Psychological and Behavioural Science

Bloody Hell – Let's Talk About It

Embracing Sustainable Menstruation in the United Kingdom

Sabina Gill

Shannon Huang

Emma Martinez Daniel

Aline Zünd

London School of Economics and Political Science

PB403 Psychology of Economic Life Summative coursework
March 2023

Course convenors: Dr. Fred Basso & Prof. Saadi Lahlou
Other teachers: Dr. Maxi Heitmayer


Don't let your usage
bleed all over the environment

Table of Contents

Abstract

Approximately half of the world's population spends 40 years of their life menstruating, making periods a universal matter. Stigmatization obscures challenges surrounding menstruation including health issues, economic challenges, and negative environmental impact caused largely by the most popular menstrual products – unsustainable single-use products. As such, our research furthers efforts to encourage sustainable menstruation in the UK. Activity Theory and Installation Theory are applied to the proposed interventions to tackle barriers to sustainable menstrual maintenance. Limited early education, negative social perception and a lack of affordances perpetuates unsustainable menstrual behavior. This paper recommends implementing health week in UK primary schools, supporting relationships between gynaecologists and menstruators, and improving restrooms installations at universities in order to encourage and facilitate sustainable behaviour.

Background

Menstruation is an activity of universal importance. On average, women spend 40 years of their lives menstruating (Hampson, 2019). On average, an individual menstruator uses 22 sanitary products per cycle – over 11,000 disposable products during their menstrual lifetime (Absorbent Hygiene Product Manufacturers Association, 2007). Through this paper, we will address singleuse pads and tampons as 'Disposable Menstrual Products' and cups, reusable pads and underpants as 'Reusable Menstrual Products' (see Table i). Disposable products, such as pads and tampons, remain the most popular product choice (UT Health Austin, 2019). As such, the magnitude of this industry is massive. In recent years, however, due to increasing awareness surrounding their adverse social, health and environmental consequences, some menstruators have started questioning these disposable menstrual products (Bobel, 2006; Bobel, 2010).

Table i

An exhaustive list of Disposable and Reusable Menstrual Products*

Product Type	Description	Product Subtype	Biodegradability	Intended Lifetime
 Menstrual Pads	An absorbent pad with adhesive wings that sticks to underwear, worn by menstruators to absorb the uterine flow.	Disposable Pads	-	One Time
		Reusable Pads	✓	2 - 5 Years
 Tampons	A wad of absorbent material that is introduced into the vagina to absorb menstrual flow.	Disposable Tampons	-	One Time
 Menstrual Cups	A bell-shaped cup that is inserted in the vagina during menstruation to collect menstrual fluid. Thereafter it is drained and sanitised to reuse.	Reusable Cups	✓	<10 Years
 Menstrual Underwear	Highly absorbent clothing designed to be worn during menstruation. Designed like regular underwear to soak up blood.	Disposable Underpants	✓	One Time
		Reusable Underpants	✓	2 – 5 Years
 Menstrual Discs	A ring-like insertable product that collects menstrual blood. It is usually made of plastic or resin.	Disposable Discs	-	One Time
		Reusable Discs	✓	<10 years

**We have excluded menstrual sponges from our analysis because they are not recommended by the FDA.*

Disposable menstrual products have damaging externalities, including major environmental concerns. Each disposable pad is made up of 90% plastic and takes up to 500 years to decompose (London Assembly Environment Committee, 2018). Due to the heavy amount of plastic present (see Figure i), these products never fully biodegrade (Peberdy et al., 2019).

Figure i

Signage depicting the plastic in menstrual pads as equivalent to carrier bags.

The impact on marine environments is staggering. Pads and tampons that do not end up in landfills often end up in oceans (Borunda, 2019). In 2018, the EU Commission reported that menstrual products were the fifth most common waste found on beaches (European Parliament, 2018). Sunlight breaks plastic into small particles called microplastics which marine animals ingest (Wehle & Coleman, 1983). 22% of sea turtles die from ingesting just one piece of plastic (World Wildlife Fund, n.d.). Moreover, 36.5% of fish sampled in the English Channel contained microplastics (Lusher et al., 2013). Through the consumption of fish, such microplastics become a part of the human food chain and threaten human health (Campanale et al., 2020). The solution is simple – replace disposable menstrual products, with reusable products. The benefits can be consequential. The impact of a reusable menstrual cup used for one year was less than 1.5% of the environmental impact of alternative disposable products (Mooncup, n.d.).

Disposable menstrual products carry other direct risks of harming human health. Tested pads and tampons have indicated the presence of Dioxin, a dangerous carcinogen (DeVito, 2002). Toxic Shock Syndrome (TSS), another life-threatening illness, has been linked to prolonged use of highabsorbency tampons (Ross & Shoff, 2017). Research has pointed out that women do not realize that there are health and environmental concerns associated with menstrual products, thereby perpetuating demand (Borowski, 2011). In addition, dialogue surrounding menstruation is limited, with half of 14-year-old menstruators in the UK still feeling embarrassed about their periods (Tingle et al., 2018).

Flushing of menstrual products remains a common malpractice. A 2021 study found that one in two women in the UK admitted to flushing tampons and sanitary pads (Blair et al., 2022). This leads to flooding, water pollution, and pipe blockage (see Figure ii). Reversing damages comes at a high cost. The UK spends £88 million annually to unclog sewage blockages (Water UK, 2016). Respondents in a recent survey stated their primary reason for flushing was a perceived pressure to hide their period (Water UK, 2016).

Figure ii

Signage in LSE's restroom stalls to boost good menstrual product disposal practices.

The stigma and ostracization surrounding menstruation stifle conversation and reinforce the oppressive status quo, rather than encouraging collaborative efforts. Sex education in the UK teaches the concepts of menstruation, but parents can request to withdraw children from these lessons (Department of Education, n.d.). Many menstruators even lack the financial resources to purchase menstrual management products, a problem only further aggravated by the COVID-19 pandemic (Vora, 2020). Period poverty affects 12% of UK menstruators (Pycroft, 2022), due to the inability to access safe, clean facilities, health education, and affordable menstrual products (Williams, 2022; Cardoso et al., 2021).

In developed nations such as the U.K., cultural factors play a great role in determining the popularity of a menstrual product (Kpodo, 2022). It is believed that even after the sanitary pad became easily available in markets, people chose to use alternatives due to high costs (Femme International, 2013). Tampons only gained wider acceptance when the applicator was introduced in 1933 - effectively reducing the need to 'self-touch' (Bobel, 2006; Bobel 2010). Menstrual cups involve an initial high investment. Globally, the average price of a menstrual cup is £23. But, in the long run, the price of a cup represents only 5% of the price of a ten-year supply of disposable goods (Van Eijk et al., 2019).

It is crucial to open conversation surrounding menstruation. Social communities, national economies and global causes can benefit from sustainable menstrual management. Studies have

illustrated the importance of raising awareness around sustainable consumption patterns (Francis & Sarangi, 2022). An improvement in menstrual health hygiene can also advance the progress of all 17 of the United Nations Sustainable Development Goals (Sommer et al., 2021).

"All females deserve menstrual well-being and that includes knowledge and reassurance about her body from the earliest possible age." - Nikki Tajiri

1. Introduction

Every month, 1.8 billion people across the world menstruate (UNICEF, n.d.), which is a healthy and natural process. Stigmatization, however, hides many of the challenges surrounding menstruation. Among the most important are health issues, economic challenges, and negative environmental impact caused largely by the most popular menstrual products – single-use products, such as pads and tampons (Peberdy et al., 2019).

The effects of disposable products on the environment and economy are devastating. 27,000 tons of waste are generated by disposable menstrual products annually in the United Kingdom [UK], with every second menstruator flushing disposal products and releasing dangerous microplastics into our oceans (Blair et al., 2022). Menstruators' physical and mental health can also be negatively impacted. Single-use products have been linked to toxic carcinogens (Campaign for Safe Cosmetics, 2022) and higher likelihood of suffering from Toxic Shock Syndrome (National Health Service [NHS], 2019). Period poverty – the inability to access safe, clean facilities, health education, and affordable menstrual products (Williams, 2022; Cardoso et al., 2021) – affects 12% of UK menstruators (Pycroft, 2022). They resort to alternative methods of maintenance (Cardoso et al., 2021) which increases infections (Miller, 2021), and perpetuates feelings of uncleanliness, shame, and distress surrounding menstruation (Cardoso et al., 2021). This causes absences from school and work (Briggs, 2021), decreasing economic efficiency in the long term and leading to economic challenges for the UK (Michel et al., 2022).

The UK government recognizes the urgency of period poverty and is actively addressing it. In 2020, Scotland became the first country in the world to offer free period products to all (Lennon, 2019). The same year, the UK introduced the "Period Products Scheme," providing students with free access to period products, including sustainable products, in secondary schools and colleges (Department of Education, 2022). However, there is a lack of physical affordances to support the usage of sustainable products in educational settings.

