

Rapid Review of Charging for Disposable Coffee Cups and other Waste Minimisation Measure

Full Report

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Rapid review of charging for disposable coffee cups and other waste minimisation measure: Full literature review

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1.0. Introduction

1.1. Introduction

In May 2018, an *Expert Panel on Environmental Charges and Other Measures* (EPECOM) was established to provide advice to Scottish Ministers on environmental charges and other measures that could be adopted in Scotland to encourage long-term and sustainable changes in consumer and producer behaviours that were required to generate meaningful shifts towards a circular economy. The panel has asked for a rapid review of evidence that complements a knowledge account developed by the Scottish Government and Zero Waste Scotland. The previous review indicated strong evidence that applying a charge for DCCs would lead to a reduction in DCC usage and an increase in reusable cup usage. This was in contrast to the evidence on reusable cup discounts, which were found to be ineffective in changing behaviour. The previous review also considered evidence for other interventions, including recycling initiatives and reusable cup schemes. With specific reference to DCC charges, the evidence base reviewed was primarily based on local studies conducted on university campuses and in organisations. This leaves the question as to whether a DCC charge would be equally as effective in changing behaviour more widely in the high street if introduced through legislation at the national level.

1.2. Background

The practice of ‘on-the-go’ consumption of coffee and other hot drinks has increased substantially over the past two decades, and the use of disposable coffee cups (DCCs) has grown accordingly (**Environmental Audit Committee, 2018**). It is estimated that each year between 2.5 and 10 billion DCCs are used in the UK alone (**Poortinga & Whitaker, 2018; Environmental Audit Committee, 2018; PCRRG, 2019**), although it is difficult to verify these estimates from primary sources.

The coffee industry has seen an impressive growth from around 5,400 coffee shops in 1999 to an estimated 24,000 in 2017, and the number of coffee shops is projected to reach 31,000 by 2022 (**Allegra, 2018**). On average, British consumers purchase 156 hot drinks per year and this is set to increase in line with the further expansion of the coffee industry (**Ecuity, 2018**). Demand for DCCs is set to increase further in line with predicted growth in the coffee retail industry, with serious environmental implications linked to the production, consumption and disposal of DCCs.

While technically it is possible to recycle DCCs, this can only be done at specialist waste-processing facilities. Recycling is therefore dependent on DCCs being directed to the correct waste stream so that they can be separated and transported to these specialist facilities. The material constituents of DCCs are however high in volume and low in value making it economically unviable for businesses to collect and transport them over significant distances (**Lenaghan, 2017**). The waste stream issue is compounded by the problem of disposal in the context of ‘on-the-go’ consumption, in which DCCs may be discarded in diverse locations over a widely dispersed geographical area (**Environmental Audit Committee, 2018**).

DCCs are mostly disposed of at waste collection points either in the street or the workplace (**Environmental Audit Committee, 2018**). Materials collected through on-street facilities (including those specifically designed for DCCs¹) are often too contaminated to recover any recyclable materials (**Recoup, 2017**)²; and it is generally not possible to recycle DCCs either at work or at home through existing kerbside collections. This means that many DCCs end up in residual waste streams or leak into the environment through mismanagement or active and 'careful' littering (**Keep Britain Tidy, 2017**). Inappropriate recycling may even lead to more household waste ending up in landfill when DCCs get mixed up with other recyclable materials, such as paper (**LGA, 2017**).

It is clear that further action is needed to minimise waste from DCCs. The Waste Hierarchy model provides a useful framework for prioritising different measures based on their environmental impacts: starting with prevention, followed by reuse, recycling, and finally residual disposal (**Scottish Government, 2017**). The different strategies are not mutually exclusive and may need to be combined for maximum benefit. From an environmental perspective, reducing the number of DCCs is however preferable over increased recycling (**Zero Waste Scotland, 2019**).

1.3. Strategies for behaviour change

Poortinga and Whitaker (2018) summarised different structural and informational measures that can be used to change consumer behaviour in relation to DCCs, in particular to reduce the use of DCCs. There is comprehensive literature on the drivers and barriers to behaviour and behaviour change that can be drawn upon (e.g. **Michie & West, 2013; Steg & Vlek, 2009; Uzzell & Rätzkel, 2009; Vlek, 2000**), although not all factors emerging from this literature can be used as policy levers.

Intervention mapping is a systematic approach for evidence-based policy making by providing a taxonomy of interventions that can be used to promote behaviour change (**Bartholomew, Parcel, Kok, & Gottlieb, 2011**). Reviewing the literature is an integral part of an intervention mapping exercise in order to identify existing knowledge on which interventions are the most appropriate and the most likely to change behaviour (**Bartholomew et al., 2011**).

The *behaviour change wheel* can be used to structure interventions according to the elements of behaviour that it aims to address and maps them onto policies that can deliver the intervention (**Michie, van Stralen, & West, 2011**). Different policy options, such as communication, marketing, fiscal measures, social planning and regulation can be used for education, persuasion, incentivisation, environmental restructuring and restriction, respectively. These can be designed in such a way that they provide the capabilities, opportunities and motivation for behaviour change (**Michie et al., 2011**).

¹ Bins in managed places are generally less contaminated than on-street collection bins (Hubbub, 2017b).

² Coffee cups are often themselves a source of contamination in on-street recycling bins, given that they cannot be recycled in a majority of local authorities (Environmental Audit Committee, 2018).

Plastic waste and pollution have been high on the public's agenda since the broadcast of television series such as 'Hugh's War on Waste', broadcast in 2016, and Blue Planet II in 2017. There is further evidence that the carrier bag charges implemented in different parts of the UK between 2011 and 2015 have catalysed wider waste awareness among the British public, and increased support for other charges to reduce plastic waste (**Thomas, Sautkina, Poortinga, Wolstenholme, & Whitmarsh, 2019**).

There are high levels of public concern about single-use plastics and packaging. In a survey conducted in February 2018 by Ipsos MORI for the King's College Polling Club, seven in eight adults (81%) claim to be 'fairly' or 'very' concerned about the environmental impacts of disposable objects, and feel that producers, retailers and government share the responsibility with consumers to do something about it.³

Public support for action on DCCs is evidenced by a YouGov survey conducted in October 2017 for the Marine Conservation Society, showing that 74% of people across Britain would support a charge on single-use coffee cups.⁴ A different YouGov survey conducted in May 2018 shows that the public are overwhelmingly supportive of banning 'problem plastics'. This involves 80% of the British adult population supporting a ban on DCCs (with only 12% opposing), and 77% supporting a ban on 'clam-shaped' takeaway containers.⁵

In January 2018, the House of Commons Environmental Audit Committee (**Environmental Audit Committee, 2018**) recommended a mandatory 25p charge, or 'latte levy', on every DCC issued by retailers. The value of the proposed charge was based on the size of the discounts offered, and research showing the positive effects of a similar-sized charge (**Poortinga & Whitaker, 2018**). The mandatory charge does not necessarily imply higher prices in most shops, as the cost could potentially be absorbed by the discounts already being provided to customers (**Environmental Audit Committee, 2018**).

2.0. Aims and objectives

The overall aim of the rapid review was to synthesise all available evidence on the impacts of charges and other measures to reduce the use of DCCs, as well as the wider implications of introducing a charge. In particular, it considered the evidence around four key issues. The primary aim of the rapid review concerned 1) *the effectiveness of DCC charges* (including the conditions under which charges are more or less likely to be effective in changing consumer behaviour). Three additional key issues related to secondary aims of the review, comprising 2) *economic aspects of DCC charges* (including the optimal level of charge required to establish meaningful behavioural change); 3) *the effectiveness of charges on other disposable products* (such as plastic bags and other single-use plastic items); and 4) *other measures to reduce the consumption of DCCs* (including discounts, mug-share schemes, bans on single-use products, and initiatives to increase recycling).

³<http://www.ipsos.com/ipsos-mori/en-uk/public-concern-about-plastic-and-packaging-waste-not-backed-willingness-act>

⁴ <https://mcsuk.org/news/support-for-coffee-cup-charges>

⁵<https://yougov.co.uk/topics/politics/articles-reports/2018/05/29/yougov-finds-overwhelming-support-banning-problem->

The first aim is considered the *primary aim*, and the second to the fourth the *secondary aims* of the rapid review.

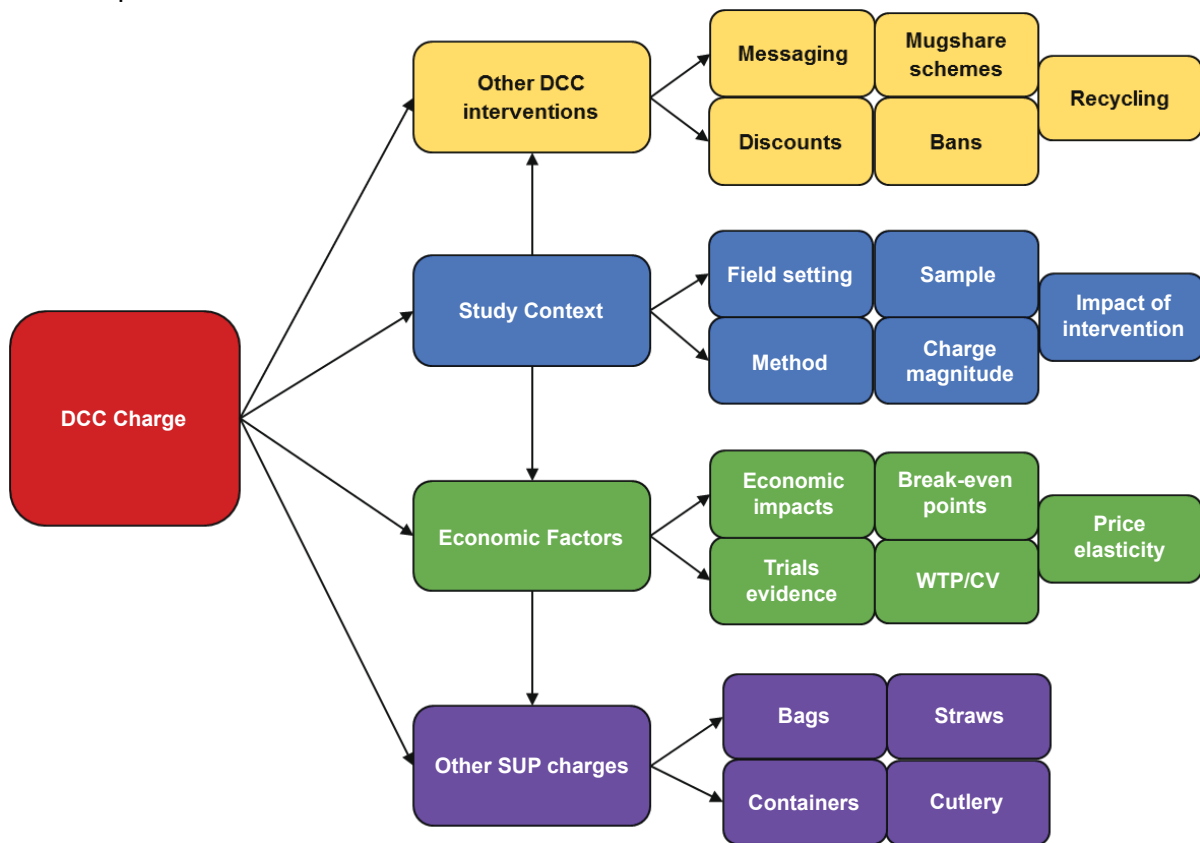


Figure 1: A conceptual model of the rapid review.

