

# PREVENTING THE OVERCONSUMPTION AND DISPOSAL OF REFILL AT HOME FAST-MOVING CONSUMER GOODS – INTERVENTIONS THAT SUPPORT CIRCULAR CONSUMER JOURNEYS

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## ABSTRACT

Context and problem: Reuse is positioned as a strategy capable of countering single-use overconsumption and disposal. For refill at home FMCGs, consumers are responsible for carrying out behaviours that enable this, such as keeping and using products for a prolonged period. However, it is not known if consumers actually fulfil these responsibilities. Aim: This research aims to understand the extent to which consumer reuse behaviours supports the intended reduction in impact and, if not, consider how best to improve it. Method: In-depth interviews with 15 consumers were conducted where the behaviour chain method was used to map resource journeys for 31 refill at home offerings. Results: Five models of consumer behaviour increased the impact of reuse. The critical moments which led consumers to carry out these behaviours were identified, uncovering intervention areas. Conclusions: The behaviour models and critical moments offer a first attempt to systematically analyse how and where actual consumer behaviour can increase the impact of refill at home FMCGs. The results call for focussed interventions across the consumer journey that support reuse components as part of a system.

**Keywords:** Circular economy, Human behaviour in design, Refill at home, Sustainability, Fast-moving consumer goods

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# 1 INTRODUCTION

For decades, single-use fast-moving consumer goods (FMCG) have been the norm, contributing significantly to virgin materials consumption and waste accumulation. Whilst recycling is increasingly being harnessed as a tool to divert some of the resulting waste from landfill and incineration, it does not tackle the speed of consumption or quantity of disposed materials. Reuse, instead, is a practice that holds the capacity to extend the utility of materials. This is, however, based on the assumption that consumers reuse an offering for a number of cycles until the environmental impact is lower than that of the single-use offering it replaces (Hocking, 1994; Woods and Bakshi, 2014; Hait and Powers, 2019; Changwichean and Gheewala, 2020). In certain FMCG reuse models, the provider shares responsibility to ensure the continued cycling of reusables, such as in 'return from home', where end-of-use packaging is collected from consumers' homes, and 'return on the go', where consumers take end-of-use packaging to drop-off locations (Ellen MacArthur Foundation, 2019). In these scenarios, the provider cleans and replenishes for reuse. In other models, such as 'refill at home' and 'refill on the go', where the consumer refills packaging at home or at a location outside of the home, ownership and control of reusables are solely in the hands of the consumer. Despite consumers' having a key role in facilitating impact reduction, little is known about actual FMCG refill at home behaviour. It is imperative to understand actual consumer behaviour to ensure that refill at home is deployed as an effective circular strategy. Therefore, the aims of this research are to (1) identify and model consumer behaviours that do not support the effective reduction in impact intended of reuse, (2) determine where in a consumer journey the impact of reuse is compromised and (3) suggest targeted interventions to facilitate the capacity for reuse to reduce impact.

This paper presents an overview of the literature in Section 2, outlining work on reuse modelling, discussing research on circular consumer journeys for FMCG, and sharing insights from intervention studies. Section 3 details the methodology, explaining the participant recruitment and interview process, cases studied, and the mapping and analysis conducted to extract problematic consumer behaviour types and critical moments which were then used to inform interventions. The results are presented in Section 4, describing five models of behaviour which compromise the impact of refill at home FMCG, presenting critical moments in the consumer journey which set these behaviours in motion, and offering a range of targeted interventions to address them. Implications from the results are discussed in Section 5 alongside limitations and future research, followed by conclusions and contributions in Section 6.

## 2 LITERATURE

### 2.1 Reuse modelling

Diagrams depicting the circular economy system (e.g. the butterfly diagram) model reuse as one of the higher utility strategies in comparison to recycling and recovery, which require more processing for value to be recaptured (Ellen MacArthur Foundation, 2013; Blomsma and Brennan, 2017). Similarly, according to the waste hierarchy, a framework ranking waste management strategies in relation to environmental impact, reuse sits above recycling, recovery, and disposal and below reduction (UK Government, 2011). These models help illustrate how materials flow in a circular economy at different levels.