Sustainability, as related to menstruation in this work, identifies products with a low negative impact on the environment (Fourcassier et al., 2022) and is characterized by "the extent to which an evidence-based intervention can deliver its intended benefits over an extended period of time,

[even] after external support [...] is terminated" (Brownson, 2017, p.23, as cited in Hailemariam et al., 2019). In their research, Fourcassier et al. (2022) concluded that reusable menstrual cups have the lowest impact on the environment, followed by period pants and reusable period pads.

We have focused our efforts on the UK and its menstruators. The paper addresses 'menstruators' since not everyone who has a period identifies as female. Despite efforts of the UK government to improve menstrual accessibility in educational settings, and destigmatize the topic, there is a clear disconnect between policy intentions and the behaviours they elicit. Efforts until now have failed to address all three layers of the targeted installation (see 1.2 Theoretical Background), tackling almost exclusively the cost of products, often lacking consideration of affordances to support usage. The policy intentions also remain unsustainable and inefficient in channelling behaviour because they overlook the other two crucial layers to individual and societal change – competences and social regulation.

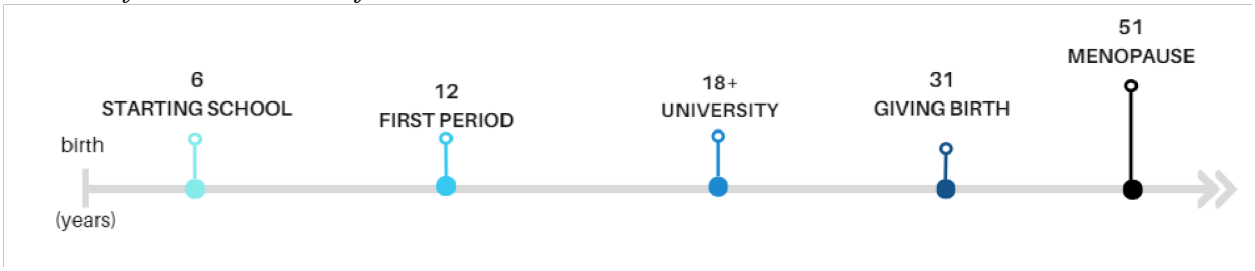
As such, this proposal examines individual activity flow to present interventions that encourage and facilitate sustainable product use and sustainable menstruation habits by addressing affordances, competences, and regulations simultaneously. Thus, the aim of this paper is to discuss how to embrace sustainable period products in the UK.

1.2 Pain Points and Menstruators' Timeline

This chapter will give an overview of the identified pain points and interventions. A pain point describes a barrier for a menstruator to use sustainable period products. We begin with presenting the timeline for a menstruators' life (see figure 1).

Figure 1

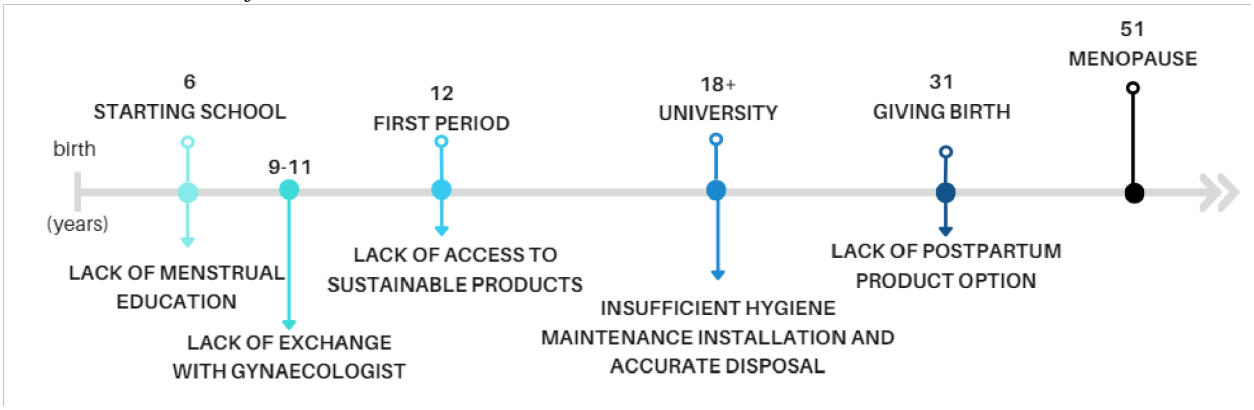
Timeline of Menstruators' Life



An individuals' menstrual lifetime spans approximately 40 years (NHS, 2018). The first period comes, on average, around age 12 (NHS, 2023), the average UK woman gives birth at age 31 (Bradford, 2022) and reaches menopause around age 51 (NHS inform, 2022). Figure 2 introduces the five pain points for the menstruator addressed in this paper.

Figure 2

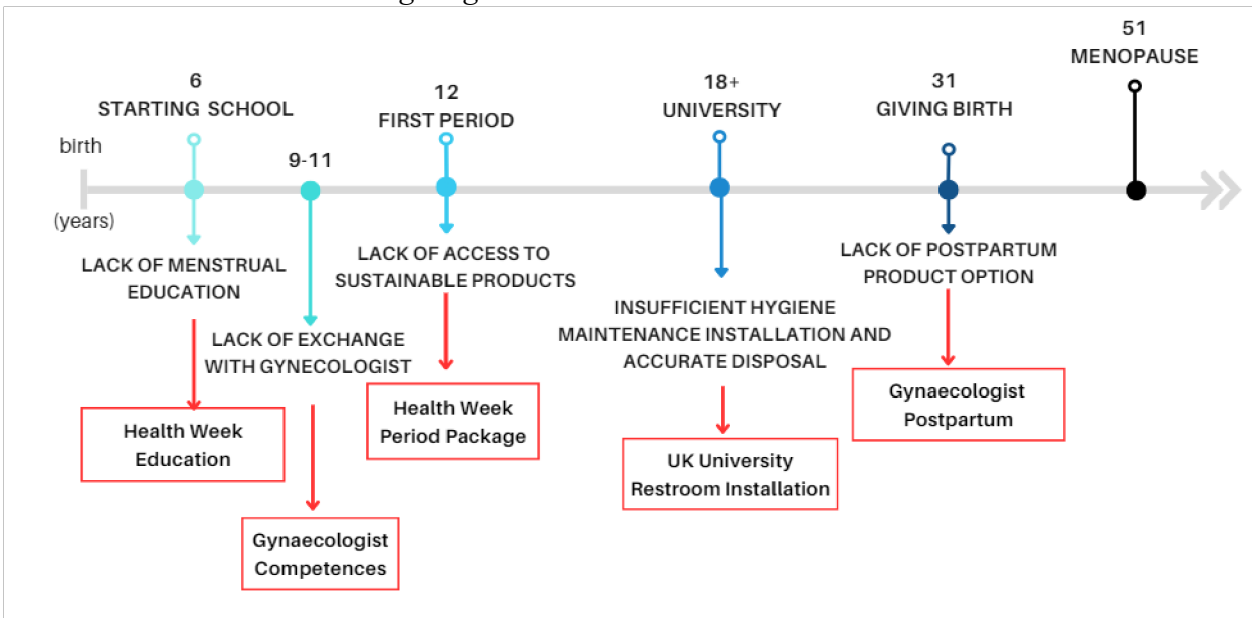
Timeline with Identified Pain Points



They are (1) lack of menstrual education by schools and parents, (2) lack of access to sustainable products (3) lack of exchange with health professionals such as gynaecologists, (4) lack of physical affordances to use sustainable products in restrooms and (5) lack of period product options postpartum. Finally, figure 3 reveals the interventions we will discuss to address these pain points.

Figure 3

Timeline with Interventions Targeting Pain Points



Our approach, as seen above, will tackle these pain points with five interventions, broken into three categories. Health week focuses on education and preparation before the first period, including distribution of the period package. Gynaecologist competences addresses open hours to improve menstruation health and addresses postpartum conditions. Finally, the UK university restroom installation addresses functionality, hygiene maintenance, disposal, and social regulation. Whereby health week education and postpartum will be addressed briefly, by identifying the general direction in which we would take these interventions with greater resources, the remaining three recommendations will be discussed more in depth. Table 1 provides a concise overview of our proposed interventions (for a more detailed table, see Appendix A).