3.0. Methodology

We developed a methodological literature reviewing approach based upon the standardised protocol for the production of quick scoping reviews and rapid evidence assessments set out by **Collins, Coughlin, Miller and Kirk** (2015). The main stages in this approach are detailed in the following sections.

3.1. Research protocol

3.1.1. Conceptual model

In accordance with the review brief provided by the Scottish Government, a schematic model was developed by the review team to make explicit the different aspects of the review, as displayed in Figure 1:

3.1.2. Clarifying the review question

In line with **Collins et al.** (2015), we utilise four elements in clarifying the best approach to be taken to answer the primary review question: (1) the population, (2) the intervention, (3)

the comparator, and (4) the outcome of the intervention. The four elements are used to address the primary and secondary aims of the rapid review as follows:

Question	What is the evidence surrounding the use of charges (and other measures) to reduce the use of DCCs?
Population	The population targeted by the intervention.
Intervention/Exposure	Contexts where interventions (primarily charges but also other types of intervention) have been used to reduce DCC use and increase reusable cup use.
Comparator	Behavioural effects in contexts where there is an absence of DCC charge, or where alternative interventions (not involving a charge) have been applied.
Outcome	Changes in DCC consumption, changes in reusable cup use, stakeholder behaviour change, stakeholder perception change, stakeholder policy evaluation.

3.1.3. Searching for relevant evidence

We identified a set of keywords that stemmed from the primary and secondary aims of the rapid review. The keywords were generated through an iterative process during the development of the protocol, in which keywords and search locations were trialled and refined. This enabled optimisation of the evidence returned by the search for the scope of the review, as well as giving some idea of the scope of evidence available for review.

Following this, we further developed a strategy for where to search for relevant evidence. We included databases of scientific literature, and relevant websites for grey literature and other sources of unpublished evidence. This was done to minimise the degree of publication bias of an area where evidence may be published across a wide range of sources.

For the peer-reviewed evidence, we searched three academic databases: *SCOPUS*, *Web of Science*, and *Google Scholar*. For the grey literature, we searched through websites of various professional organisations active in the coffee and waste sectors, and conducted numerous general web searches. In addition to searching for unpublished materials on the web, we sourced unpublished evidence through connections held by members of the review team, one of whom had already published original peer-reviewed work on interventions to reduce the consumption of DCCs. This included contacts in the coffee and packaging industry (e.g. *Bewley's Tea and Coffee Company*, the *Paper Cup Recovery and Recycling Group* etc.), the third sector (e.g. *Keep Britain Tidy*, *Hubbub*, etc.), and other organisations (e.g. *Zero Waste Scotland*). We also used an informal system of expert elicitation through existing connections, to underpin and expand our literature searches.

Academic databases were searched for studies published between 10 January 2000 and 14 February 2019. Studies that were published between 1995 and 2019 were considered for

inclusion. The start date for inclusion was set based on the expansion of the coffee industry in the UK. Records of the different searches were combined to create a complete list of all the evidence found.

Search terms included: “*coffee cups*”, “*disposable coffee cups*”, “*reusable coffee cups*”, “*policies*”, “*legislation*”, “*taxes*”, “*levy*”, “*latte levy*”, “*charge*”, “*discount*”, alone and in combination. For the secondary aims of the rapid review we added various permutations of the terms: “*single-use plastic(s)*”, “*disposable*”, “*plastic bags*”, “*carrier bags*”, “*bag charge*”, “*straws*”, “*cutlery*”, “*takeaway boxes*”, “*takeaway containers*”, “*deposit return*”, and “*recycling*”.

3.1.4. Screening the evidence

After the searches were completed, the results were screened to ensure the relevance of the literature base ahead of review and synthesis. An *initial screening* included reading the title of the documents found. A judgement was then made in terms of the relevance of the document. A *secondary screening* then took place in which the abstract or introduction (if applicable) of each source was read to identify those that met the inclusion criteria to be retained for the evidence extraction and synthesis phases. This was done by multiple members of the review team to provide consistency in the way the inclusion/exclusion criteria were applied. At the end of the secondary screening phase we were left with a refined list of search returns for evidence extraction and synthesis.

3.1.5. Extraction of evidence

The screened sources were collated in an Excel file in preparation for evidence extraction. A set of criteria was generated in advance in line with the review aims, which included type of evidence (i.e. research design used, population studies, geographical and retail context, summary of the intervention applied, and outcomes measured) relating to the four aims of the review. The resulting database of extracted information was used to create a systematic map of the evidence, which forms the basis of this report.

3.1.6. Synthesis of evidence

Once we had screened and built a database of relevant evidence, we read through each source to generate findings to address the questions outlined above. A narrative synthesis approach was used to address the review question. A more quantitative synthesis of the evidence was beyond the scope of the project due to the schedule of the review and the diversity of documents and other sources that would need to be considered. However, this choice was not made for practical reasons only; a narrative synthesis is also most useful for organising and communicating review findings for policy and practice (**Popay et al., 2006**).

4.0. Results

4.1. The effectiveness of DCC charges

4.1.1. Interventions using charges

In this rapid review, we identified eight interventions in which charges on DCCs have been trialled (see Table 1). These studies are described in detail below.

Poortinga & Whitaker (2018) conducted a field study to test the effects of a charge on DCCs across 12 UK university and business sites between September and December 2016, one of which (a campus at The University of Winchester) introduced a £0.25 cost-neutral charge. Additional interventions were deployed to supplement the charge, including showcards and/or posters at each site (displaying an environmental message about the number of disposable cups going to landfill and asking customers to bring their own reusable cup; with additional messages being distributed via intranet and social media at one site). In addition, reusable cups were made available for sale in the cafe. Sales of hot drinks were recorded over five weeks (25 days) before and during the intervention.

Results showed that across the 12 university and business sites, sales of hot drinks in reusable cups increased across all sites, on average from 3.3% to 7.6% (an increase of 4.3 percentage points). The University of Winchester site (where a charge was applied) saw the biggest increase, from 5.1% to 17.4% (an increase of 12.3 percentage points).

The University of Winchester continued with the charge after the trial had officially ended, rolled out the charge across all sites, and continued to monitor sales over an extended period from November 2016 until September 2017. An additional 2,500 free reusable cups were distributed among students in February 2017. During this period, sales of drinks in reusable cups increased by 27.4 percentage points on average (i.e. 28.5%, 34.4% and 23.5% respectively). There was also a spike in drinks served in reusable cups in the period between February and May 2017 following the distribution of free reusable cups.

Sidhu, Mehrotra & Hu (2018) conducted a field study at the University of British Columbia, Vancouver (Canada) between September and the first half of November 2018. A \$0.15 discount was replaced by a cost-neutral \$0.25 charge for drinks sold in DCCs. Sales across outlets at five campus locations (3 stand-alone outlets and 2 first-year residential outlets) were monitored over this period. No additional interventions that might have affected sales are stated in the report. Sales of drinks overall and drinks sold in reusable cups were recorded and compared with sales data from the same period during the previous year (i.e. September to November 2017). Based on sales at four sites for which full data were available (one outlet was excluded because they did not have data from the previous year), sales of drinks in reusable cups increased across all sites, on average from 4.8% to 23.7% (an increase of 18.9 percentage points). The measured increase of drinks served in reusable cups following the switch from a discount to a charge suggests the greater efficacy of the latter (see also **Section 4.4.1** below).

Table 1. Results from eight interventions involving a DCC charge

Study	Location	Year	Charge	Where	Reusable cups before (%)	Reusable cups after (%)	Increase
Poortinga	UK (Winchester)	2016	£0.25	Campus	5.1	17.4 (28.5)	23.4
Sidhu (overall)	Canada (UBC)	2018	\$0.25 (£0.15)	Campus	4.8	23.7	18.9
site 1	Canada (UBC)	2018	\$0.25 (£0.15)	Campus	5.6	19.0	13.4
site 2	Canada (UBC)	2018	\$0.25 (£0.15)	Campus	3.9	18.2	14.3
site 3	Canada (UBC)	2018	\$0.25 (£0.15)	Campus	6.0	17.5	11.5
site 4	Canada (UBC)	2018	\$0.25 (£0.15)	Campus	2.6	58.8	56.2
Tufts	US (Tufts, MA)	2008	\$0.17 (£0.13)	Campus	3.1	8.1	5.0
Berkeley	US (Berkeley, CA)	2016	\$0.15 (£0.11)	Campus	0.8	6.2	5.4
ZWS2 (overall)	Scotland	2018	£0.10	Organisation	3.4	10.5	7.1
site 1	Scotland	2018	£0.10	Organisation	1.3	5.2	3.9
site 2	Scotland	2018	£0.10	Organisation	4.7	7.7	3.0
site 3	Scotland	2018	£0.10	Organisation	4.1	18.5	14.4
NHS Scotland	Scotland	2018	£0.10	Organisation	1.0	43.0	42.0
ZWS1	Scotland	2018	£0.05	Organisation	69.8	86.9	17.1
Starbucks (overall)	UK (London)	2018	£0.05	High street	2.2	5.8	3.6
site 1 (Retail/Tourism)	UK (London)	2018	£0.05	High street	1.6	4.2	2.6
site 2 (Offices)	UK (London)	2018	£0.05	High street	2.2	6.0	3.8
site 3 (Neighbourhood)	UK (London)	2018	£0.05	High street	2.8	6.5	3.7

Fisher (2008) reports on a field study, forming part of a thesis, at Tufts University, Massachusetts (USA). An intervention consisting of a cost-neutral \$0.17 charge for DCCs was introduced at a single outlet on campus with a high volume of regular customers over a 5-week period between February and March 2008. Similar as in the **Sidhu et al.** (2018) study, a \$0.10 discount for drinks sold in reusable cups was in operation across campus cafes before the charge was introduced. A minimal number of marketing displays formed part of the intervention, which did not focus on environmental messages, but comprised information sheets placed next to the till, signs inside and outside the cafe, and a menu board to inform customers about the new pricing structure.