Reuse has also been modelled independently from other strategies to classify different types of reuse for FMCG. For example, the Ellen MacArthur Foundation (2019) identified four reuse models: refill at home, refill on the go, return from home and return on the go. Beyond this, research has also differentiated between types of reuse according to the sales model (e.g. subscription; Mansour et al., 2019), delivery logistics (e.g. door to door; Mansour et al., 2019), and location where reuse takes place (e.g. at home and on the go; Ellen MacArthur Foundation, 2019; Tassell and Aurisicchio, 2020; Greenwood et al., 2021). Behavioural factors have further helped distinguish different classes of reuse, such as the division of responsibility between stakeholders (consumer or company; Tassell and Aurisicchio, 2020), the ownership of reuse components (consumer or business; Greenwood et al., 2021) and the type of interaction a consumer has with reuse components (exclusive or sequential; Muranko et al., 2021). These elements of reuse models help structure understanding and capture the design intent of reuse. However, they do not capture the lived reality of reuse, that is when consumers are faced with the roles assigned to them in reuse models.

## 2.2 Behaviours in consumer reuse journeys

Previous research has used intended consumer journeys to define the key behaviours necessary for reuse to take place. Zeeuw van der Laan and Aurisicchio (2019) identify four archetypal roles, namely 'keep', 'bring', 'consign', and 'abandon', based on what the consumer must do to make an obsolete product recoverable. Similarly, Muranko et al. (2021) define ultimate circular behaviour as 'the end-goal behaviour that a circular system is set out to achieve', such as refill or return in the Ellen MacArthur Foundation (2019) models. These are further distinguished according to whether they can be achieved by a single behaviour in one stage of a consumer journey, such as return in post-utilisation, or whether a string of behaviours is required across more than one stage of a consumer journey for reuse to take place, such as preparing (pre-utilisation), consuming (during utilisation) and maintaining (post-utilisation). Although past work has highlighted important behaviours which are useful to increase the likelihood of reuse taking place, it falls short of understanding where consumers actually divert from the intended path, information which would help identify moments in a journey that require intervention.

## 2.3 Interventions for reuse

Previous research has also tested interventions that aim to promote reuse behaviours. For example, in research measuring actual behaviour change, more water refill points on campus were associated with increased reuse (Bethurem, Choate and Bramwell, 2021), and environmental messaging, provision of alternatives and financial (dis)incentives were found to increase the use of reusable hot drinks cups (Poortinga and Whitaker, 2018). In attempting to overcome barriers associated with a proposed home cleaning product with a refill service, Bashir et al. (2020) used message framing to emphasise the relative environmental friendliness and safety, finding a positive intention to change when both messages were combined. Similarly, Miller, Bennett and Cumming (2011) found that the provision of information on how to save money, minimise the effect on the environment and maximise comfort helped increase intention to use reusable nappies. To date, interventions tend to focus on specific product types (e.g. bottles (Bethurem, Choate and Bramwell, 2021), cups (Poortinga and Whitaker, 2018) and nappies (Miller, Bennett and Cumming, 2011)) and moments in time (e.g. pre-purchase (Miller, Bennett and Cumming, 2011; Bashir et al., 2020) and point of sale (Poortinga and Whitaker, 2018)). Given that the success of reuse is based on factors like length of life, there is a need to consider how interventions can be deployed at different critical moments across consumer journeys to optimise the reuse cycle beyond the buy-in.

# 3 METHODOLOGY

To collect data on real consumer journeys for business-to-consumer FMCG refill at home offerings, in-depth interviews with consumers who had experience using refill at home FMCG were conducted.