Table 1

Brief Overview of Interventions

Intervention Title	Problem	Intervention Explanation
2. Health Week	Lack of menstruation education	'Health Week' in UK curriculu ms
2.2 Period Packages	Lack of preparation before first period	Distribute period package to menstruators ahead of first period
3. Gynaecologis t	Lack of access to early education tools	'Open Hours' for walk-in consultations, information at cervical screening appointments
3.1 Postpartum	Unsustainable postpartum management	Encourage sustainable products to new mothers
4.1 Restroom - Functionality	Lack of how-to-use menstrual cup knowledge	Signage to ensure effective and safe insertion and removal
4.2 Restroom - Hygiene Maintenance Basins	Lack of affordances to sanitize cup between uses from within the stall	Installation of sanitizing water basins
4.2.1 Restroom - Hygiene Maintenance Wipes	Interim before installation of basins, lack of ability to sanitize cup within stall	Basket of biodegradable menstrual sanitizing wipes on restroom counters
4.3 Restroom - Voting Bin	Tendency to flush products	Voting bin design to entice receptacle disposal
4.4 Restroom - Button-Meter	Establish repeated behaviour using social expectations	Button-meter indicates baby turtles collectively saved by menstruators

1.3 Theoretical Background

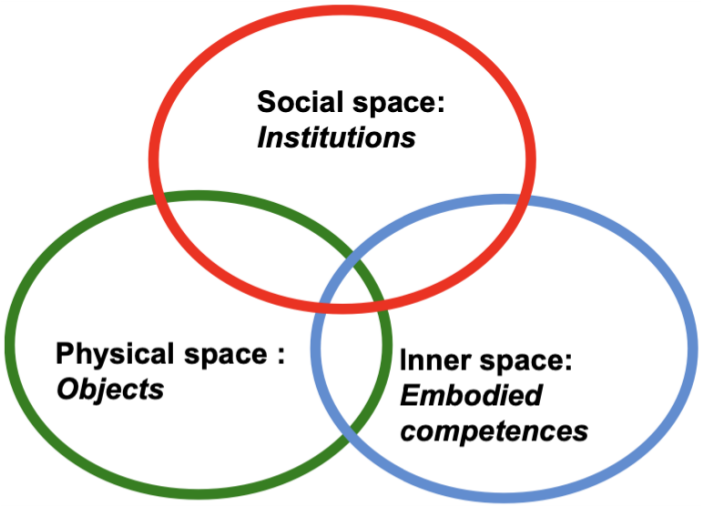
Our intervention recommendations are primarily based on two theories – Activity Theory and Installation Theory. Activity Theory identifies how motives drive individuals to produce a new state of things at each trajectory (Lahlou, 2017). As such, we will use the theory to illustrate how our interventions facilitate menstruators' activity of reaching their end goals whilst manipulating objects (Lahlou, 2017). By dividing activity into subgoals, we (as interventionists) can identify the motives behind the behaviour.

Installation Theory parallels Activity Theory to ensure our proposed interventions have all necessary layers to most effectively channel behaviour. Installations are structures that can create predictability in most of our "normal" behaviour (Lahlou, 2017). The theory classifies behaviour into three layers; physical affordances, embodied competences and social regulation (see figure 4), providing a mechanism to enable a systematic and practical analysis of these components (Lahlou, 2017). Physical affordances involve the material environment (scaffolding behaviour), embodied competences refer to the interpretive system and agency of the menstruator (which produces (and replicates) behaviour), and social regulation consists of formal and informal rules and institutions that regulate behaviour (Lahlou, 2017). Our interventions build up these layers, with an emphasis

on the combination of all three, to ensure maximum sustainability of channelled behaviour (Lahlou, 2017).

Figure 4

Installation Theory Diagram (Lahlou, 2017)



Some proposed interventions implore additional theoretical concepts. A boost fosters people's ability to make their own choices—that is, to practice their own agency (Hertwig & Grüne-Yanoff, 2017). Distributed cognition allows cognitive processes and knowledge to be distributed amongst artefacts and social groups, spread across time (Lahlou, 2017).

2. Health Week

School and parental figures, especially mothers, are often the first point of contact for young menstruators (Rubinsky et al., 2020; Brown et al., 2022). Education in the UK has been found to deal rather superficially, if at all, with the topic of menstrual health (Rubinsky et al., 2020; Brown et al., 2022). Thus, we recommend implementing a UK-wide annual "Health Week."

This health week would feature a series of educational experiences on health-related topics catered to the relevance of the intended age group. The curriculum would include education on menstruation in addition to other health topics, such as sexual intercourse, men's health, nutrition, and mental health. The early exposure of all students could begin to dismantle the stigma around all health topics, regardless of how peripheral their impact may seem.

Menstruators often regard parents, especially mothers, as their most important contact point regarding menstruation (Rubinsky et al., 2020; Lee, 2008). A Rubinsky et al. (2020) study revealed that young menstruators feel their mothers do not meet their menstrual conversation needs, failing to keep them well informed about diverse product options.

> "If anything, I wish my mother was more open to other options like tampons, menstrual cups, THINX, etc. I wish I had the option of choosing which way would be best and most efficient for myself" (Participant 185 as cited in Rubinsky et al., 2020, p. 246).

Given the importance of educational conversations at home, parental involvement in health week would be encouraged. As such, two evenings of health week would be dedicated to parental education, inviting all guardians to participate. Exposing students and parents – of both genders – to health education could reduce stigma within the family unit. It increases health expectations and competences for both parties, educating students thoroughly ahead of first menstruation, and encouraging older menstruators to embody new competences, converse openly with their children and partake in more sustainable menstrual habits.

2.1 Period Package

The first period is a poignant moment in a menstruators' life, representing a crucial step of entering puberty. Even armed with the appropriate competences, a lack of affordances – such as a lack of period products at the moment of first period – can cause distress. Moreover, period poverty deprives many menstruators of all product options altogether (Pycroft, 2022), which the UK government tackles with their "Period Product Scheme" (Department of Education, 2022).
However, the scheme only addresses secondary school and college students (Department of Education, 2022), excluding young menstruators.

As Lahlou (2017) explains, a first-time activity – such as the first time using a period product – sets the standard for future behaviour. We recommend distribution of period packages during health week to set a sustainable menstrual maintenance standard from the beginning.

The package is a small, easy-to-carry kit with all items necessary to sustainably handle a first period. The package (see figure 5) is comprised of two parts, the menstruation instructions, and the menstruation-relevant product. Distribution around age 10, precedes the average first period at age 12 (NHS, 2023).

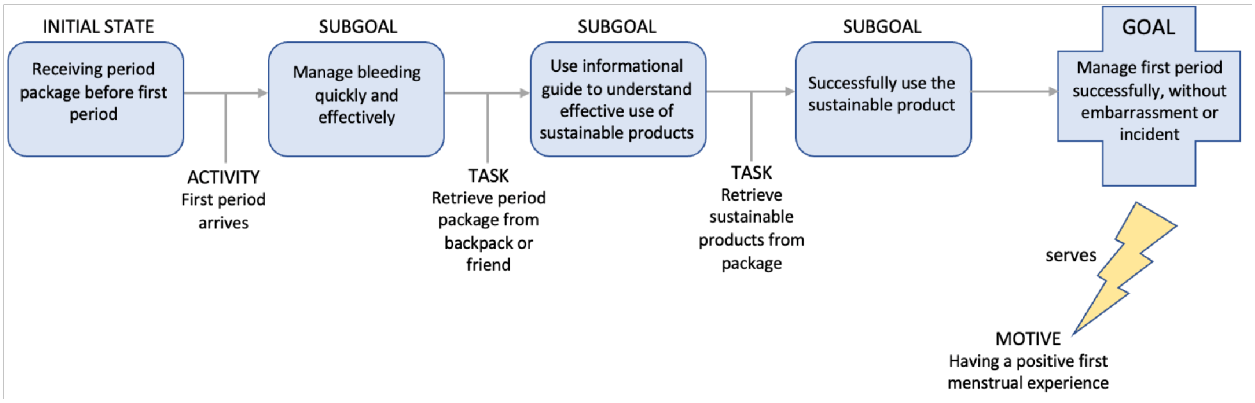
Figure 5
Period package contents

The booklet introduces basic information about the menstrual cycle and includes an information sheet detailing the use of each product. The contents include sustainable period products (sustainable period pads, a menstrual cup and a teen period pants) and hygiene products (hand sanitizer, hygiene wipes, soap, etc).

Implementing the period package facilitates menstruators' target activity. The period package helps clarify each subgoal and action menstruators must take when facing their first period. The main activity is access to information before – and period products when – they get their first period. Figure 3 shows the activity of how the period package supports the goal of preparing menstruators with sustainable products at the moment of the first period. Installation Theory (Lahlou, 2017) is also helpful in this case. The period package provides menstrual and hygiene products for the physical affordance level. Being equipped with knowledge for menstruation (including how to use the period product and how to keep good hygiene when getting their period) improves menstruators' embodied interpretive competence. Competences boost menstruators, allowing transportation of newfound knowledge to future installations. Moreover, the pervasive use of period packages could demystify period taboos, changing the social norms at the social regulation level.

Analysis of the period package with Activity Theory helps to clarify the subgoals that drive menstruators during their first period (see figure 6).

Figure 6
Activity of the menstruator (adapted from Lahlou (2017))



Initially, menstruators are underprepared for the onset of their first period. The package provides the affordances and competences (Lahlou, 2017) necessary to achieve preparedness at the moment of first menstruation. It also boosts menstruators, allowing them to transport this knowledge to future menstrual activities. Moreover, it encourages young menstruators to converse and exchange packages if their friends don't have theirs at the moment of first period. This social component works to breakdown period taboos, changing norms at the social regulation level. With the pervasiveness of the period package, young menstruators are given the information and space to talk about periods (Astrup, 2017). When menstruation becomes a common topic that can be discussed in public, stigma reduces.

The package impacts several stakeholders. It serves as a conversation starter and reminder for menstruators and their guardians. The indiscriminatory practice of distribution to all students benefits those facing period poverty. The Department of Health and Social Care (DHSC) and the NHS should issue a policy related to the period package. Schools should be responsible for period package distribution to each menstruator during health week. Furthermore, manufactures would benefit greatly from increased sales consequent to period package creation and distribution.