Data on sales of drinks in reusable cups were recorded at the outlet introducing the charge and compared with sales data over the same period for the previous year. In addition, sales data were also collected from another campus outlet with the same manager, which offered a \$0.10 discount for drinks sold in reusable cups.

During the intervention period, reusable cups accounted for 8.1% of hot drink sales, compared to 3.1% of sales over the same period in the previous year when the \$0.10 discount was in place (a difference of 5.0 percentage points). This not only indicates that the charge changed behaviour, but that it did so more effectively than the previous discount. Furthermore, sales of reusable cups increased by 133%. Sales of drinks in reusable cups did not significantly change over the same period in 2007 and 2008 at the outlet that kept offering a \$0.10 discount (recording 0.37% and 0.34% hot drink sales in reusable cups, respectively).

Latimer (2016) summarises a field study undertaken by the Telegraph Green Project at Berkeley University in California (USA). Over a 5-week period in February and March 2016, a cost-neutral DCC charge of \$0.15 was introduced at a single café on campus. Following the collection of baseline sales data for a week, signage informed customers about the new pricing structure on a menu board. A supplementary intervention took place on one of the intervention trial days (a reusable cup promotional event on 'Earth Day'), though sales data for that day were removed from the analysis. Following the introduction of the charge, daily sales of drinks in reusable cups increased on average from 0.8% to 6.2% (an increase of 5.4 percentage points).

Zero Waste Scotland (2018b) conducted a trial at NHS Crosshouse Hospital (Scotland), in which drinks sold in DCCs were subject to a £0.10 cost-neutral charge. The trial took place over an 8-week period between August and September 2018. Additional interventions included a staff loyalty card offering a free drink for every 10 drinks purchased, a free reusable cup and posters advertising the trial. Following the onset of the intervention, sales of drinks in reusable cups increased substantially, from 1% to 43% (an increase of 42 percentage points in absolute terms).

Zero Waste Scotland (2018a) conducted additional trials in collaboration with two public sector organisations over a 5-week period in 2018. For the first trial, the setting was a single coffee outlet in an environmental organisation in which a cost-neutral DCC charge of £0.05 replaced a discount for drinks sold in reusable cups. For the second trial, three outlets in a local authority organisation also switched from a discount to a cost-neutral charge, though in

this trial the charge was £0.10. Sales data were collected for 5 weeks prior and for 5 weeks following the introduction of the charge intervention.

In the single environmental organisation outlet, sales of drinks in reusable cups increased from an already high 69.8% to 86.9% (an increase of 17.1 percentage points). The high reusable cup use likely reflects the environmental ethos of that particular organisation. Meanwhile, in the local authority setting, sales of drinks in reusable cups increased on average by 7.1 percentage points. This pattern varied somewhat across the three outlets, where drinks sales in reusable cups increased from 1.3% to 5.2% (an increase of 3.9 percentage points), from 4.7% to 7.7% (an increase of 3.0 percentage points), and 4.1% to 18.5% (an increase of 14.4 percentage points) respectively.

Finally, the **Hubbub Foundation** (2018) collaborated with Starbucks Coffee to conduct a trial that introduced a cost-neutral £0.05 charge for drinks sold in DCCs at a number of Starbucks outlets. The trials took place between February and May 2018 and comprised 35 outlets in different areas of London: 13 outlets in the City of London catering mainly to office workers, 11 outlets in Central London/West End catering mainly to shoppers and tourists, and 11 outlets in suburban West London mainly catering to local residents. In addition to recording sales in the outlets where the charge was applied, another 35 outlets in similar areas across the UK were used as a comparator group. Additional interventions included messages provided to customers a week before the charge was introduced and while the trial continued. Reusable cups were given more prominence in stores and paper cup recycling facilities were introduced in outlets that did not already have them.

In outlets where the charge was applied, sales of drinks in reusable cups rose on average from 2.2% to 5.8% (an average increase of 3.6 percentage points). There was a smaller increase from 2.2% to 3.3% in the comparator outlets (an average increase of 1.1 percentage points) and reflected a similar increase from 2.3% to 3.6% on average across UK outlets as a whole (an average increase of 1.3 percentage points).

Studying sales at the three different outlet sectors (i.e. offices, neighbourhoods, and retail & tourism), sales of drinks in reusable cups increased in each sector. Outlets catering to office workers saw the largest increase, from 2.2% to 6.0% (an increase of 3.8 percentage points), followed by residential outlets with an increase from 2.8% to 6.5% (an increase of 3.7 percentage points), and finally, retail and tourist outlets with an increase from 1.6% to 4.3% (an increase of 2.7 percentage points). Of particular note here is that the charge was minimal (i.e. £0.05), yet still produced a modest change in behaviour in a high-street context.

4.1.2. Messaging

There is some evidence that combining charges with tailored messages can increase the effectiveness of a charge. **Poortinga & Whitaker** (2018) found that environmental messaging led to an average 2.3 percentage point increase in sales of drinks in reusable cups.

In an extension of their original study, **Sidhu et al.** (2018) conducted a short intervention in which two of the four outlets participating in the trials introduced additional measures to supplement the existing \$0.25 charge. In both cafes, a single counter sign and three posters

were put on display. Messages were worded to encourage and offer gratitude to customers using reusable cups, as well as displaying figures on the environmental impact of disposable cups. In one café, a range of reusable cups was also displayed along with messages. To test the effectiveness of these additional interventions, reusable cup sales were recorded in the two weeks before and the two weeks after the introduction of these measures.

Taking potential wider influences on sales of drinks in reusable cups into consideration, which declined across all four outlets (negative reusable cup sales recorded on two days were removed from the analysis), analysis of the adjusted data (comparing the week immediately before the extra interventions and the second week following their introduction), showed that sales of drinks in reusable cups in the message-only outlet increased by 2.2 percentage points. In the outlet with messaging and a reusable cup display, sales of drinks in reusable cups increased by 3.6 percentage points (a difference of 1.4 percentage point between the two outlets).

Loschelder and colleagues (2019) studied the effects of a dynamic social norm message (highlighting how other people's behaviour is changing over time) over a 14-week period (10 weeks baseline followed by a 4-week intervention period) in a cafe on campus at the University of Lüneburg. Signs were placed next to three coffee dispensing machines in the campus cafe, encouraging customers to purchase their drinks in a reusable cup from the cafe (requiring a refundable deposit of €1.00), or to bring their own reusable cup, instead of taking a disposable cup (subject to an additional €0.10 charge).

Between the baseline and intervention phases of the field study, sales of drinks in reusable cups increased while sales of drinks in DCCs decreased. The average percentage of drinks sold in reusable cups increased from 23.7% during baseline, to 27.7% during the intervention (an average increase of 4.0 percentage points). Sales were compared with sales at five other campus cafes at different German universities over the same time period. No increases were found at the other cafes, suggesting that the dynamic social norm intervention was responsible for the increase.

It should be noted that sales of drinks in reusable cups were already high at baseline (around 24%), which may have been due to a charge and a cup rental scheme already in place. The study provides additional evidence that messaging can increase reusable cup use in a way that goes beyond a disposable cup charge.

4.1.3. Field study context

Surveying all of the reviewed studies using disposable cup charges as interventions, three types of context are evident, i.e. university, workplace and high-street sites. The most common settings are university campuses (comprising four of the studies: **Fisher, 2008; Latimer, 2016; Poortinga & Whitaker, 2018; Sidhu et al, 2018**); two studies used organisational settings (**Zero Waste Scotland, 2018a, 2018b**); and only one study was conducted in an 'open' high-street setting (**Hubbub, 2018**). One study (**Poortinga & Whitaker, 2018**) conducted trials at both campus and workplace sites, although a charge was only introduced at one of the campus sites.

It is likely that in closed field contexts, such as cafes at university campuses, a higher proportion of customers are motivated to make the shift to reusable cups than might be expected among the general public. One reason for this is that customers of university or workplace cafes are more likely to use the same cafe site on a regular basis and may also have a place where they can store their reusable cup. This potentially makes it easier to introduce a reusable cup into one's daily routine. This is supported by **Hubbub (2018)**, who found that outlets in predominantly office and neighbourhood areas saw a larger increase in sales in reusable cups than those in predominantly retail and tourist areas.

In addition, consumers within organisations may feel a greater obligation to act in line with the imposed interventions. Social norms are powerful drivers of behaviour (see e.g. **Farrow, Grolleau, & Ibanez, 2017**). A charge provides a signal that the incentivised behaviour is the preferred one (**Lieberman, Duke, & Amir, 2017**), in particular if customers are given a free reusable cup from their employer or university and they observe their direct peers (i.e. colleagues or fellow students) using reusable cups. Conversely, one might expect a wider range of factors to impinge upon behaviour in a more open setting. For example, a more diverse customer base with a greater proportion of passing trade may make it more difficult to increase the proportion of drinks sold in reusable cups (cf. **Hubbub, 2018**).

In summary, while charges have been found to change behaviour in different contexts, the evidence suggests that a charge on DCCs in an open high-street setting will have a smaller impact on behaviour than one in closed contexts.

4.1.4. On-the-go coffee consumption

Though coffee shops have existed for hundreds of years, they have become a ubiquitous part of most towns and cities in the past two decades (**Tucker, 2017**). With reference to the foregoing discussion of the problem of DCCs, both international coffee chains and independent coffee outlets have witnessed massive growth in demand from customers for takeaway coffee (**Niimi & Lynch, 2017**).

Benoit, Schaeffers & Heider (2016) go beyond the sparse literature citing time pressure as the main driver of on-the-go consumption, identifying hedonic factors (enjoyment) as the biggest driver, in addition to utilitarian factors (time pressure and price consciousness), and a hybrid factor (health orientation). In other words, on-the-go consumption is more than about saving time alone. They conclude that instead of only addressing longer-term utilitarian motives, interventions should also focus on shorter-term hedonic drivers.

The problem of DCCs can be seen as connected to wider cultural patterns of consumption linked to *materials* (e.g. coffee shop infrastructure, materials and coffee products), *procedures* (e.g. work routines, travel-modes and recreation) and *symbolic identities* linked to the social identity of the drinker (**Bookman, 2013**), as well as *symbolic qualities* of the beverage itself (**Niimi & Lynch, 2017**). Many of the most successful coffee chains in the UK have been introduced from North America. As such, they have introduced the cultural valuation of the portability of coffee, in contrast to traditional cafe-based continental European coffee culture (**Ferreira, 2018; Kilkenny, 2015**).