## 3.1 Pre-screening and selecting interview participants

UK-wide participant recruitment was carried out using a pre-screening questionnaire asking consumers to confirm whether they had experience using any of the following refill at home offerings: razors, toothbrushes, hand and body wash and hair care products, home surface cleaning and clothes wash products, food storage containers, coffee pods, beverage bottles, hot drinks cups and cloth nappies. For each type selected, participants were also required to state the exact product and brand. Recruitment was carried out via a specialist consumer recruitment agency on a first come, first served basis if the participants' pre-screening answers met the criteria to discuss their journey for at least one refill offering they had experience of using. Participants were offered £40 to take part. Cases for discussion were selected to cover as many different types of offering present in the pre-screening answers as possible. Participants included males and females, aged between 20 and 65.

## 3.2 Conducting in-depth interviews supported by consumer journey models

Before participating in the interviews, participants were provided with an information sheet and asked to sign a consent form, giving permission to record the interviews for transcription. Overall, 15 interviews were conducted, covering 31 refill at home cases. Each interview covered up to three cases depending on time (approximately 1 hour) and pre-screening selection(s).

The interviews were conducted by one researcher via Microsoft Teams. Participants were guided to discuss their practices for each offering, beginning with when they first purchased and started using it up to the present (if still using it) or point that they stopped.

### 3.3 Mapping and analysing the interview data

Once the interviews had been transcribed, the data were used to map the interaction between the consumer and the refill offering by applying the behaviour chain method (Muranko et al., 2020). This covered each component of a refill offering, including the reuse facilitator which is kept and continuously used (e.g. hand wash bottle or razor handle), the consumable which is used up (e.g. hand wash solution or razor blades), and the refill facilitator that assists with the replenishment of the reuse facilitator (e.g. hand wash refill pouch or razor blade cartridge). The behaviour chain method enables a structured, analytical, and predictive approach to scoping behaviours and considers how consumer behaviour affects the optimum flow of resources needed for a circular economy to operate efficiently (Muranko et al., 2020). Given that correct resource handling in FMCG reuse (i.e. reusing a sufficient number of times) is critical to offset the environmental impact compared to single-use alternatives (Changwichan and Gheewala, 2020; Muranko et al., 2021), the behaviour chain method was deemed to be the most appropriate instrument to analyse how consumers handle resources for FMCG refill offerings. The primary refill offering each participant used was mapped alongside any other offerings they used to meet their need. For example, the behaviour chain in Figure 1 shows that the consumer uses more than one refillable razor in addition to disposables.

### 3.4 Analysing the behaviour chains and structuring emerging insights

Once mapped in detail (see Figure 1), the 31 behaviour chains were used in conjunction with each participant's commentary from the interview to identify how and where consumers' handling of reuse components led to an increased impact against the baseline. The behaviour types and specific moments responsible for these outcomes were flagged and compared across all 31 behaviour chains, grouped into common models and distilled into a set of critical points across the consumer journey.