However, there are limitations to the period package. One major obstacle is ensuring all menstruators a package, as the delivery method is not flawless. Since the package is not mandated, we cannot require usage or avoid shifts to unsustainable practices once the period package is depleted. Funding is another concern. The implementation of period packages requires financial support from the government. We suggest incorporating period packages as a further development of the UK Period Product Scheme to provide sustainable period products for menstruators at first exposure to menstruation.

3. Gynaecologist

Another ideal moment of intervention to popularise sustainable menstrual products is at the gynaecologist. This targets two separate groups; age 9+ and ages 25 – 64. Female adolescents (ages 9+) and existing menstruators should have the opportunity to engage one-on-one with a gynaecologist. We propose implementing 'Open Hours,' which would create a drop-in consultation affordance to discuss all female reproductive topics. The current infrastructure requires patients to

schedule appointments with specialists through referrals from their General Practitioner (NHS, n.d.-b), which often fall through the cracks (HealthWatch Greenwich, 2019). As such, this walk-in system would open the possibility of conversation for many menstruators.

Open hours are encouraged beginning at age 9 to afford younger menstruators access to information and support ahead of the first period. Boosting knowledge of menstruators during preteen years allows transportation of knowledge to all future behaviour (Lahlou, 2017) and serves as an upstream intervention, one designed to prevent unsustainable menstrual maintenance before it begins (Verplanken & Wood, 2006). Awareness is key to success. Distributing badges with QR codes (see figure 7) allows menstruators to signal to other that they utilized open hours.

Figure 7

Signalling badge

Advertising campaigns, directed towards the individual (Hagman et al., 2022) through schools (figure 8) will inform students and educators of their existence, spreading eventually to the wider society through distributed cognition (Lahlou, 2017).

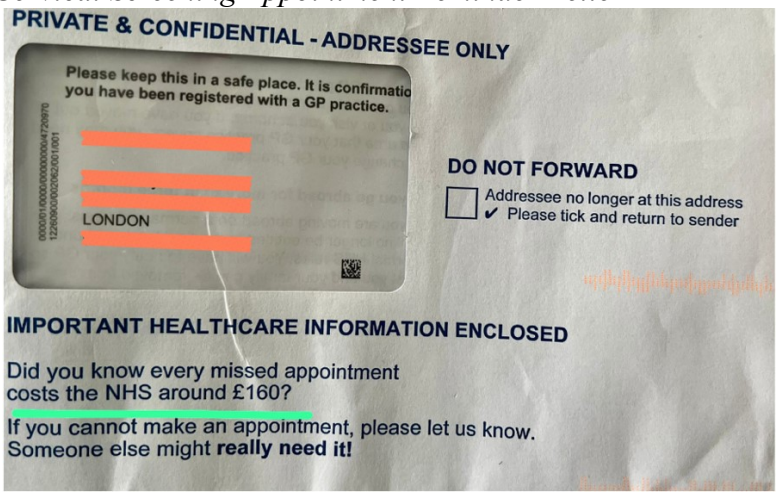
Figure 8

Advertising Open Hours in Schools

The current NHS system encourages menstruators to visit the gynaecologist starting at age 25 for cervical screening tests, to be repeated every three years until the age of 64 (NHS, n.d.-a). Mailed reminders (see figure 9) place a monetary price on the value of a missed appointment, triggering anticipatory guilt. This causes feelings that missing the appointment – which is preventable – will trigger an unwanted loss (Huhmann & Brotherton, 1997). Given the existing occurrence of these appointments, gynaecologists can be trained to give an elevator pitch at each meeting, introducing and reinforcing the benefits of sustainable menstruation maintenance (for the menstruator and the greater environment).

Figure 9

Cervical Screening Appointment Reminder Letter



A 3D replica of the female reproductive system should be used to demonstrate desired behaviour and to afford the menstruator the opportunity to learn through trial and error (Lahlou, 2017) (see figure 10). This hands-on experience allows the newfound competence to be embodied. Exposure to sustainable menstruation at a younger age allows a sustainable default to be set, influencing all subsequent menstrual behaviour (Lahlou, 2017). The social status of attending open hours and the additional information can encourage conversation among menstruators, forming new social regulations. Peer support has also been found to be significant in increasing the uptake of menstrual cups (Oster & Thorton, 2012). The NHS benefits peripherally, as increased education and minimizing disposable product use reduces menstruation complications and benefits the environment (Benartzi et al., 2017).

Figure 10

3D model of the Female Reproductive System

Open hours would require delegating more time to outpatient counselling. The NHS is currently understaffed (British Medical Association, 2022), illuminating a potentially significant limitation to intervention implementation. Further, the bureaucratic hurdle of mandating open hours could prove difficult to overcome.

3.1 Postpartum

After birth is a time of great change for a menstruator. The major contextual change is that majority shift to super absorbent sanitary towels (NHS, 2021), is an ideal moment to induce habit change (Verplanken & Wood, 2006). Obstetricians and pre/postnatal classes present an ideal way to introduce and encourage sustainable product use after birth.

This directional suggestion for a larger intervention is two-fold. First, encouraging sustainable products as the go-to for postpartum (6-8 weeks) immediately following birth (Lopez-Gonzalez & Kopparapu, 2020), and highlighting their benefits can be implemented at prenatal, postnatal appointments and classes. This could include promoting postpartum period pants and reusable pads that can be stored in the freezer, making them an appealing alternative, since postpartum menstruators would not have to resort to putting ice packs in their pants for pain relief (Vallie, 2023). Secondly, encouraging sustainable menstrual options after the 6–8 week period (when menstruators revert to standard methods of maintenance) is key for the sustainability and longevity of any postpartum intervention.

The clearest drawback is the undesirability of adding another task to the to-do list for new parents. Using reusable pants requires regular hygiene maintenance. Weeks 1 – 8 are the hardest for parents (Centre of Perinatal Excellence, n.d.), which may create a desirability for disposable products. Encouraging single-use yet sustainable options could be a way around this limitation.

4. UK University Restroom Installation

The current design of public restrooms is not conducive to menstrual cup use. Menstruators on university campuses struggle to quickly and efficiently change their cups in the current installation. As such, our proposed intervention consists of 4 individual modifications and additions that function simultaneously in gender-neutral, accessible and women's public restrooms at universities in the UK. Their collective goal is facilitating reusable product use, eliminating barriers to use and mitigating the damage of flushing single-use disposable products for university students (ages 18 – 27) (AtlanticLondon, 2021; Little & Tang, 2008). They address the efficacy of inserting and removing menstrual cups, sanitizing them properly in a public space, social recognition of environmental consciousness and flushing avoidance. Primarily focusing on reusable menstrual cups and single-use products, these interventions provide an activity system (Zhang & Bai, 2005), by targeting points of action that currently impede menstrual cup usage, to optimally channel behaviour within the context of restrooms at university.

4.1 Functionality; Narrative Signage

Intimidation, lack of knowledge, and distrust of insertion, efficacy and removal are major barriers to menstrual cup usage (Lunette, n.d.-b). Success during the first few uses – ideally the first attempt – is key to setting the standard for future behaviour (Lahlou, 2017). Ensuring proper function can exponentiate an individuals' long-term success with a menstrual cup. As such, the intervention targets the moment at which a menstruator is in a stall, unsure of how to insert or remove their menstrual cup, by providing step-by-step instructions with visuals to ensure effective and painless use.

Restrooms should have clear, concise signage at seated eye level on the inside door of each stall to guide menstruators in properly using their menstrual cup (see figure 11). The directions follow the story of a young woman indicating the step-by-step process of insertion and removal. Narratives instil a deeper engagement and sense of connection between narrator and reader (Polletta & Redman, 2020). This engages trust (Kramer, 2014) and facilitates a deeper embodiment of knowledge for the menstruator, boosting them and allowing for greater transportation (Green, 2004) of this newfound competence to future behaviour.

Figure 11

Narrative Functionality Signage

The signage features a maintenance reminder to sterilize properly once a month and offers an alternative for menstruators who continue to feel discomfort or face difficulties using the cup. Encouraging period pants as a substitute motivates the continued use of reusable products.

Increasing the efficacy of menstrual cups is beneficial across multiple stakeholders. For menstruators, cups – when used correctly – require less maintenance during usage, provide comfort and security throughout the day and reduce odour (Grajkowski, 2022). Less error in insertion means less anxiety, less stains and improved individual hygiene during menstruation. Moreover, a menstruator can individually save about £4,824 over a lifetime by switching to a menstrual cup (see Appendix B).

Producers will see purchase and profit growth as word spreads about the cups' efficacy and benefits. Conversely, current disposable product manufacturers might see a decline in the purchases of single-use disposable products. However, they can adjust to the new social sustainability standard, which will increase their return on investment (ROI) in the short-term, since the upfront cost of a menstrual cup outweighs the cost of a box of tampons by approximately 651.6% in the UK (see Appendix B).

Lastly, a decrease in disposable products means a decrease in flushing (alongside section 3.3) which will save both universities and the UK government large sums in annual de-clogging costs. The signage is relatively cheap to produce and implement, with the potential for significant returns.