Morales (2019) discusses a range of practical issues that create barriers to using reusable cups. For customers, carrying around a reusable cup throughout the day tends to be viewed as an inconvenience. One response to this has led to the trialling of '*mug-share*' initiatives in which customers borrow reusable cups from coffee outlets. These initiatives are discussed in **Section 4.4.3** below.

Reusable cups may also prove problematic for baristas, because they vary in size and do not necessarily correspond to drink sizes served, nor necessarily fit under coffee spouts and steamers. In addition, reusable cups may need washing before they can be used, which creates additional inconvenience. In a campus bar study at Dalhousie University, Canada (**Coster et al., 2011**), the process of switching from disposable plastic cups to reusable cups was tested over a 2-week period. A particular reported problem was the inconvenience stemming from a lack of dishwashing facilities for reusable cups.

The practices and products associated with on-the-go coffee consumption are linked to complex meanings that communicate desired identities. **Morales** (2019) discusses how disposable cups not only symbolise unnecessary waste, but also possess a *culturally-valued image and style* in their design that functions as markers of status, signifying cosmopolitan lifestyles, wealth, a busy schedule and a sophisticated palette. **Daviron & Ponte** (2005) discuss the 'Starbucks Factor' on how this particular coffee chain underwent a change in marketing, through which the branded disposable cup itself became a signal of status and good taste (**Simon, 2009**). The DCC itself functions as a 'visually persuasive container' that does not challenge its use, but instead urges continued consumption and an individualised response to recycle them (through messages and images that appear on the cup itself), as opposed to communicating the need to consume less.

4.2. Economic aspects of DCC charges

The review identified different methods that could be used to estimate the size of a charge needed to leverage significant behavioural change. This can be done using 1) *evidence from intervention studies with different-sized charges*; 2) *calculating 'break-even' points between a DCC charge and the costs of a reusable cup*, whereby the economic or environmental costs of using DCCs are the same as for using a reusable cup; 3) *using contingent valuation and associated techniques*, to determine consumers' willingness to pay (WTP) for DCCs. Other economic aspects to consider, are the possible impacts of a potential DCC on high-street coffee retailers.

4.2.1 Results from intervention studies

The results from a number of intervention studies that have introduced charging for DCCs have been discussed in detail in the previous section. Figure 2 shows that there is a weak relationship between the size of the charge and the observed increase in disposable coffee cup sales.⁶

⁶ The results from ZWS1 were excluded as an outlier with atypically high sales with reusable cups (Lenaghan, Clark, & Middlemass, 2019).

Most of lower charges (between £0.05-0.13) only increased reusable cup sales by 4-7% in absolute terms. There was one exception: a £0.05 charge at an environmental organisation in Scotland increased hot drink sales with reusable cup by around 17 percentage points from an already high 70% (Lenaghan, Clark, & Middlemass, 2019). This is likely to reflect the environmental ethos of that particular organisation. Another location that saw a substantial increase in hot drink sales with reusable cups was at NHS Scotland. Here a £0.10 charge led to an increase of hot drink sales in reusable cups of 42 percentage points. A trial at the University of Winchester saw increases in hot drink sales with reusable cup from 2.3% before to 12.5% in the first five weeks after a £0.25 charge was introduced. Hot drink sales with reusable cups continued to increase to 28.5% on average in the nine months after the initial trial had finished (Poortinga & Whitaker, 2018).

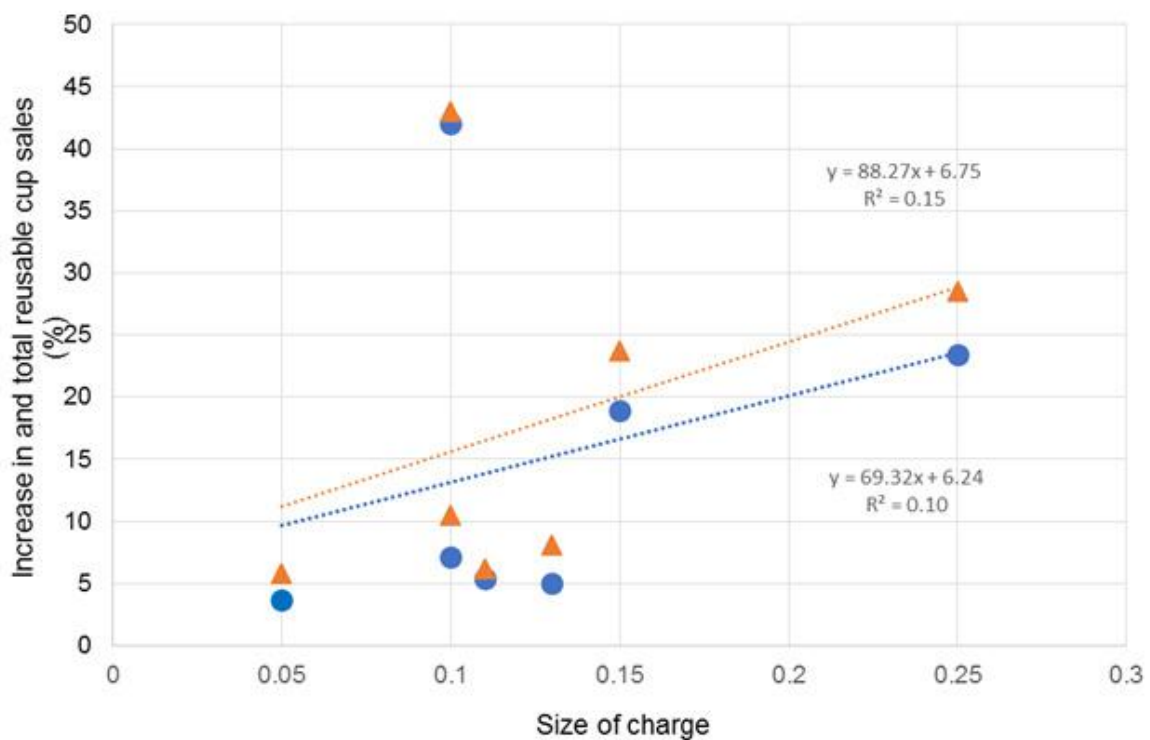


Figure 2. Association between the size of a DCC charge and increase in (in blue) and total (in orange) reusable cup sales (in %)

These results suggest that higher charges are generally more successful than lower charges. From visual inspection of Figure 2, it appears that a charge of at least £0.15 is needed to establish a substantial shift away from DCCs. Trials with lower charges almost all saw increases in hot drink sales with reusable cups that were well below 10 percentage points.

While higher charges are generally more successful in increasing reusable cup use than lower charges, the evidence base is thin and confounded by other factors. The results are based on a limited number of trials at a number of different location types (see Section 4.1.3 above) and with different additional measures taken (see Section 4.1.2 above)

The two charge trials that were the most successful in raising sales with reusable cups also distributed a substantial number of them for free among their customer base (Poortinga &

Whitaker, 2018; Zero Waste Scotland, 2018a). It is therefore possible that the success of a charge is partly dependent upon the provision of free reusable alternatives. Furthermore, most trials were accompanied by signs to inform customers about the change in pricing and by (environmental) marketing campaigns. It is however difficult to establish the role these communications played in changing customers' behaviour, as few studies reported on their content and how they were used.

Only one of the trials was conducted at a high-street coffee shops (**Hubbub, 2017c**). A relatively small charge (£0.05) more than doubled hot drink sales with reusable cups (from 2.2% to 5.8%), but this was from a very low base. These figures have to be considered in the context of rising sales with reusable cups in outlets that did not introduce a charge, suggesting that only part of this increase can be attributed to the charge itself.

4.2.2 Break-even points

According to the Paper Cup Alliance (**Ecuity, 2018**), the break-even point for a DCC charge is £0.06 for the average consumer to use a reusable cup. This is based on British consumers purchasing on average 156 hot drinks per year, and the assumption that a reusable cup costs £10. This is likely to be a low estimate given that decisions are not based on price alone and consumers may not always be able to bring a reusable cup with them.

The break-even point between DCCs and reusable cups can also be assessed based on their respective environmental impacts. The point at which the impact for reusable cups falls below that of a DCC is dependent on a number of factors, including the type of cup used, how cups are disposed of, and how often reusable cups are being washed. In terms of energy usage, ceramic mugs need to be used 25 times to be more environmentally friendly than DCCs, while 'Keep Cups' need to be used at least 16 times (**Lenaghan et al., 2019**). If the costs were to reflect the environmental impacts of the different options, the charge would need to be between £0.20 and £0.63. This assumes that ceramic and reusable mugs cost £5 and £10 respectively, and does not include costs for landfill and litter clean-up.

4.2.3 Contingent valuation

Contingent valuation is a survey-based economic technique that estimates the price at or below which a person will buy that product; or in other words, what a person is 'willing to pay' for that product. The willingness to pay for a DCC (or conversely, the willingness to accept a DCC charge) can be established through direct survey elicitation or through choice modelling techniques (**Mitchell & Carson, 1994**). The rapid review identified three sources that used these methodologies to estimate the financial incentives needed to shift demand away from DCCs.

In a 2017 survey among 2,000 UK adults, a substantial number of people indicated to be willing to pay £0.05 (25%) or £0.10 (14%) for purchasing a hot drink in a disposable paper cup (**Keep Britain Tidy, 2017**). They concluded on the basis of these results that significantly large incentives of more than £0.50 are needed to establish a significant behavioural shift away from DCCs (**Environmental Audit Committee, 2018**).

Research conducted in Ireland (**Amárach Research & Carr Communications, 2018**) asked respondents of a nationally representative survey (n=1,000) how they felt about a €0.15 levy for a single-use coffee cup. Just under half (45%) felt that it was just right, 13% thought it was too little, and 42% considered it too much. While this is not a typical WTA/WTP question, they provide insights into whether a €0.15 levy is sufficient or not to change behaviour. It is notable that groups with higher on-the-go consumption are more likely to think that the stated level is too low; suggesting that a higher levy may be needed to establish substantial behaviour change among these high-consumption groups. According to respondents, a discount for using refillable containers is more effective in encouraging behaviour change (80%) than a levy on single-use plastic goods (60%). These findings may reflect that discounts are seen as more appealing (**Luxmoore, 2018**), but that loss aversion (i.e. a greater dislike for measures that may suggest a loss rather than a gain) may make a charge more effective (see **Section 4.4.2** below).