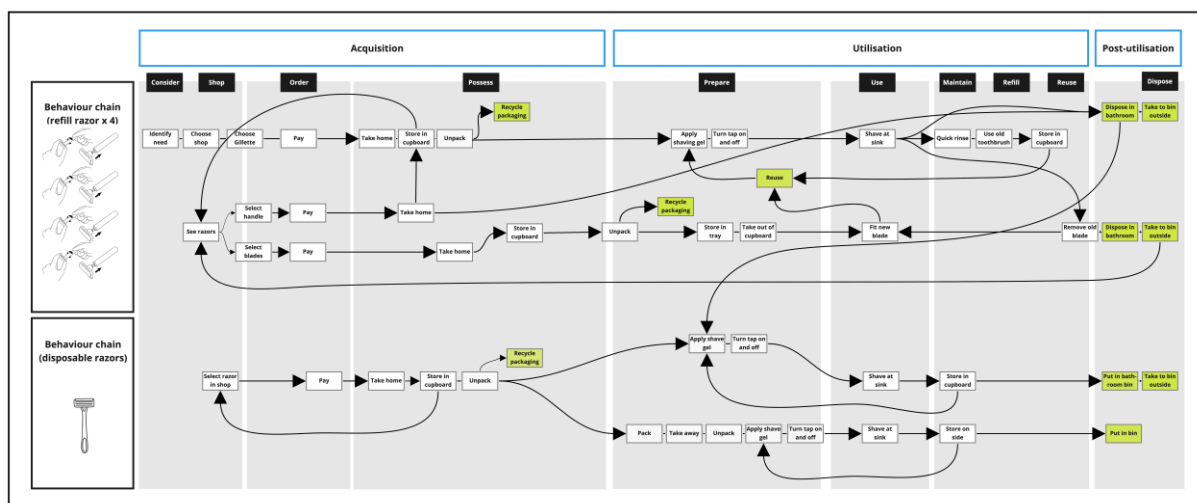


Figure 1. Example behaviour chain produced from interview data showing a refill at home razor journey

### 3.5 Using the data to propose interventions

The behaviour types and critical moments leading consumers to increase the intended impact of refill at home FMCG were then used to systematically propose a range of interventions at system, product or information level, and according to the journey phase and component affected. For example, the shopping stage in acquisition is a critical moment where consumers are unable to find or purchase compatible refill facilitators and consumables to replenish reuse facilitators, leading them to one of three unintended outcomes: (1) switch to another refill offering, (2) temporarily switch to a single-use offering, or (3) abandon the refill offering for a single-use offering. Therefore, one of the suggested interventions proposes to offer subscription services to automate the repurchase of refill facilitators

and consumables (e.g. razor blade cartridges) as a means to facilitate the replenishment of already owned reuse facilitators (e.g. razor handles). Using this example, Figure 2 shows how each step of the data analysis informed the next. The parallel identification of behaviour types (step 1) and critical moments across the consumer journey (step 2) led to targeted interventions (step 3).

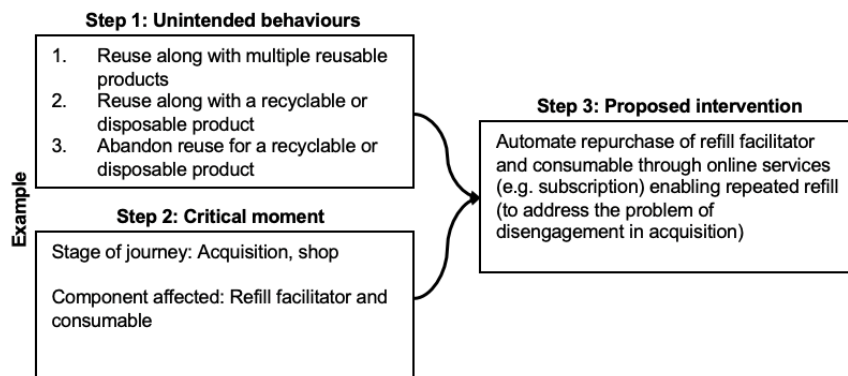


Figure 2. Example of step-by-step data analysis leading to a proposed intervention

## 4 RESULTS

### 4.1 Modelling behaviours that increase the impact of reuse

Consumers of refill at home FMCG were found to carry out five behaviours that increase impact (Figure 3). In model 1, consumers reused with multiple reusable products, either replacing refill offerings more quickly than intended or owning and using more than one refill offering (e.g. bottle or razor) to meet the relative need (e.g. thirst or hair removal). In model 2, consumers practised reuse along with single-use products, either at the same time (e.g. filling a durable bottle with water from a disposable bottle) or intermittently (e.g. owning reusable hot drinks cups but also buying coffee in single-use cups). For these two models, consumers continued to interact with reuse offerings to varying degrees. Reuse offerings were either in the active reuse cycle alongside other reusables or single-use products, paused for single-use products, or replaced by another reuse offering. Consumers abandoned reuse in behaviour model 3, returning to single-use products (e.g. replacing cloth nappies with disposables). Therefore, in this model, reuse offerings were no longer in use. At the end of life, consumers incorrectly disposed of reuse components, either recycling non-recyclables as in behaviour model 4 or placing recyclables in the residual waste as in behaviour model 5.