4.2 Hygiene Maintenance; Sanitizing Water Basins

Given the current infrastructure, the premise of reusing a menstrual cup in a public setting – such as a university restroom – presents a major barrier to usage (Grajkowski, 2022). At minimum, it requires sanitization between removal and reinsertion (Anderson, 2020), rendering current public restroom installations unconducive to menstrual cup usage. This intervention addresses the moment of cup changing by proposing the addition of sanitizing wash basins to individual restroom stalls (see figure 12).

Figure 12

Sanitizing Basin in Stall

This compact, medical grade, sink like basin allows menstruators to rinse their cup between removal and reinsertion within the stall. Signage provides simple sanitizing instructions (see figure 13). Down the line, technologies that provide compact sanitizing and sterilizing affordances, like FLOW and JUJU could be fitted to restroom stalls (see Appendix C). In launching this intervention, we suggest installing basins in accessibility stalls and restrooms first, providing signage to inform users of the installation.

Figure 13
Signage above sanitizing basin

This affordance provides menstruators with the instrument necessary to practically use their cups during university hours. Basins facilitate cup use (the activity) by allowing the menstruator to take necessary sanitizing steps without moving – effectively, efficiently and safely using their cup, therefore achieving the identified target outcome (University of Warwick, 2011).

For producers, it illuminates an untapped market for medical water basin technology (see Appendix D) and increases menstrual cup purchases for users between 18 – 27 years old. As mentioned in section 4.1, the latter could cause a reduction in disposal product purchases for manufacturers and retailers. It simultaneously serves, however, as a financial incentive to reevaluate and re-adjust to meet growing sustainability practices.

Tasked with funding the installation, universities are unlikely – on a purely fiscal level – to see the desirability of this investment. Non-monetary benefits, however, are salient and resounding. Reputational benefits can send a stronger message of value (Chron, 2020) to identified ingroups, including other universities, students and prospective students. This could include general rankings lists, sustainability rankings, university appeal increase, especially for prospective students, and student life rankings. Pioneering these efforts is in the best interest of each university, as being the first-mover results in greater non-monetary benefits and profit than those of subsequent followers (Mittal & Swami, 2004). Moreover, launching in accessible restrooms spreads the cost over time. There is opportunity to seek grants or outside funding for work on sustainability and supporting women in higher education.

The plumbing requirements for the basins could lead to costly and time-consuming implementation. Beginning in accessible restrooms and stalls somewhat addresses this, though awareness of the installation could be more difficult, as many menstruators rarely use them.
Moreover, while universities would benefit reputationally in the long run, they'd still have to front the budget, installation and maintenance of these stations.

4.2.1 Hygiene Maintenance; Sanitizing Menstrual Wipes

In the interim, while basins' funding and installation reach restroom stalls, a basket of biodegradable menstruation sanitizing wipes should be added to each restroom counter. These biodegradable wipes (Ohne, n.d.) are designed specifically for menstrual cups, to ensure sanitization between uses – even without a clean water source (Lunette, n.d.-a). Menstruators can easily grab one on their way into the stall, enabling them to use their menstrual cups on campus before the basins are installed. Voting design containers in each stall (see section 4.3) facilitate proper disposal after use.

The impacts of this temporary intervention mirror those of the basin intervention. Wipes afford menstruators the artifacts necessary to use their menstrual cups and facilitate the activity at the moment of reuse. It also stimulates the menstrual cup market, encouraging the purchase and use of the cup.

Existing student life departments at universities have budgets to accommodate the cost of improving students' wellbeing and experience on campus (LSE, n.d.; University of York, n.d.). This cost-effective, easy and immediately feasible intervention could majorly increase menstruating students' wellbeing. Moreover, it encourages other manufacturers to favour the production of biodegradable, sustainable and environmentally friendly wipes and products.

The biodegradable nature of the wipes maintains the sustainable integrity of the intervention. Even so, universities would have to understand the wipes' merit and allocate necessary funds. Most concerningly, the benefits of the low-upfront costs laid out by this temporary intervention might discourage universities from funding and installing the water basins, rendering this a long-term band-aid rather than a temporary solution. Since the wipes are biodegradable, environmental concerns are minimal. Moreover, the impulse to flush can be addressed with the bin intervention presented in section 4.3.

4.3 Single-use Product Disposal; Voting Bin Design

As previously highlighted, the flushing of disposable menstrual products is costly to the government, the environment and public health. A UK study found that one in two UK women admitted to flushing menstrual products (Blair et al., 2022). Thus, this intervention seeks to channel behaviour at the moment of disposal, encouraging use of the bin through a voting sanitary bin redesign.

Where stalls are currently equipped with traditional disposal bins, a voting redesign will decrease flushing significantly (see figure 14). By fitting the bin with two openings (filling the same bag underneath), a pop-culture referenced provocative question can be posed to entice menstruators to 'vote' with their used disposable product. A sign over the bin informs – or reminds – menstruators that products cannot be flushed. By just slightly shifting the physical affordances of the installation in the stall, a drift according to Lahlou's (2017) installation evolution theory, users are more likely to participate – or feel a reason to participate – in the disposal of products, rather than flushing.

Figure 14

Sanitary Disposal Bin with Voting Design

The bin features the age-old rivalry of Pepsi vs. Coca-Cola (Bhasin, 2011). Posing a provocative question garners more attention because it elicits more interest than a non-controversial question (Chen & Berger, 2013). Interest is a key motivator to sparking engagement and re-engagement, as well as maintaining intrinsic motivation over time (O'Keefe et al., 2017) – igniting the motivation to break flushing habits. Moreover, when people answering questions are granted anonymity (such as in a restroom stall), the discomfort that accompanies controversial questions in social settings is significantly reduced (Markman, 2013). The signage boosts the menstruators knowledge, either informing them, or reminding them, that menstrual products cannot be flushed. As this channelled behaviour repeats, menstruators will begin to transport these newly established habits and competences to non-voting scenarios (Lahlou, 2017).

The voting disposal method has previously proven successful. The Ballot Bin, a company that uses the voting method to encourage proper disposal of cigarette butts, found that their efforts reduce cigarette litter by 46% (Ballot Bin, n.d.). Ballot Bins feature on some UK university campuses already (see Appendix F).

Reducing flushing of single-use menstrual products on university campuses in the UK is the catalyst for a larger movement. It would greatly benefit government and university budgets, allowing for reallocation of current de-clogging funds to other pressing causes. Marine life would see a much-needed reduction of disposable menstrual products in oceans, including microplastics which are immensely harmful to their ecosystem (Harrison & Tyson, 2022). Finally, the UK public and health care systems would reap the benefits of a reduction (or elimination) of sewer-overflow caused contamination of drinking water.

This intervention has a few limitations. One of the drivers of the Ballot Bin is the ability to see the votes of others in the box, which is obscured in this design. It would also require funding from universities. However, funds saved by the absence of de-clogging costs could balance or even outweigh these costs. Most pressingly, it is important to recognize that this intervention does not decrease all environmental impacts of disposable menstrual products. Even disposed of correctly, they continue to end up in landfills and emit carbon emissions.

4.4 Social Regulation; Button-Meter

The final intervention intends to establish a measure of social regulation. The collectivistic feelings of civic responsibility within university restrooms will ensure sustainable efficacy and begin to break down the stigma attached to menstrual conversations.

Success begins with addressing the moment directly after use, creating social expectations that motivate menstruators to practice and maintain sustainable menstrual habits. To achieve this, a button-meter will be installed for users to indicate they have used a reusable product that day (see figure 15). Above the button is a digital counter (meter) with persuasive messaging. It indicates how many baby turtles have been saved in that restroom in a given time period. On average, avoidance of 11.66 menstrual products saves 1 baby turtle, allowing 1 single menstruator to save 1.9 baby turtles per menstrual cycle, or 24.5 baby turtles annually (see Appendix B).

Figure 15

Regulation Button with Meter

Social regulation is an integral aspect of channelling behaviour (Lahlou, 2017). Individuals behave differently around a desired ingroup than they do alone (Walden University, 2019). Pressing the

button signals an extension of the self to other menstruators in the restroom – non-verbally indicating the user's priority of sustainability and environmental friendliness.

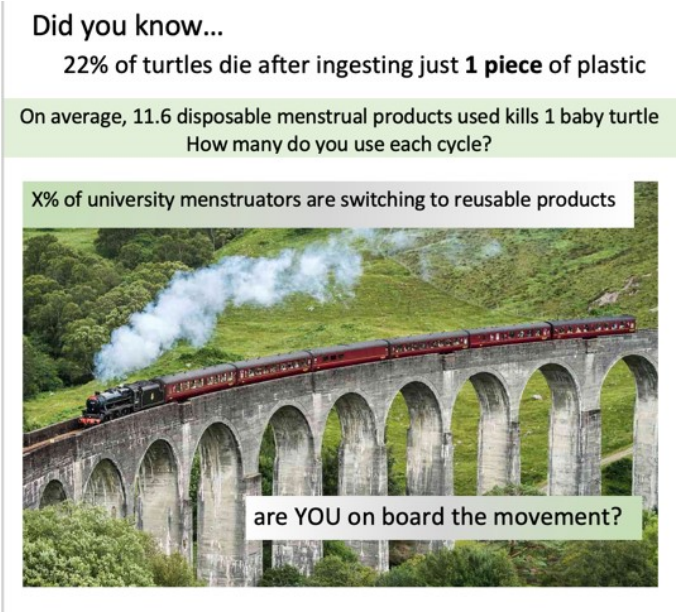
Normative social influence is also a powerful tool to change behaviour, as social influence creates conformity (Stangor, 2014). With enough participation, the minority becomes the menstruators *not* using reusable products – motivating them to join the movement to avoid social isolation (Stangor, 2014).

