB staff throughout? *(ie. staff specifically briefed to undertake the task)*	Yes ☐ No ☐ Unsure ☐	Comments (*write in staff initials*):
3.2 Staff positioned at the designated distribution point throughout? *(see site plan)*	Yes ☐ No ☐ Unsure ☐	Comments:
3.3 Designated uniform/dress worn throughout? *('Thank you for visiting' hoodies)*	Yes ☐ No ☐ Unsure ☐	Comments:
3.4 Staff adhered to the allotted time period and schedule? (*Between 12 noon -7pm Thurs & 10am -5pm Sat*)	Yes ☐ No ☐ Unsure ☐	Comments:

3.5 Conducted unimpeded without any significant interruptions? *(ie. distributers able to deliver a constant, uninterrupted supply to passers by)*	Yes ☐ No ☐ Unsure ☐	Comments:
3.6 Selected confection item distributed throughout? *(ie. mints)*	Yes ☐ No ☐ Unsure ☐	Comments:
3.7 All confection distributed as single items? *(ie. one item per person)*	Yes ☐ No ☐ Unsure ☐	Comments:
3.8 Process supported / not impeded by local authorities and their staff? *(ie. station staff and other relevant local authority workers)*	Yes ☐ No ☐ Unsure ☐	Comments:

4. Monitoring – see site plan

4.1 Designated monitor(s) on patrol throughout?	Yes ☐ No ☐ Unsure ☐	Comments (*write in staff initials*):
4.2 Monitors had full access to the study site throughout *(i.e. were able to patrol all relevant areas unimpeded – see site plan)*	Yes ☐ No ☐ Unsure ☐	Comments:
4.3 Monitors able to retrieve bin contents? *(liners renewed at start of session and after each count)*	Yes ☐ No ☐ Unsure ☐	Comments:
4.4 Process supported / not impeded by local agencies and their staff? *(ie. Centre staff and relevant local authority workers)*	Yes ☐ No ☐ Unsure ☐	Comments:

5. Weather Conditions

Describe the prevailing weather conditions, paying particular attention to features that might affect traffic flow speed, visibility and ability to detect discarded wrappers; eg. lighting levels, temperature, disruptive effects of wind and rain etc. *(please write in)*

6. Physical Changes and Events

Describe any physical changes or events that could potentially affect the intervention outcome; eg. temporary features in the study area such as stands, or advertising hoardings, other distractions or changing crowd dynamics brought about by street performers etc *(please write in)*

7. Staff Feedback and Observations

Summarise feedback and observations made by monitors and distribution staff; e.g. response to the intervention by the public, any interruptions or difficulties in monitoring experienced etc *(please write in)*

8. Overall Assessment

Use this space to explain your overall assessment as appropriate and to record any points of potential importance not already described *(circle appropriate number on scale and write in space provided)*
High fidelity 1 2 3 4 5 6 Low fidelity

9. Count Record Form

		Initials	**Number count**	**Total**
Number of individual items of confectionery distributed	Staff 1			
	Staff 2			
	Staff 3			
TOTAL				

		Full Wrapper count	Wrapper Fragment count	Wrapped confection count	Unwrapped confection count	Total
Number of items correctly binned *(ie. wrappers, wrapped confection and unwrapped confection)*	Bin 1 (test)					
	Bin 2 (test)					
	Bin 3 (test)					
	Bin 4 (test)					
	Bin 5					
	Bin 6					
	Bin 7					
	Bin 9					
TOTAL						

		Initials	Full Wrapper count	Wrapper Fragment count	Wrapped confection count	Unwrapped confection count	Total
Number of items discarded within the observation area *(ie. wrappers, wrapped confection & unwrapped confection)*	Monitor 1						
	Monitor 2						
	Monitor 3						
TOTAL							


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