Harris and Probert (2009) conducted a viability study at a Welsh university to reduce waste from disposable drinks containers. The study consisted of a choice experiment in which 306 participants were presented with three choice sets, with two cup types (a DCC or reusable cup) and three price levels - corresponding to low, medium and high prices (£0.77, £0.86, and £0.95 for DCCs and £0.64, £0.71, and £0.78 for reusable cups, respectively). DCCs were chosen in 37.5% and reusable cups were chosen in 62.5% of the observations.

The results of the experiment show that consumers were willing to spend about £0.10 more for coffee in a DCC. Respondents were also asked directly what discount was required to switch to a reusable cup. The most popular discount level was £0.10, chosen by 33% of the respondents; and over 55% of the sample stated that they would need a £0.10-0.15 to make a switch to reusable cups.

The differences between the studies of **Harris and Probert** (2009) on the one hand and **Keep Britain Tidy** (2017) and **Amárach Research and Carr Communications** (2018) on the other hand most likely reflect that the former research took place at a university campus, while the latter consisted of a surveys conducted among the general UK and Irish public respectively. Students may be more sensitive and able to adapt to a campus-based charge on DCCs. The **Keep Britain Tidy** (2017) study most likely reflects the willingness to pay for on-the-go DCCs at high-street coffee shops, although this was not specified in the question asked. The **Amárach Research and Carr Communications** (2018) study was explicitly about takeaway hot beverages.

4.2.4 Economic impacts of a DCC charge

Ecuity (2018) conducted an impact analysis of a possible DCC charge, commissioned by the Paper Cup Alliance “*as part of an ongoing dialogue*” with Government. According to the impact analysis, the costs of a DCC charge would outweigh the benefits. While a £0.05 and £0.25 charge would reduce paper cup waste and as a result avoid landfill, litter clean-up and carbon emission costs of £0.88m and £3.1m respectively, this would be offset by substantial lower take-away sales and as a result revenue loss of £124m and £646m respectively.

These estimates are based on the assumption that a DCC charge would raise costs of coffee accordingly. This may be an unrealistic assumption, given that an overwhelming

majority of high-street coffee chains already have discounts for customers who bring their own cups. These discounts can absorb some or whole of a potential mandatory charge on DCCs (see **Environmental Audit Committee, 2018**). Other aspects underpinning the analysis need to be explored further, including the assumed price elasticities, which were sourced from Japan (**Yohannes, Matsuda, & Sato, 2016**), and whether the results from a campus-based study (**Poortinga & Whitaker, 2018**) can be transposed directly to a high street context.

Evidence from the reviewed literature suggests that cost-neutral charges do not affect sales. **Poortinga and Whitaker (2018)** found that a £0.25 charge did not have a negative impact on the total number of hot drink sales. Similarly, **Fisher (2008)** found comparable sales before and after a cost-neutral charge was introduced at Tufts University. A study conducted at a NHS Scotland site found an increase in hot drink sales of 10 percentage points following the introduction of a £0.10 charge (**Lenaghan et al., 2019**). One study reported lower sales in some of the cases that were part of their trial, but these changes were attributed to increased local competition rather than the introduction of the charge (**Sidhu, Mehrotra, & Hu, 2018**). Several studies reported positive feedback from customers and store partners on the introduction of a charge (**Fisher, 2008; Hubbub, 2017c; Latimer, 2016**).

4.3. Charges on other disposable products

4.3.1. Plastic bags

The effectiveness of plastic bag charges. Charges have been used to discourage the usage of other disposable single-use products, most notable single-use carrier bags. Over the past two decades, many national, sub-national and local governments across the world have taken initiatives to reduce the sale or use of disposable plastic bags. These initiatives have taken various shapes and forms, varying from outright bans to the use of pricing instruments and voluntary measures (**Clapp & Swanston, 2009**). Partial and complete bans tend to be more common in Asian and African countries, while charges are more common in a wide range of Western and South American countries (**Schnurr et al., 2018; Xanthos & Walker, 2017**). Legislation is typically introduced at the local level in North America, South America and Australia, while national-level legislation is more common across Europe and a number of South African countries (see Figure 3).

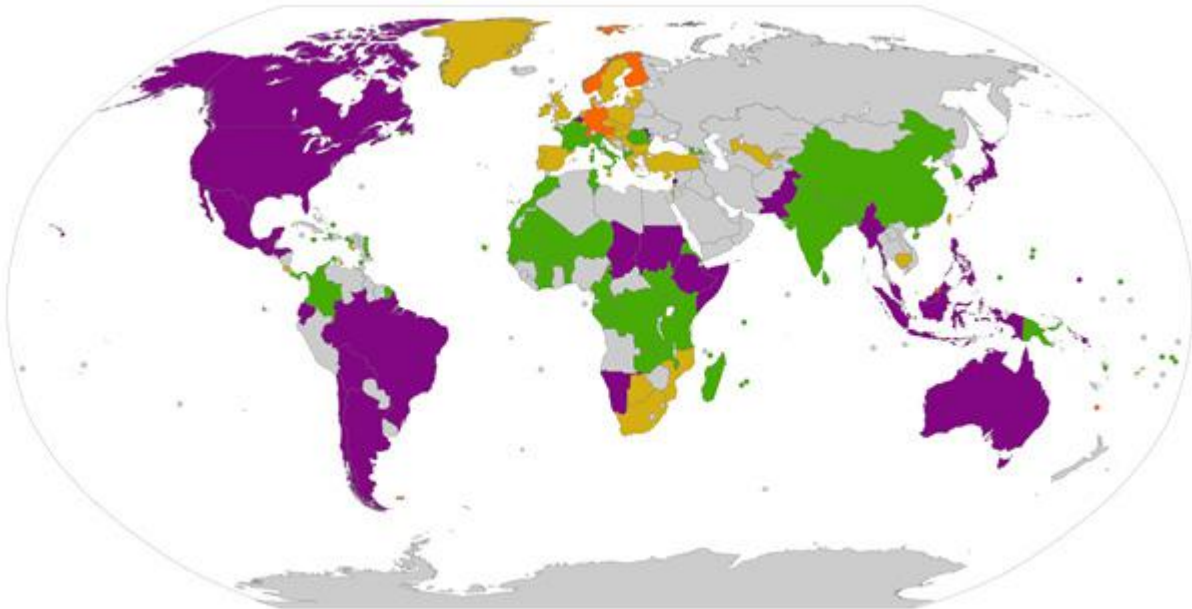


Figure 3. Plastic bag regulation around the world (■ Ban; ■ Charge; ■ Voluntary charge agreement; ■ Partial charge or ban (municipal or regional levels). Source: Wikipedia, https://commons.wikimedia.org/wiki/File:Plastic_bag_legislation.svg#/media/File:Plastic_bag_legislation.svg; CC BY-SA 3.0.

Plastic bag charges are highly effective in reducing single-use bag usage. Research by **Convery et al.** (2007) shows that the plastic bag tax €0.15 that was introduced in the Republic of Ireland in 2002 (the ‘plastax’) reduced plastic bag use by more than 90% and raised substantial revenues for the Environment Fund. A plastic bag charge of on average ¥0.33 (£0.04) that was introduced in China in 2008 led to a 49% reduction in the use of new plastic bags (**He, 2010**). A charge of R0.46 (£0.03) that was introduced in South Africa in 2003 initially reduced bag usage between 70 and 90% (**Dikgang, Leiman, & Visser, 2012**).

Homonoff (2013) reported on the impact of a \$0.05 (£0.04) bag charge that was trialled at the local level within the Washington Metropolitan Area. The study involved scanner data from a large retail chain, and a dataset of observed bag use collected two months before and two months after the charge from 16 stores in the area (n=16,251). **Homonoff** (2013) found that the charge reduced plastic bag usage by more than 40% (from 82% to 40% of customers). While the study observed absolute differences in plastic bag usage across different socio-demographic groups, the effects of the charge were the same for them (**ibid**).

The study further found that there were large differences in plastic bag usage before the charge was introduced. In shops that offered no incentive, 84% of customers used at least one disposable bag; in shops that offered a discount, 82% did; and in shops that had a charge, 39% of customers used at least one disposable bag. **Homonoff** (2013) concluded that a discount, in contrast to a charge, does not change behaviour. This is in line with research on financial incentives to discourage the use of DCCs (**Poortinga & Whitaker, 2018**).

In a supermarket observation study that was conducted in Buenos Aires, Argentina, **Jakovcevic et al.** (2014) found that increases in own bag uses were greater in supermarkets that had introduced a charge as compared to ‘control’ supermarkets where no

charge was introduced. Own bag usage grew from 7% before to around 55% two months after the charge was introduced. Similar effects were found for a supermarket that introduced a charge a few months later. **Jakovcevic et al.** (2014) did not report the size of the charge.

All four UK countries introduced charges on single-use carrier/plastic bags between October 2011 and October 2015. These all led to substantial reductions in single-use plastic bag usage. The **Welsh Government** (2012) reported a 70-96% reduction in carrier bag usage in the first six months after the Welsh carrier bag charge was introduced; **Zero Waste Scotland** (2015) reported a reduction of 80% within the first year of the Scottish charge; and **Defra** (2016) reported a reduction of 85% in the first six months following the introduction of the English charge. Data published by the Waste & Resources Action Programme (**WRAP, 2013**) shows that supermarket customers in Wales used 76% fewer single-use bags in 2012 as compared to 2011 when the single-use carrier bag charge was introduced. In England, where no charge was in place at that time, single-use carrier bag use increased by 4%.

Research by **Poortinga et al.** (2013) found a significant increase in the number of people bringing their own bags to the supermarket from 62% before to 82% after the Welsh carrier bag charge was introduced. The percentage of respondents 'always' taking their own bag/s to a supermarket rose from 27% to 43%. These findings were based on a field study in which nationally representative quota samples were collected before and after the introduction of the charge in Wales (n=500). Similar samples were collected in England, where no carrier bag charge was introduced. These served as the comparator for the study. **Thomas et al.** (2016) found even larger increases using data from the Understanding Society Survey. The proportion of respondents who 'always' bring their own shopping bag increased from around 47% in 2009/10 to 74% in 2012/13 in Wales, while rates dropped to 44% and 41% over the same period in England and Scotland respectively.

Thomas et al. (2019) reported on a multi-method evaluation of the English plastic bag charge that was introduced in October 2015, including a controlled before-and-after survey in England, Scotland and Wales and a supermarket observation study (also see **Poortinga, Sautkina, Thomas, & Wolstenholme, 2016**). They found an immediate and profound change in bag usage after the English charge was implemented. Whereas before the charge about one in four respondents from England "Often/Always" took single-use plastic bags doing their main and top-up food shop, this fell to around one in ten after the charge was introduced. Within six months after the plastic bag charge was introduced, plastic bag use and own bag use in England was statistically indistinguishable from Wales and Scotland where bag charges were introduced in 2011 and 2014, respectively. Controlled before-and-after observations at English and Welsh supermarkets showed that just over a half (55%) of shoppers in England used plastic bags before, falling to one in five shoppers (21%) after the charge was introduced. In Wales, where a bag charge was introduced in 2011, bag usage remained stable over time. Again, bag usage in England was comparable to bag usage in Wales after the English plastic bag charge was introduced (**Thomas et al., 2019**).