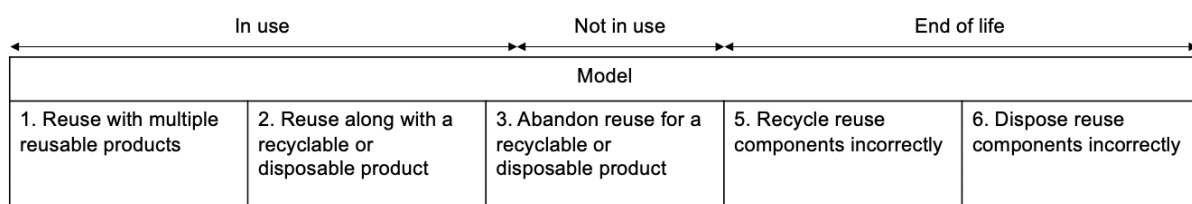


Figure 3. Five behaviours which increase the impact of reuse

### 4.2 Critical moments in a consumer journey that increase the impact of reuse

Critical moments which led consumers to carry out the five behaviours were identified during acquisition when shopping, during utilisation when using and reusing, and during post utilisation when recycling or disposing (see columns in Table 1). These were further distinguished according to the component of a reuse offering affected (i.e. the reuse facilitator, refill facilitator and consumable) (see rows in Table 1). In shopping, recycling, and disposal, consumer interactions with all components contributed to increasing the impact of reuse. However, critical moments in the use stage were brought about by the reuse facilitator and consumable, and in the reuse stage just by the reuse facilitator.

Table 1. Critical moments in a consumer journey defined by the stages, behaviour types (1, 2, 3,4, and 5) and components of a reuse offering

	Acquisition				Utilisation					Post-utilisation	
	Consider	Shop	Order	Possess	Prepare	Use	Maintain	Refill	Reuse	Recycle	Dispose
Reuse facilitator		1				1, 2, 3			1	4	5
Refill facilitator		1, 2, 3								4	5
Consumable							1, 2, 3				4

#### 4.2.1 Acquisition, shopping

*Reuse facilitator.* When shopping, consumers were found to purchase new reuse facilitators (e.g. razor handles or toothbrush handles) despite already owning one that had not yet reached the end-of-life for functional reasons. This behaviour tended to be carried out on the spot, facilitated by the sales environment, succumbing to temptation, struggling to find replacement refills, or making decisions based on price and packaging. As a result, consumers either owned and used multiple reuse facilitators, used one primary reuse facilitator and stored the other(s) or disposed of previously used reuse facilitators before the end of the design life.

*Refill facilitator and consumable.* Another barrier to replenishing already owned reuse facilitators was found when consumers looked for the refill facilitator and consumable (e.g. hand wash/ hair wash/ body wash refill pouches, razor blade cartridges, toothbrush heads) during shopping but were not able to select them because they were out of stock, discontinued, unavailable at a particular store or too difficult to find. This prompted consumers to replace the reuse offering they previously owned, either with another reuse offering or with a single-use equivalent, a switch that could be temporary or permanent. Again, previously used reuse components would either then be stored and unused or prematurely thrown away. There were also instances when shopping where consumers did not have the knowledge to determine whether the components of a refill system, such as a refill pouch for hand wash, were actually a more sustainable choice, increasing the likelihood that they reverted back to single-use products.

#### 4.2.2 Utilisation, use

*Reuse facilitator.* There were reasons that caused consumers to buy additional products in parallel to their reuse offering which traced back to the utilisation stage of their journey. When consumers had an overwhelmingly positive experience using a reuse facilitator (e.g. hot drinks cup), they would buy the same one or a similar one to ensure they had enough on rotation for use in different contexts (e.g. taking one to work and using the other at home or on-the-go).