Anticipatory guilt has been found to be especially effective in the context of animal wellbeing (Wen et al., 2016). Framing the signage to induce anticipatory guilt about baby turtles will incite more use of the menstrual cup in future behaviour.

Metaphors ground abstract concepts and consequences, since the brain works through associations (Pecher et al., 2011). Further, dynamic social norms have proven more motivating than static social norms (Sparkman & Walton, 2017). The combination (see figure 16) features a visual of a train indicating, 'X% of menstruators are switching to reusable products – are you on board the movement?' Implementing both strategies simultaneously should highly motivate the menstruator.

Figure 16

Signage using Metaphor, Guilt & Dynamic Norms



Social regulation consists of formal and information rules that regulate behaviour (Lahlou, 2017). Thus, the primary stakeholders here are menstruators – button participants and ingroup witnesses (those socially regulating). Universities would need to combine existing technologies (see Appendix E) to install these buttons in restrooms, though some already feature similar installations (see Appendix F). Given the existence of these technologies, costs should remain relatively low.

In addition to the potential funding limitations acknowledged above, this button could face difficulty breaking psychological barriers. If the number of baby turtles saved isn't high enough,

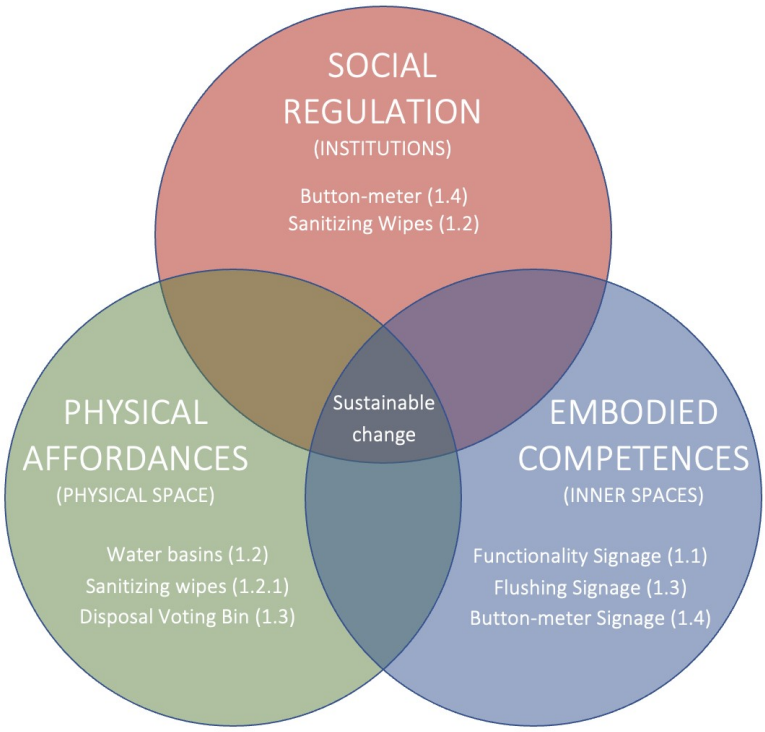
it might lead to the assumption that others aren't using reusable products, leading people to follow suit and the intervention could backfire.

4.5 Installation Theory and Activity Theory

Installation Theory unites the scope of these interventions as they function simultaneously. As Lahlou (2017) asserts, an installation is made up of physical affordances, embodied competences and social regulation. Crucially, what strengthens an installation is the overlap of layers – behaviours are more likely to be channelled when they are supported by multiple layers (Lahlou, 2017).

Figure 17

Interventions Organized with Installation Theory (adapted from Lahlou (2017))

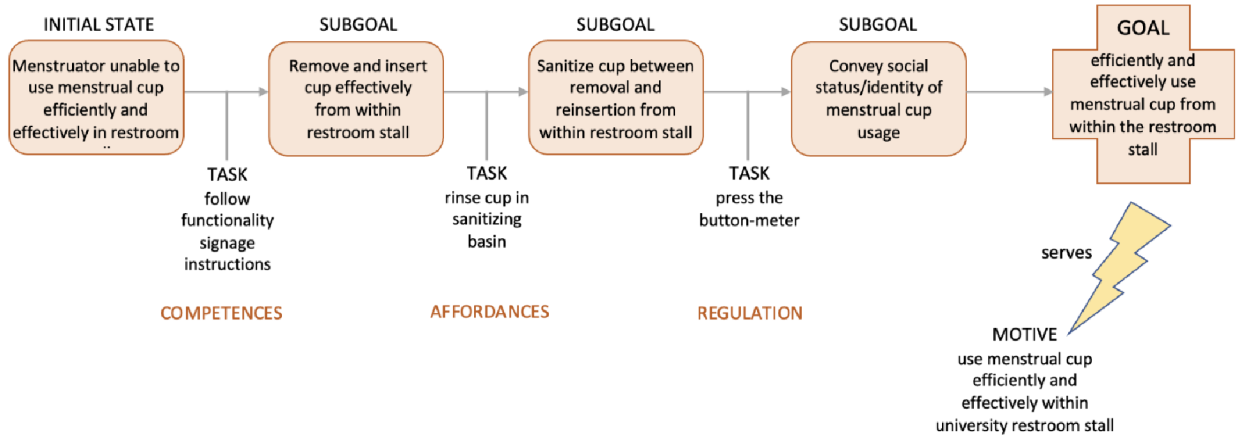


This intervention overlaps 4 installation interventions (at a time) covering each layer of the theory (see figure 17). The interventions provide affordances for menstruators to use their cups practically and safely on campus through the sanitizing stations, biodegradable wipes and the voting disposal bin design. They boost competences through the functionality narrative signage, the flushing information signage and the information provided above the meter. Finally, the meter uses signalling and builds on the extension of the self to establish socially regulatory expectations for menstruators in public restrooms. The layers are distributed across the installation, assembling at the point of activity (Lahlou, 2017).

Using Activity Theory, these interventions build on the relation of the menstruator to the objects they encounter in pursuit of using their menstrual cup in university restrooms (Lahlou, 2017) (see figure 18).

Figure 18

Menstruators' Menstrual Cup University Restroom Activity (adapted from (Lahlou, 2017))



Each menstrual cup intervention, all but disposal, targets a specific subgoal leading the menstruator to their overall goal of using the menstrual cup efficiently and effectively from within a restroom stall at university. Driven by motive, a menstruator "tries to reach [their] goal in the given conditions (the context)" (Lahlou, 2017, p.63). Adjusting the installation (and therefore the context) affords menstruators the conditions necessary to reach their goal in public restrooms – it facilitates the activity.

It is necessary to acknowledge that funding for these interventions is left up to the discretion of individual universities. However, these installations are relatively inexpensive, could be directed to the budgets of the student life departments and come alongside rewards for the university – fiscally and reputationally.

5. Conclusion and Future Research

The lack of sustainability surrounding menstrual maintenance is an urgent crisis in the UK for menstruators, the environment, the health care system and public funds, among other stakeholders. Using Installation Theory layers, we have identified a common shortcoming of previous behaviour change offerings in this realm; namely that while focusing on one or two layers alone might direct behaviour, it falls short of the channelling necessary to ensure sustainable change (Lahlou, 2017). In pursuit of addressing the gap, this work offers interventions that build on each other to ensure the affordance, competence and regulatory aspects function simultaneously, improving the longevity, sustainability and efficacy of the interventions.

Implementing a health week into school curricula educates students and parents on the proper usage and benefits of sustainable options, encourages conversations at home and supports efforts to destigmatize menstruation discourse. The period package, distributed at health week, prioritizes preparation ahead of the first exposure, setting a sustainable product standard at the moment of first menstruation and encourages conversations among peers. Implementing gynaecological open hours with women's health experts early in a menstruators' life, aids in destigmatizing conversation and increasing awareness and competences. Simultaneously, reminders and recommendations throughout gynaecological visits demystify sustainable products at all stages of menstruation. Finally, addressing women's (and gender-neutral) restrooms at university creates a layered installation that is effective, conducive to sustainably, immediately implementable, and relatively low cost. The affordances, competences and social regulation (see figure 11 in section 4.5) layer each other to ensure maximum efficacy in channelling behaviour, and in competence transportation to future behaviour.