The long-term effectiveness of plastic bag charges. There are some suggestions that a charge needs to be increased after a number of years in order to retain its effectiveness, although the evidence is inconsistent. In Ireland, plastic bag use started to increase again after the initial sharp drop in bag consumption. Plastic bag usage decreased once more after

the levy was raised from €0.15 to €0.20 in 2007. In South Africa plastic bags use went up in the two years following the introduction of the plastic bag levy in 2002. However, in South Africa the statutory bag price was removed three months after its introduction, following pressure from bag manufacturers, leading to a substantial price reduction at most retailers. This was swiftly followed by a rebound in demand for single-use plastic bags (**Dikgang et al., 2012**). Later increases in the charge did not substantially affect sales of plastic bags, most likely because consumers were already accustomed to the charge (**Dikgang & Visser, 2012**).

However, research by **Poortinga and colleagues** (2016) shows that even a modest charge of £0.05 can be highly successful in changing behaviour and maintaining that behaviour change in the long term. **Warmington et al.** (2016) estimated that the Welsh carrier bag charge reduced single-use carrier bag usage by 71% over the three years following its implementation. **Poortinga et al.** (2016) found evidence that five years after the introduction of the Welsh carrier bag charge a great majority of shoppers in Wales still brought their own shopping bags to the supermarket.

How does a plastic bag charge work? Policies designed to change behaviour often assume that behaviour is reasoned and planned, and that providing information and incentives will change behaviour as people process available information and adjust their actions accordingly (**Dolan et al., 2012**). From an economic perspective, a bag charge is effective because it alters the costs and benefits of the different behavioural options. Single use products, such as a plastic bag, can then be assessed in terms of its 'elasticity', i.e. the rate of change in the use of a product as the price of a product increases. Research has shown that even relatively small charges can produce a substantial reduction in plastic bag usage (**Thomas et al., 2019**). These plastic bag charges then have extremely high price elasticities (**Dikgang et al., 2012; Dikgang & Visser, 2012**).

It has therefore been argued that, rather than being an economic instrument, a plastic bag charge acts as a '*habit disruptor*' (**Poortinga et al., 2016, 2013; Thomas et al., 2019**). That is, a charge makes the decision to use a single-use plastic carrier bag a deliberative instead of an automatic process (**Poortinga, 2017**). Habits are behaviours that, over time, have become automatic responses to cues in the environment to the point where exposure to familiar cues bypasses intentions to change the behaviour. Once a familiar and stable context is changed, e.g. by the introduction of a charge, the automaticity of habits decreases and greater awareness and consideration is given to the behaviour, including consideration of new information. In other words, even a small charge makes shoppers 'stop and think' whether they really need a disposable bag that is likely going to be used only once.

The '*habit disruption*' interpretation is supported by the observation that the effects of a plastic bag charge are the same across a wide range of socio-demographic groups. **Thomas et al.** (2019) found that the English plastic bag charge led to an immediate change in behaviour and attitudes, irrespective of age, gender or household income. **Homonoff** (2013) similarly found that the rate of change was the same for different socio-demographic groups, even if absolute levels of bag usage were different.

4.3.2. Plastic straws, cutlery and food containers

The rapid review did not find any sources that reported on charges applied to other disposable products. Similarly, a recent systematic review of international market-based interventions only identified studies on charging for single-use plastic bags (**Schnurr et al., 2018**). There is anecdotal evidence that a £0.25 charge on take-away containers has been effective (*personal communication with University of Winchester's Catering Operations Manager, 12 February 2019*), but no official or systematic evaluation of the scheme (or any other scheme) has taken place. Disposable products, such as plastic straws, cutlery, and take-away food containers, have mostly been subject to national or local bans and non-legislative interventions (**Schnurr et al., 2018**). Non-legislative interventions typically involve grassroots and third-sector initiatives to remove or minimise the use of single-use plastics. These initiatives were not considered in the current rapid review.

4.3.3. Lessons from charges on other disposable products

Experiences with plastic bag charges across the world have shown that charges can be an effective way of establishing substantial behaviour change. It is however not clear whether the findings can be transferred directly to other disposable products, such as DCCs. One of the reasons as to why plastic bag charges are successful, is that consumers find it relatively easy to adapt to them. Plastic bags are not always needed, and research by **Poortinga and colleagues** (2016) has shown that a charge, even a small one, acts as a habit disrupter.

Changing on-the-go coffee consumption requires more advance planning on the part of the consumer. DCC use may therefore be more difficult to disrupt, especially when the purchase is impulsive and no convenient alternative is available at the point of purchase (**Environmental Audit Committee, 2018**). This may also explain why charges may be more effective at closed locations, such as workplaces and universities. Bringing a reusable cup may more easily become part of a person's routine, for example when going to University; and office workers may be able to store and clean their ceramic or reusable cup after they have used them.

There is however the possibility that a national-scale charge can be expected to more effective than one that has been introduced at a single coffee shop chain (**Hubbub, 2018**). Charges do not only work on the basis of loss aversion, but also communicate that reusable cups are the preferred option (**Lieberman et al., 2017; Loschelder et al., 2019**). A nationwide charge would clearly signal a norm to use reusable cups, and customers may be more willing to make changes to their day-to-day routine when they expect to have to pay a charge every time they buy a hot drink on the go.

4.4. Other measures to reduce consumption of DCCs

There are other options available to reduce the use of DCCs, including *discounts, mug-share schemes, bans* (or the voluntarily removal of DCCs), and *initiatives to increase recycling*. The latter option will not reduce the use of DCCs but will avoid them going to landfill.

4.4.1. Reusable cup discounts

Across a number of coffee retailers discounts have been available for some time to customers who bring their own reusable cup to purchase a drink. Starbucks Coffee have promoted reusable cup offers and discounts since 1985. Following a pledge to achieve 25% of sales in reusable cups by 2015, in the UK the company offered a £0.25 discount and £1.00 reusable cup offer. In 2011, sales of drinks in reusable cups were less than 2%. Starbucks doubled the existing discount in 2015 from £0.25 to £0.50, though sales of drinks in reusable cups amounted proportionally to only 1-2% of total drink sales (**Environmental Audit Committee, 2018**). Pret-a-Manger announced in 2018 that it would also double its reusable cup discount from £0.25 to £0.50 in parallel with Starbucks and Costa Coffee (**Luxmoore, 2018**). However, discounts on the high street have to date made only marginal impacts on cup use.

A number of academic studies have examined the effects of reusable cup discounts. **Poortinga & Whitaker (2018)** studied a range of interventions at 12 business and university campus locations. Three of these locations (2 business and 1 campus location) offered discounts for using a reusable cup. Overall, sales of drinks in reusable cups increased from an average of 6.5% before the intervention, to 11.9% after the intervention (a difference of 5.4 percentage points). However, it should be noted that different combinations of interventions were used across the three sites. At all three sites the discount was accompanied by posters/showcards (details on messaging are given above in **Section 4.1.2**). At the two business sites, reusable cups were also offered for sale, while in one of the business sites free reusable cups were also given away. The authors report that, overall, applying a discount in itself does not affect sales. It may therefore be that discounts are more effective in combination with other measures.

In some of the disposable cup charge studies summarised in **Section 4.1** above (e.g. **Fisher, 2008; Sidhu, Mehrotra, & Hu, 2018**), reusable cup discounts were replaced with disposable cup charges, leading to significant increases in reusable cup use. From a retail and customer perspective however, discounts may be perceived to be more appealing than charges. Discounts imply a generosity on the part of the retailer, whereas taxes or charges do not (**Luxmoore, 2018**). Nonetheless, discounts appear less effective in changing behaviour than charges, in both closed and open settings.

4.4.2. Barriers to the effectiveness of discounts

There is strong evidence that discounts are less effective than charges when trying to restrict use of single-use products, including DCCs. Discounts are still offered by most main coffee retailers, some of which are substantial. Starbucks is the only major coffee retailer that has introduced a small charge on DCCs of £0.05 alongside a discount (**Starbucks, 2018**).

There is an abundant literature on Prospect Theory (**Kahneman & Tversky, 1979**), which postulates that people perceive losses (such as costs or charges) to be of greater magnitude than gains (such as bonuses or discounts). In other words, people tend to be more sensitive to losses than to gains when making decisions. This suggests that consumers may not be as motivated to bring a reusable cup at the prospect of gaining a discount as they are at the prospect of avoiding a charge.

Framing a financial incentive as a charge further communicates that using a reusable cup is considered the default, because you have to pay *extra* for a DCC rather receiving a *reduction* on the advertised coffee price. **Lieberman et al.** (2017) found that an incentive presented as a surcharge (rather than a discount) significantly increases the perceived injunctive norm⁷ of the incentivised behaviour, such as bringing a reusable bag; and also increases the expectation that other customers would behave in that way. This suggests that a charge may work better than a discount because it provides a signal that the desired behaviour is normative.

4.4.3. Mug-share schemes

Mug-share schemes operate in a similar way as other deposit return or cup rental schemes. Customers pay a deposit for a reusable cup which is then refundable upon return. Small interventions have been piloted fairly extensively, though very few have been formally evaluated. It is therefore not clear how effective they are at reducing the use of DCCs.

Most mug-share initiatives have typically been small in scale and introduced at several university campuses. For example, **Karna et al.** (2016) report on a mug-share programme at the University of British Columbia (Canada), in which customers pay a \$5.00 deposit and then receive a laminated membership card they hand in as a deposit when they purchase a beverage in a reusable cup. The card is given back when the cup is given back. **Evans and colleagues** (2016) report on a number of mug-share pilot programmes that were trialled at Northern American Universities. The programmes were introduced in a number of small student-run cafes on campus. The University of Northern British Columbia allowed customers to borrow a reusable mug, which then were collected at the end of the day by volunteers. It is unlikely that such an approach can be rolled out across multiple outlets.

Project MUG (**WWW, 2013**) at Western Washington University (USA), piloted in the autumn of 2013, involved a similar rental system that allowed students to check out a reusable mug with a special card as a deposit, which was returned when bringing back the mug to the cafe when finished. The project was well received by students using the cafe. The most favourite aspects of the scheme were not having to remember bringing a mug from home and not having to clean them. Most students wanted to see the project expanded to full campus, although the project was discontinued after the trial.