*Consumable.* On the other hand, negative experiences with the consumable could also lead consumers to buy additional reuse products or to abandon reuse for single-use products. This occurred when the experience of using a consumable (e.g. clothes wash, hair wash) did not meet the consumers' expectations (e.g. clothes or hair not feeling adequately washed). This could lead to parallel use of multiple products (e.g. putting two laundry wash consumables from separate refill offerings in the washing machine together) or sequential use of multiple products (e.g. washing hair with a single use product every other time). If the consumer abandoned the refill consumable altogether, then the reuse facilitator containing it was likely to meet an early disposal.

#### 4.2.3 Utilisation, reuse

*Reuse facilitator.* According to the principles of circularity, the least impact is caused when a reuse facilitator continues to be reused for as long as possible. However, it was common for consumers to decide to discontinue the cycle of reuse when this component appeared worn or dirty, or when they simply did not know how long they were expected to continue reusing it for. Instead, they preferred to purchase a replacement, resulting in the disposal of reuse facilitators that were still technically usable.

#### 4.2.4 Post-utilisation, recycling

*All components.* At the end of life, consumers often recycled non-recyclable components. This either resulted from lack of knowledge or, when provided, confusion over the symbols and instructions

offered. When in doubt, they were hopeful and wanted to believe that recovery might be possible. However, this frequently resulted in contamination of the recyclable materials stream.

#### 4.2.5 Post-utilisation, disposal

*All components.* At the end of life, consumers also disposed of reuse offering components to landfill despite them being recyclable. This can be attributed to habitual and automatic behaviour, a lack of awareness on lesser-known take-back schemes or the perception of effort for such schemes, where consumers are required to carry out additional steps, such as collecting, transporting, and depositing components.

### 4.3 Interventions to facilitate the capacity for reuse to reduce impact

Through locating the critical moments in a behaviour chain, where consumers deviate from the intended journey in ways which increase the impact of reuse, targeted interventions emerged with the aim to facilitate the capacity for reuse to reduce impact. Each proposed intervention is listed in Table 2 according to the stage in the consumer journey, the type of intervention (i.e. whether it is delivered through the provision of information, wider system infrastructure or product (re)design) and the component implicated (i.e. reuse facilitator, refill facilitator and consumable).

Whilst some interventions relate to a specific component (e.g. offering standardised reuse facilitators or providing digital information on the availability of refill facilitators and consumables in acquisition), others are applicable to an entire refill offering (e.g. labelling all components clearly for reuse and recycling in post-utilisation).

Table 2. Interventions to address the five behaviours across the consumer journey

		Reuse facilitator	Refill facilitator	Consumable
<b>Acquisition</b>	<b>Shop</b>	<i>System</i> -Incentivise consumers to continue using the first reuse facilitator (e.g. discount)/ disincentivise buying new reuse facilitators <i>Product</i> -Offer standardised reuse facilitators that can be used interchangeably with different refill offerings	<i>System</i> -Lay out store shelves to aid repeated refill over consumption of disposable or recyclable offerings -Increase availability and stock levels of refill facilitators/ consumables in-store -Automate repurchase through online services (e.g. subscription) enabling repeated refill (to address the problem of disengagement in acquisition) <i>Information</i> -Provide digital information on availability (e.g. refills app)	
		<i>System</i> -Explore alternative systems of refill components (to enable better engagement of consumers concerned about greenwashing) <i>Information</i> -Inform consumers on the sustainability and impact of refill at home versus disposable/ recyclable offerings		
<b>Utilisation</b>	<b>Use</b>	<i>System</i> -Make reuse facilitators universal (allowing consumers to use them for different refill consumables if they decide to change) -Increase availability of other reuse models (e.g. return on the go) for contexts like work/ study (to reduce the likelihood that consumers own multiple reuse facilitators)		<i>Product</i> -Ensure the experience of refill consumables meets consumer expectations