Due to the scope of this paper, we have not addressed every possible pain point, stakeholder or intervention. Alongside some of the limitations of our proposal, these avenues can be addressed in future research. Intentionally, our primary target population is students and younger generations – those that could most greatly impact the future menstrual status quo. Future work should further develop the interventions introduced for existing menstruators – especially those without children – in order to layer interventions, ensuring more channelled sustainable behaviour. Modifications could aim to channel sustainable behaviour within private spaces, such as the home. Bureaucracy and funding obstacles surrounding the health week, period package and gynaecology interventions can trigger implementation difficulties, as the processes require participation from a greater number of institutions. Technological innovations will reveal new research opportunities to encourage sustainable menstruation. Furthermore, work to remove the current UK option for parents to opt their children out of sex education in schools (Department of Education, 2021) would eliminate a major barrier to intervention success.

While manufacturers, producers and retailers – as stakeholders – fell largely outside the scope of our research, future work might examine their role and impacts on sustainable menstruation. Some retailers already integrate reusable products in mainstream offerings (ex. Victoria's Secret markets reusable pants). The contextual transformation of these options from granny-panty style to more fashionable options could transform the concept for a consumer.

Menstruation maintenance products could only reach 100% sustainability if they were eliminated entirely. Since they are crucial to the life and well-being of a menstruator, this is not possible. Our interventions work to increase sustainability in this field. They layer one another, aligning the affordance, competence and regulatory components necessary to ensure channelled, sustained and sustainable menstrual behaviour. This work builds on a greater conversation surrounding the importance of sustainable menstruation and menstrual health. It is complex but long overdue, so bloody hell, let's talk about it.

References

Absorbent Hygiene Product Manufacturers Association [Aphma]. (2007) Menstruation and Sanitary protection/Femcare market facts and figures. https://www.ahpma.co.uk/menstruation_facts_and_figures/

Anderson, J. (2020, June 15). *How to Clean and Store Your Menstrual Cup.* Healthline. https://www.healthline.com/health/how-to-clean-menstrualcup#:~:text=If%20you%20don

Astrup, J. (2017). PERIOD POVERTY Tackling the taboo. *Community Practitioner, 90*(12), 4042. https://www.proquest.com/openview/8b2e91f379aaaba3907ea05686fd27d2/1?pqorigsite=gscholar&cbl=47216

AtlanticLondon. (2021, September 3). *At what age do you go to university in the UK?* Atlantic London. https://atlanticlondon.co.uk/what-age-do-you-go-to-university-in-the-uk/

Ballot Bin. (n.d.). *Ballot Bin*. https://ballotbin.co.uk/about/

Benartzi, S., Beshears, J., Milkman, K. L., Sunstein, C. R., Thaler, R. H., Shankar, M., TuckerRay, W., Congdon, W. & Galing, S. (2017). Should governments invest more in nudging? *Psychological science, 28*(8), 1041-1055. https://journals.sagepub.com/doi/pdf/10.1177/0956797617702501

Bhasin, K. (2011, November 2). *COKE VS. PEPSI*: The Amazing Story Behind The Cola Wars. Business Insider. https://www.businessinsider.com/soda-wars-coca-cola-pepsi-historyinfographic-2011-11?r=US&IR=T#pepsi-cola-was-created-in-13-years-later-bypharmacist-caleb-bradham-2

Blair, L. A. G., Bajón-Fernández, Y., & Villa, R. (2022). An exploratory study of the impact and potential of menstrual hygiene management waste in the UK. *Cleaner Engineering and Technology*, 7, 100435. https://doi.org/10.1016/j.clet.2022.100435

Blincoe, K. (2016, September 21). *Half of UK women flush tampons away – this has to stop.* The Guardian. https://www.theguardian.com/commentisfree/2016/sep/21/flushing-tamponstoilet-blocks-drains-sanitary-products

Bobel, C. (2006). "Our revolution has style": Contemporary menstrual product activists "doing feminism" in the third wave. *Sex Roles, 54,* 331-345. https://link.springer.com/article/10.1007/s11199-006-9001-7

Bobel, C. (2010). *New blood: Third-wave feminism and the politics of menstruation.* Rutgers University Press. https://books.google.co.uk/books?hl=en&lr=&id=B1326g__TUEC&oi=fnd&pg=PR7&dq=bobel+2010&ots=ATF3qIyGA9&sig=Qs2afhy5kD2GO_QRBS_gkki8YWo&redir_esc=y#v=onepage&q=bobel%202010&f=false.

Borowski, A. (2011). *Are American Women Turning to Reusable and Greener Menstrual Products Due to Health and Environmental Pollution Concerns?* [Master's Thesis, Rochester Institute of Technology]. ProQuest Dissertations and Theses Global. https://www.proquest.com/dissertations-theses/are-american-women-turningreusable-greener/docview/993676269/se-2

Borunda, A. (2019, September 6). *How Tampons and Pads Became so Unsustainable.* National Geographic. https://www.nationalgeographic.com/environment/article/how-tamponspads-became-unsustainable-story-of-plastic

Bradford, S. (2022, January 13). *Birth characteristics in England and Wales: 2020.* Office for National Statistics. https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthcharacteristicsinenglandandwales/2020

Briggs, A. (2021). 'period poverty' in stoke-on-trent, UK: New Insights into gendered poverty and the lived experiences of austerity. *Journal of Poverty and Social Justice, 29*(1), 85–102. https://doi.org/10.1332/175982720x16050132762411

British Medical Association. (2022). *An NHS under pressure.* https://www.bma.org.uk/adviceand-support/nhs-delivery-and-workforce/pressures/an-nhs-under-pressure

Brown, N., Williams, R., Bruinvels, G., Piasecki, J., & Forrest, L. J. (2022). Teachers' perceptions and experiences of menstrual cycle education and support in UK schools. *Frontiers in Global Women's Health, 3*. https://doi.org/10.3389/fgwh.2022.827365

Brownson, R. C. (2017). Dissemination and Implementation Research in Health: Translating Science to Practice. In *Google Books*. Oxford University Press. https://books.google.co.uk/books?hl=en&lr=&id=ycM9DwAAQBAJ&oi=fnd&pg=PA19&ots=boQ7PFB9hP&sig=glq8xMub8CziZotAqZ40ycs_7GA&redir_esc=y#v=onepage&q&f=false

Campaign for Safe Cosmetics [CSC]. (2022). Menstrual Care Products and Toxic Chemicals. Safe Cosmetics. https://www.safecosmetics.org/resources/health-science/menstrual-careproducts/

Campanale, C., Massarelli, C., Savino, I., Locaputo, V., & Uricchio, V. F. (2020). A detailed review study on potential effects of microplastics and additives of concern on human health. *International journal of environmental research and public health, 17*(4), 1212. https://doi.org/10.3390/ijerph17041212

Cardoso, L. F., Scolese, A. M., Hamidaddin, A., & Gupta, J. (2021). Period poverty and mental health implications among college-aged women in the United States. *BMC women's health, 21*(1), 1-7. https://doi.org/10.1186/s12905-020-01149-5

Centre Of Parental Excellence [COPE]. (n.d.). *Adjusting To Parenthood*. https://www.cope.org.au/new-parents/first-weeks/

Chen, Z., & Berger, J. (2013). When, Why, and How Controversy Causes Conversation. *Journal of Consumer Research, 40*(3), 580–593. https://doi.org/10.1086/671465

Chron. (2020). *The Importance of Non-financial Rewards for the Organization.* Chron.com. https://smallbusiness.chron.com/importance-nonfinancial-rewards-organization45146.html

Colgate. (n.d.). *Anxiety Over a Dental Appointment? How to Ease Your Child's Worries.* https://www.colgate.com/en-za/oral-health/dental-visits/anxiety-over-a-dentalappointment-how-to-ease-your-childs-worries-1213

Department of Education. (2021). UK Government. *Introduction to requirements.* https://www.gov.uk/government/publications/relationships-education-relationships-andsex-education-rse-and-health-education/introduction-torequirements#:~:text=new%20legal%20framework.-

Department of Education (2022). UK Government. *Period product scheme for schools and colleges in England.* https://www.gov.uk/government/publications/period-products-inschools-and-colleges/period-product-scheme-for-schools-and-colleges-inengland#:~:text=The%20period%20product%20scheme%20is,to%20order%20until%20J uly%202024.

Department of Education (n.d.). UK Government. *Relationships Education, Relationships and Sex Education (RSE) and Health Education -Statutory guidance for governing bodies, proprietors, head teachers, principals, senior leadership teams, teachers.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1090195/Relationships_Education_RSE_and_Health_Education.pdf

DeVito, M. J., & Schecter, A. (2002). Exposure assessment to dioxins from the use of tampons and diapers. *Environmental Health Perspectives, 110*(1), 23–28. https://doi.org/10.1289/ehp.0211023

European Parliament. (2018, October 12). *Plastic in the ocean: the facts, effects, and new EU roles.* https://www.europarl.europa.eu/news/en/headlines/society/20181005STO15110/plasticin-the-ocean-the-facts-effects-and-new-eu-rules

Femme International. (2013). *History of The Sanitary Pad.* https://femmeinternational.org/thehistory-of-the-sanitary-pad/

Fornix. (2021, January 21). *How to clean your menstrual cup the right way*. The Fornix Blog by Flex. https://blog.flexfits.com/how-to-clean-menstrual-cup/#:~:text=No%20matter%20which%20brand%20you

Fourcassier, S., Douziech, M., Pérez-López, P., & Schiebinger, L. (2022). Menstrual products: A comparable life cycle assessment. *Cleaner Environmental Systems, 7*, 100096. https://doi.org/10.1016/j.cesys.2022.100096.