Karna et al. (2016) describe four different mug share projects in North America. The 'Borrow-a-Mug' initiative at the University of Northern British Columbia started in 2012, with donated reusable cups placed outside of the local Tim Horton's for students and staff to use. Borrowed mugs could be returned at various collection points, and were collected and washed by volunteers. In 2015, the scheme was upgraded with recognisable and branded mugs. Similarly, at the Emily Carr University in Vancouver, a student art project has been providing free reusable mugs which can then be returned in designated return bins since 2009. In Portland and San Francisco, the Go Box initiative works based on an app and distributes reusable to-go boxes for \$18 per year. The reusable boxes can be returned to

⁷ an injunctive norm is what people perceive to be the approved behaviour (Cialdini, Reno, & Kallgren, 1990).

'drop boxes' which can easily be found via the app. Lastly, a 3-day student-run trial in New York City piloted a \$5 deposit for a reusable mug, with participants keeping the cup lids to identify membership to the scheme. Collection bins were placed in-store and at a nearby station for convenience.

Guo et al. (2015) studied perceptions of a mug-share programme at Dalhousie University (Canada). They surveyed 400 students and faculty staff in three campus coffee outlets over a 2-week period. They found support for the implementation of a mug-share program to be high, with 88% of participants responding that they would participate in the programme, 82% feeling that DCCs were an unnecessary source of waste, and 78% being motivated to reduce waste. The most popular advantage of a mug-share programme was expressed as being the convenience of not having to carry your own reusable mug (47%). Conversely, 59% were discouraged from participating by concerns about cleanliness, and 53% cited the inconvenience of having to return the reusable cup.

Garcia-Alonso et al., (2016) report on a mug-share initiative at the University of British Columbia (Canada), in which the relative merits of stainless steel and ceramic cups were compared. While each type of cup had its own pros and cons, stainless steel cups were found to produce the most CO₂ in their production, but were also more durable. Ceramic cups were not recyclable but generated no emissions after disposal. Overall, ceramic mugs were judged to be the most sustainable choice as long as care was taken to avoid breakage.

There are a few larger-scale initiatives at the local (city) or national level and appear successful based on the number of businesses signing up to them. In November 2016, the German city of Freiburg rolled out the '*Freiburg Cup*' deposit-return scheme. Customers are able to use a reusable cup for a €1 deposit and return them at any of the 119 participating businesses within the city boundary (**FreiburgCup, 2019**). The cups are washed and disinfected in-store, and can be reused up to 400 times. In 2019, participating businesses also started offering a reusable cup lid for €0.50, but these are not returnable for hygiene reasons. The lids are however reusable, and customers can decide to do so themselves.

The German RECUP initiative is an app-based deposit-return scheme with over 2000 partners nationwide (**RECUP, 2019**). Companies across the country have signed up to the scheme, and as a result has become the 'official' deposit-return scheme for over 20 German cities and municipalities. RECUP has three different cup sizes available, as well as reusable lids (**RECUP, 2019**). Customers pay a deposit of €1 for a cup, which can be reused up to 500 times (**Lenaghan et al., 2019**). Although the initiative seems to be successful with many companies signing up to the scheme, there has been no official or systematic evaluation, making it difficult to assess how effective they are at reducing the use of DCCs.

On top of their voluntary removal of DCCs at the British coffee chain Boston Tea Party (see **Section 4.4.2** below), the company offers a 'loan scheme' in which customers can use a cup for a small price (£4.50) and get a refund when returned in good condition at any Boston Tea Party branch (**Boston Tea Party, 2019**).

4.4.4. Banning or removing disposable cups

Other initiatives have involved banning plastic items, either through legislation (e.g. **Schnurr et al., 2018**) or through voluntary action by business owners themselves. Bans have not been applied to DCCs specifically, but they may have been included as part of wider bans to reduce single-use plastic usage.

DCCs have been removed in a number of businesses in the UK. Most notably, Waitrose removed all of the DCCs from its stores in autumn 2018. This ban is said to save 52m DCCs per year, and is part of the company's commitment to plastic and packaging reduction (**BBC, 2018a**). Another company that has removed DCCs altogether is the Boston Tea Party coffee chain, which has 21 branches across England. A previously implemented discount of 25p on reusable coffee cups only led to an uptake of 2.8%. Currently, customers who do not bring a reusable cup are able to buy one in store for £4.50 (**BBC, 2018b**). The ban has saved 17,500 DCCs from landfill in just one month, although the chain has taken a hit on takeaway hot drink sales of 24%.⁸ It is however not clear what proportion of overall sales this constitutes, and whether any substitution to in-store consumption has taken place.

Santa Monica City Council was one of the first cities to ban all single-use plastics for prepared foods (**Alsop et al., 2004**), encompassing plastic straws, lids, utensils, plates, bowls, trays, containers, stirrers, cups and lid plugs, and to substitute them for products made of other materials such as paper, fibre and wood (**City of Santa Monica, 2018**). This formed part of their zero-waste strategy, although no evaluation of the effectiveness of the policy could be found.

4.4.5. Initiatives to increase recycling

Some major coffee chains and industry organisations in the UK have focussed their efforts on initiatives to increase the recycling of DCCs. The charity Hubbub has trialled multiple public recycling campaigns in London, Manchester, and Leeds. These initiatives do not necessarily aim to reduce the use of DCCs, but try to increase the recycling rates of on-the-go food and drink packaging, including DCCs.

In a project called the *#SquareMileChallenge*, Hubbub attempted to collect and recycle DCCs used for on-the-go coffee consumption (**Hubbub, 2017b**). The project succeeded with almost 510,000 cups being collected in the first month of the initiative. The project continues with currently over 4m DCCs collected since the initiation of the project. The campaign has spread over major coffee retailers, 35 businesses, the City of London and Network Rail, and has created 117 places to recycle DCCs around a designated square mile in the City of London. During April 2017, seven giant coffee-cup bins were positioned on the streets across the square mile for both recycling and awareness purposes. While the giant street bins have since been removed, over 100 recycling points still remain (**Hubbub, 2017b**).

The predecessor of this project was the *#1MoreShot* campaign, which was trialled in Manchester between October 2016 and February 2017 (**Hubbub, 2017a**). The trial included bright yellow coffee cup shaped bins on Oxford Road, and the cups collected have now been recycled into plant pot holders, bird feeders and chalk boards (**Hubbub, 2017a**).

⁸ <https://www.somersetlive.co.uk/news/incredible-number-single-use-coffee-1741307>

The *#LeedsByExample* project is an initiative that tries to more effectively capture disposable packaging and containers that are thrown away on the high street in Leeds (**Hubbub, 2019**). The initiative involves bright yellow street infrastructure and a 'We recycle' app that shows whether and where packaging can be recycled. Dedicated orange bins are used to collect DCCs. The initiative is accompanied by a colourful and 'playful' marketing campaign. The preliminary results of the project show that the materials collected are less contaminated; and that they are of good enough quality to be recycled. It is claimed that over 250,000 cups have been collected between October 2018 and February 2019.⁹

It is however not clear what proportion of the overall number of DCCs consumed this constitutes. There are indications that it may only be a relatively modest amount of the total number used (**Environmental Audit Committee, 2018**). A pilot project at a Welsh university, which introduced dedicated bins across one of their campuses, reported recycling rates of 13-16% of total DCC sales.^{10 11}

Other major coffee chains and big corporations have adopted recycling schemes for DCCs (**Keep Britain Tidy, 2017**). The coffee chain Costa Coffee has adopted an in-store recycling scheme in which they accept any DCC (including those of other retailers) in an attempt to recycle one disposable cup for every cup sold (**Costa, 2019**). Fast food chain McDonalds has installed over 1,000 DCC recycling units in their UK restaurants since 2015 (**McDonald's, 2019**).

Following the mug-share DRS initiatives described above in **Section 4.4.3**, several countries and regions around the world have implemented mandatory deposit return schemes for single-use drink containers. These schemes usually achieve very high collection and recycling rates: over 80% on average, with over 95% recycling rate in some instances (**Albrecht, Brodersen, Horst, & Scherf, 2011**). Germany is at the top of this list, with a €0.25 deposit and a return rate of 98.5%. Increasing the financial incentive can potentially increase the return rate: the mandatory deposit in Michigan (US) was doubled to \$0.10 and increased the return rate to 95%.

5.0. Summary and Conclusion

This rapid review set out to investigate existing evidence concerning the implications of introducing a charge for DCCs. This included evidence on their *effectiveness in changing behaviour*, *economic aspects* of DCC charges (including the optimal size of a charge); transferable evidence from *charges on other disposable products* (such as single-use plastic bags); and *other measures to reduce the environmental burden of DCCs* (such as mug share schemes, bans/removal of DCCs, and efforts to increase the proportion of DCCs being recycled).

⁹ <https://t.co/K0ngghMZ48>

¹⁰ <http://www.cardiffmet.ac.uk/news/Pages/New-on-the-go-recycling-campaign-launched.aspx>

¹¹ <https://twitter.com/CMetEnvironment/status/1092442199437045760>

5.1. The effectiveness of DCC charges

The review shows that charges on DCCs and other disposable products are highly effective at establishing behavioural change. The eight interventions that introduced cost-neutral charges were all found to significantly increase hot drink sales in reusable cups. However, the review found large variations in the size of the increase, ranging from 4 to 42 percentage points overall.

The effectiveness of a charge was linked to a number of factors beyond the introduction of the charge itself, including (a) *clear messaging and social marketing campaigns*, (b) the *presence of other measures* to promote the uptake of reusable alternatives, (c) the *location* where the charge is introduced, and (d) the *size of the charge*.

Sufficient evidence exists that clear messaging and social marketing alongside a charge can help to promote the uptake of reusable cups, by informing customers about the introduction of the charge and by making environmental appeals. In particular, initiatives that used environmental messages to inform customers about the impacts of DCCs (**Poortinga & Whitaker, 2018; Sidhu et al., 2018**) and those highlighting social norms (**Loschelder et al., 2019**) were the most successful in increasing reusable cup use/reducing DCC use.

The two charge trials that were the most successful in raising sales with reusable cups also distributed a substantial number of them for free among their customer bases (**Poortinga & Whitaker, 2018; Zero Waste Scotland, 2018a**). It is therefore possible that the initial success of a charge is partly dependent upon the provision of free reusable alternatives. This raises the issue of whether a national-level charge will result in similar shifts away from DCCs if no consideration is given to how customers can adapt to the charge on the high street (also see **Section 4.1.4.** on on-the-go consumption below).