	<b>Reuse</b>	<i>System</i> -Consider take-back schemes to collect and industrially clean/ refurbish reuse facilitators <i>Product</i> -Design reuse facilitators for durability -Offer replacements for parts susceptible to wear <i>Information</i> -Inform consumers on the lifetime of the reuse facilitator through advertisement and labels		
<b>Post-utilisation</b>	<b>Recycle</b>	<i>System</i> -Reduce effort in take-back schemes to collect and recycle -Design for doorstep recycling rather than drop off points <i>Product</i> -Design mono-material components and/ or design for disassembly <i>Information</i> -Label all components clearly for reuse and recycling		
	<b>Dispose</b>	<i>Information</i> -Educate consumers on the implications of waste stream contamination -Label all components clearly for reuse and recycling		

## 5 DISCUSSION

Previous research has modelled FMCG reuse and identified key actions required for reuse to take place based on intended consumer behaviour (Ellen MacArthur Foundation, 2019; Mansour et al., 2019; Zeeuw van der Laan and Aurisicchio, 2019; Muranko et al., 2020, 2021; Tassell and Aurisicchio, 2020). These works have framed reuse as a strategy to reduce impact and offered a set of consumer behaviours considered essential to operationalise each model. In contrast, the five types of behaviour and critical moments identified in this research (Figure 3 and Table 1) constitute a first attempt to model how and where actual consumer behaviour can compromise the impact of reuse for refill at home FMCG. This helps highlight moments in need of intervention and further increase the likelihood that the ultimate circular behaviour (Muranko et al., 2020) is actually carried out. The results from this research go beyond positioning ‘refill’ as an ultimate circular behaviour to highlight when this behaviour risks not being performed. Critical moments which stand in the way of this ultimate circular behaviour are: 1) in acquisition when the consumer shops for the refill facilitator and consumable but is unable to purchase them, instead buying a new reuse offering in full and refilling that instead or reverting to single use and stopping refill altogether; 2) in acquisition when the consumer buys a new reuse facilitator whilst shopping because they want more than one and therefore stops refilling the one they previously owned or no longer refills it as regularly; and 3) during utilisation when the consumer uses the consumable and, unimpressed by their experience, decides to discontinue refill.

Circular economy strategies holistically consider the impact of products across their lifecycle. However, interventions that seek to increase engagement with reuse tend to be tested at specific moments in a consumer journey (e.g. Poortinga and Whitaker, 2018). In comparison, the results from this study call for the consideration and implementation of focussed interventions across the consumer journey. This holds greater potential to facilitate consumers in their parallel handling of reuse facilitators, refill facilitators and consumables as part of an effective circular system to reduce impact. Future research could develop more specific variations of these interventions for particular refill at home offering types (e.g. razors, cups, hand wash). In addition, the effectiveness of different interventions could be tested, either individually or as a string of different combinations across the consumer journey. Further still, the analysis conducted predominantly describes *how* consumers are behaving, only touching at a high level on *why* they carry out these types of behaviour. The



influencing factors could be explored in greater depth to help understand which interventions hold the greatest potential. Moving beyond refill at home, similar research on other types of FMCG reuse (e.g. refill on the go, return from home and return on the go) could be conducted for comparison.

## 6 CONCLUSIONS

Reuse is a key strategy to enable the transition to a circular economy in the FMCG industry as it holds the capacity to increase the utility of materials. For refill at home to grow and become mainstream, consumers have to familiarise themselves with the practice, understand how it differs from recycling, and make it habitual. However, current understanding of actual behaviour with refill at home FMCG is insufficient to help develop the practice. This research is the first attempt to characterise reuse behaviour with refill at home FMCG, revealing multiple consumer habits leading to the overconsumption and early disposal of reuse offerings and explaining where in the consumer journey they occur. The results have been translated into a series of interventions to facilitate the capacity for reuse to reduce impact, grouped depending on whether they aim to change the system, product or information provided to consumers.

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