Initiatives at 'closed' locations, such as university campuses and workplace cafes, appear to be more successful than those conducted on the high-street. This may reflect that these cafes are used on a more regular basis by the same customers, who may also have a place to store and clean their reusable cup. This makes it easier to incorporate the use of a reusable cup into one's daily routine. In addition, participants in these trials may feel more personally committed or a greater deal of social expectation to change their behaviour expectation than participants in more open locations. The evidence is however inconclusive as only one trial has been conducted on the high street (**Hubbub, 2018**), with a charge (£0.05) that is well below what most people are willing to pay for a DCC (also see **Section 5.2** below).

5.2. Economic aspects of DCC charges

While higher charges appear more successful in increasing reusable cup use than lower charges, the evidence base is thin and confounded by other factors (see **Section 5.1** above). There is some evidence that small charges of £0.05 to £0.10 are unlikely to be effective in leveraging widespread change. It is, however, less clear whether and under what conditions higher charges would produce more substantial behaviour change.

Evidence from break-even calculations and research using contingent valuation techniques suggest that substantially larger charges (of a minimum of £0.15 or £0.20) are needed to establish a significant behavioural shift away from DCCs. The majority of respondents surveyed in Ireland (**Amárach Research & Carr Communications, 2018**); indicate that a €0.15 levy on DCCs was 'too little' (14%) or 'just about right' (45%); and research conducted in the UK shows that around 25% were willing to pay £0.05, 14% would pay £0.10 and another 10% would pay £0.15-0.20 for a DCC instead of using a reusable cup (**Keep Britain Tidy, 2017**). This means that a minimum charge of £0.20 is needed in order to change the behaviour of 49% of the population. Students appear to have a lower willingness to pay for DCCs (**Harris & Probert, 2009**), which may explain the relative success of charges introduced at campus locations.

It has to be considered that the willingness to pay estimates are derived from generic population samples, while the evidence suggests that groups characterised by higher on-the-go coffee consumption are less sensitive to charges. (**Amárach Research & Carr Communications, 2018**). This means that a more detailed analysis of willingness to pay among different consumer groups to provide more robust support for determining the optimal size of a charge to change behaviour. This may also be linked to the strength of hedonic, utilitarian and other factors within those groups (**Benoit et al., 2016**), as well as the influence of symbolic meanings conferred by on-the-go consumption (**Daviron & Ponte, 2005**).

Charges are unlikely to substantially affect hot drink sales where they can be implemented in a cost-neutral way. None of the reviewed interventions reported reductions in hot drink sales that could be attributable to such a charge. Most high-street coffee chains, and many independent coffee shops, already offer their customers sizeable discounts for using reusable cups. This suggests that a modest mandatory charge (e.g. of £0.25) can readily be absorbed by existing discounts (**Environmental Audit Committee, 2018**). Higher charges (e.g. of £0.50) may affect sales due to them potentially exceeding the existing discounts offered, and thus increasing the price of coffee and other hot drinks.

Any future implementation of a charge would benefit from an independent cost-benefit analysis of its economic and environmental impacts, including a Life Cycle Analysis (LCA) to indicate how a reduction in DCCs and an increase in reusable cup use might affect resource use. While there are benefits associated with avoiding landfill and litter clean-up costs, there are also administrative and enforcement costs, as well as possible changes in costs and revenues to retailers and producers. This needs to be complemented by LCAs of DCCs and their ceramic and reusable alternatives to compare their environmental profiles. LCAs may be conducted using existing sources (see e.g. **Potting & van der Harst, 2015; Refiller, 2013**).

5.3. Charges on other disposable products

Charges have been used to discourage the usage of other disposable single-use products, most notably, single-use carrier bags. The available evidence on the effectiveness of charges on plastic or other single-use carrier bags suggests that a reduction of 50-90% can be achieved in the short term, and that even a small charge can maintain large parts of that behaviour change in the long term (**Poortinga et al., 2016; Warmington et al., 2016**).

It is unlikely that the impressive reductions in plastic bag consumption brought about by bag charge legislation could be reproduced with DCCs. In contrast to the results from trials involving DCC charges, even small plastic bag charges have shown surprisingly large effects (**Dikgang et al., 2012; He, 2010; Homonoff, 2013; Poortinga et al., 2013; Thomas et al., 2019**) across different socio-economic groups (**Thomas et al., 2019**).

This has led to suggestions that a plastic bag charge acts as a habit disrupter, by making people 'stop and think' about whether they need a single-use plastic bag or not (**Poortinga et al., 2016**). This more readily leads to behaviour change because consumers only have to make modest changes to their day-to-day practices to avoid paying for a bag (**Thomas et al., 2019**). In contrast, changing on-the-go coffee consumption requires more advance planning on the part of the consumer. DCC use may therefore be more difficult to disrupt, especially when the purchase is impulsive and no viable alternatives exist (**Environmental Audit Committee, 2018**).

An additional reason as to why consumers may fail to adapt to a charge is that the reward schemes are different for each coffee chain. A nationwide charge provides consistency across high street retailers and may as a result lead to greater behaviour change than has been observed in the sole high street trial (**Hubbub, 2018**). A small-scale trial at a single coffee shop chain may be seen as an ephemeral novelty, as well as allowing consumers to vote with their feet and consume elsewhere. A nationwide charge would signal a norm to use reusable cups (also see **Section 5.4**), creating a social context more conducive to facilitating change within people's day-to-day routines. If an individual anticipated a surcharge for a DCC whenever and wherever they purchased a cup of coffee this would potentially lead to more consistent and lasting behaviour change in the direction desired (**Environmental Audit Committee, 2018**).

5.4. Other measures to reduce the consumption of DCCs

The review identified a range of other initiatives that have been used across the world to reduce the consumption and environmental burden of DCCs, including discounts, mug-share initiatives, bans, and initiatives to increase the recycling of DCCs.

It is clear that discounts, unlike charges on DCCs, are not particularly effective in establishing behaviour change. Evidence from intervention studies on DCCs shows that they do not work beyond a marginal degree and therefore will not create a significant impact on DCC consumption (e.g. **Poortinga & Whitaker, 2018**). This is further supported by evidence showing that a discount on plastic bags does not change behaviour (**Homonoff, 2013**). The ineffectiveness of a discount can be explained by customers being less sensitive to a gain than to a loss (**Kahneman & Tversky, 1979**); and that it still signals the use of DCCs as the default option (**Lieberman et al., 2017**).

Several mug-share schemes have been introduced at the local, regional and national level, in which customers can borrow a reusable cup for a deposit (similar to a deposit-return scheme); the deposit is returned once the customer has finished with the cup. German schemes like RECUP and Freiburg Cup appear successful given the number of retailers

signing up to them; although no official evaluations exist showing how effective they actually are. Mugshare and other deposit-return initiatives may be beneficial in combination with a DCC charge, as they deal with the practicalities associated with on-the-go coffee consumption while providing an incentive to return reusable containers (also see **Section 5.5** below). Schemes have been well received by customers as they avoid the need to have to remember or carry around a cup, as well as removing the problem of having to clean and dry that cup.

Bans, introduced either through legislation or through voluntary action by retailers, can be an effective way of reducing DCCs, although they can affect take-away sales if they are imposed by individual retailers rather than applying to the coffee industry across the board. In many cases, bans have been accompanied by a mug-share scheme, and increased sales of reusable cups.

There have been a number of initiatives at the local level to improve the collection and recycling of DCCs, such as 'The Square Mile Challenge' in London (**Hubbub, 2017c**) and the 'Cup Movement' in Glasgow (**Marland, 2019**). In addition, high-street retailers have made efforts to increase in-store collection facilities (**Dickinson, 2018**). While the absolute number of cups recycled in these initiatives are impressive (see e.g. **Hubbub, 2017c**), this often still constitutes a small proportion of the overall number of DCCs used (**Environmental Audit Committee, 2018**), and does little to address the wider problem of DCC consumption.

It is important to consider that initiatives to increase the recycling of DCCs have a place alongside those trying to increase the use of reusable cups. In line with the Waste Hierarchy, prevention and reuse should be prioritised over recycling and disposal. However, recycling and charge interventions could operate in concert, as they differ in their focus and impacts that are not easily substitutable.

5.5. Other considerations: on-the-go consumption

The introduction of a mandatory charge is likely to be effective in shifting demand away from DCCs, although there is still significant uncertainty as to the nature and the degree of change that would be brought about by charge legislation, as well as public receptiveness to the charge.

One of the greatest sources of uncertainty is the on-the-go nature of coffee consumption, and as a result consumers ability and willingness to adapt to a charge. DCCs not only symbolise unnecessary waste, but also communicate other, more positive qualities associated with the identity of the consumer and cosmopolitan lifestyles (**Morales, 2019**). Such qualities potentially make DCC consumption more resistant to change than, for example, plastic bags.

Policies aimed at changing DCC consumption should take account of the cultural significance of DCCs. This highlights the importance of messaging and social marketing. Other measures (e.g. mug-share schemes) are also required to construct a portfolio approach, which can help support the desired behaviour change by both altering meanings

and dealing with the more practical issues associated with sustainable consumer behaviour change (also see **Section 5.3** above).

5.6. Conclusions

The evidence surveyed in this review indicates support for a DCC charge to alter consumer behaviour in a way that effectively reduces the environmental impact of coffee consumption. A charge should be of a sufficient size to leverage behaviour change, but not exceed existing discounts to avoid any potential negative economic impacts. We have pointed out that the evidence base for DCC charges is small and gaps in the literature exist, but that there are some learnings from other disposable products and interventions, such as the plastic bag charge, that may be transferable to DCCs.

Other interventions, principally discounts, mug-share and recycling schemes, while leveraging behaviour change, fail to do so on a scale needed to deal with the problem of DCC waste; but could be considered alongside a charge to minimise the consumption and overall environmental burden of DCCs.

The decision to implement a charge would benefit from an independent cost-benefit analysis of its economic and environmental impacts, including a Life Cycle Analysis (LCA) to indicate whether possible costs associated with a charge are commensurate with the environmental benefits. Alternative options, including initiatives that facilitate use of reusable cups and those that aim to increase recycling of DCCs, should be part of such cost-benefit analyses, given that these also have infrastructure, maintenance and management costs associated with them.

Finally, despite the significance of the size of a charge in affecting both consumers' receptiveness and behavioural responses to that charge, the charge-setting rationale would benefit from a greater understanding of perceptual and behavioural responses to differently-sized charges in different contexts. This would help to address gaps in the existing literature, and facilitate the implementation of future policy to change behaviour in relation to other disposable items and environmentally unsustainable practices.

6.0. References

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