Francis, A., & Sarangi, G. K. (2022). Sustainable consumer behaviour of Indian millennials: Some evidence. *Current Research in Environmental Sustainability, 4*, 100109. https://doi.org/10.1016/j.crsust.2021.100109

Godin, C. (2021, April 26). *Are Your Period Habits Hurting the Planet? Calculate to Find Out!* Intimina. https://www.intimina.com/blog/period-habits-might-be-hurting-the-planet/

Grajkowski, A. (2022, July 7). *Menstrual cups versus tampons.* Mayo Clinic Health System. https://www.mayoclinichealthsystem.org/hometown-health/speaking-ofhealth/menstrual-cups-vs-tampons-things-you-might-not-know-about-the-cup

Green, M. C. (2004). Transportation Into Narrative Worlds: The Role of Prior Knowledge and Perceived Realism. *Discourse Processes, 38*(2), 247–266. https://doi.org/10.1207/s15326950dp3802_5

Hailemariam, M., Bustos, T., Montgomery, B., Barajas, R., Evans, L. B., & Drahota, A. (2019). Evidence-based intervention sustainability strategies: a systematic review. *Implementation Science, 14*(1). https://doi.org/10.1186/s13012-019-0910-6

Hagman, W., Erlandsson, A., Dickert, S., Tinghög, G., & Västfjäll, D. (2022). The effect of paternalistic alternatives on attitudes toward default nudges. *Behavioural Public Policy, 6*(1), 95-118 https://www.researchgate.net/publication/336162714_The_effect_of_paternalistic_alternatives_on_attitudes_toward_default_nudges .

Hampson, L. (2019, November 28). *Women spend £5,000 on period products in their lifetime.* Www.standard.co.uk. https://www.standard.co.uk/escapist/health/how-much-do-womenspend-on-period-products-a4299531.html

Harrison, M. E., & Tyson, N. (2022). Menstruation: Environmental impact and need for global health equity. *International Journal of Gynecology & Obstetrics, 160*(2). https://doi.org/10.1002/ijgo.14311

HealthWatch Greenwich. (2023). *Referrals black hole' - new findings of people's experiences of GP referrals.* https://healthwatchgreenwich.co.uk/news/2023-02-20/referrals-black-hole'new-findings-people's-experiences-gp-referrals

Hertwig, R., & Grüne-Yanoff, T. (2017). Nudging and boosting: Steering or empowering good decisions. *Perspectives on Psychological Science, 12*(6), 973-986. https://journals.sagepub.com/doi/pdf/10.1177/1745691617702496?casa_token=w06ipX8XQCYAAAAA:z5CPmei1Y9bsZdECN13ROwmPAVSZtgcoDtwhsyivw-Uw0Mr2i5mRczLxEQvH4bEPxPlKF-gFbLk

Huhmann, B. A., & Brotherton, T. P. (1997). A content analysis of guilt appeals in popular magazine advertisements. *Journal of Advertising, 26*(2), 35 45. https://www.tandfonline.com/doi/abs/10.1080/00913367.1997.10673521

IndieGoGo. (n.d.). *FLOW: The Menstrual Cup Cleaning & Sanitizing Device.* Indiegogo. https://www.indiegogo.com/projects/flow-the-menstrual-cup-cleaning-sanitizingdevice#/

Kpodo, L., Aberese-Ako, M., Axame, W. K., Adjuik, M., & Gyapong, M. (2022, October 4). Socio-cultural factors associated with knowledge, attitudes and menstrual hygiene practices among Junior High School adolescent girls in the Kpando district of Ghana: A mixed

method study. *PLOS ONE, 17*(10), e0275583. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0275583

Kramer, R. M. (2014). *Rethinking Trust.* Harvard Business Review. https://hbr.org/2009/06/rethinking-trust

Lahlou, S. (2017). *Installation theory: the societal construction and regulation of behaviour.* Cambridge University Press.

Lee, J. S. (2008). "A Kotex and a Smile." *Journal of Family Issues, 29*(10), 1325–1347. https://doi.org/10.1177/0192513x08316117

Lennon, M., (2019). MSP, Policy Memorandum - Period Products (Free Provision) (Scotland) Bill. https://archive2021.parliament.scot/S5_Bills/Period%20Products%20(Free%20Provision)%20(Scotland)%20Bill/SPBill45FMS052019.pdf

Little, B., & Tang, W.-Y. (2008, January 1). *Age differences in graduate employment across Europe.* ResearchGate. https://www.researchgate.net/publication/42788307_Age_differences_in_graduate_employment_across_Europe

Lopez-Gonzalez, D. M., & Kopparapu, A. K. (2020). *Postpartum care of the new mother*. https://europepmc.org/article/nbk/nbk565875

LONDON ASSEMBLY Environment Committee. (2018, August). *Single-use plastics, unflushables*. https://www.london.gov.uk/sites/default/files/plastics_unflushables__submited_evidence.pdf

LSE. (n.d.). *Student life.* London School of Economics and Political Science. https://www.lse.ac.uk/student-life

Lunette. (n.d.-a). *LUNETTE DISINFECTING WIPES.* La Vida Vegan. https://www.lavidavegan.com.au/products/lunette-disinfecting-wipes

Lunette. (n.d.-b). *Menstrual Cup FAQ - Frequently Asked Questions about Cups - Lunette*. Lunette Global. https://www.lunette.com/pages/faq

Lusher, A. L., McHugh, M., & Thompson, R. C. (2013). Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Marine pollution bulletin, 67*(1-2), 94–99. https://doi.org/10.1016/j.marpolbul.2012.11.028

Markman, A. (2013, September 20). *Controversy and Conversation*. Psychology Today. https://www.psychologytoday.com/gb/blog/ulterior-motives/201309/controversyand-conversation

Miller, O. (2021). How does period poverty have a negative effect on teenage girls? UNICEF Global Development Commons. https://gdc.unicef.org/resource/how-does-period-

povertyhave-negative-effect-teenage-girls#:~:text=Period%20poverty%20can%20lead%20to

Mittal, S., & Swami, S. (2004). What Factors Influence Pioneering Advantage of Companies? Vikalpa: *The Journal for Decision Makers, 29*(3), 15–34. https://doi.org/10.1177/0256090920040302

Mooncup. (n.d.). *8 Reasons To Switch To The Mooncup.* Menstrual Cup. https://www.mooncup.co.uk/blog/8-reasons-to-make-a-switch-to-the-mooncupmenstrual-cup/

Natracare. (2019, June 26). *How Much Plastic is in Period Pads? - Natracare*. Natracare. https://www.natracare.com/blog/how-much-plastic-in-period-pads/

NHS.(n.d.-a). *Cervical Screening: Programme Overview.* nhs.uk. https://www.gov.uk/guidance/cervical-screening-programme-overview

NHS. (n.d. -b). *Referrals For Specialist Care.* nhs.uk. https://www.nhs.uk/nhs-services/hospitals/referrals-for-specialist-care/

NHS inform. (2022) *Menopause.* https://www.nhsinform.scot/healthy-living/womenshealth/later-years-around-50-years-and-over/menopause-and-post-menopausehealth/menopause

NHS Inform (n.d.). *Periods (Menstruation).* https://www.nhsinform.scot/healthy-living/womenshealth/girls-and-young-women-puberty-to-around-25/periods-and-menstrualhealth/periods-menstruation

NHS. (2018). *Periods and fertility in the menstrual cycle.* nhs.uk. https://www.nhs.uk/conditions/periods/fertility-in-the-menstrual-cycle/

NHS. (2019). *Toxic shock syndrome.* nhs.uk. https://www.nhs.uk/conditions/toxic-shocksyndrome/#:~:text=Toxic%20shock%20syndrome%20(TSS)%20is%20caused%20by%20either%20staphylococcus%20or

NHS. (2021). *Your body after the birth*. nhs.uk. https://www.nhs.uk/pregnancy/labour-andbirth/after-the-birth/your-body/

NHS. (2023). *Starting your periods*. nhs.uk. https://www.nhs.uk/conditions/periods/startingperiods/

Ohne. (n.d.). *Menstrual Cup Wipes.* Ohne. https://ohne.com/products/menstrual-cup-wipes

O'Keefe, P. A., Horberg, E. J., & Plante, I. (2017). The Multifaceted Role of Interest in Motivation and Engagement. *The Science of Interest,* 49–67. https://doi.org/10.1007/978-3-31955509-6_3

Oster, E., & Thornton, R. (2012). Determinants of technology adoption: Peer effects in Menstrual Cup take-up. *Journal of the European Economic Association, 10*(6), 1263–1293. https://doi.org/10.1111/j.1542-4774.2012.01090.x

Peberdy, E., Jones, A., & Green, D. (2019). A Study into Public Awareness of the Environmental Impact of Menstrual Products and Product Choice. *Sustainability, 11*(2), 473. MDPI AG. http://dx.doi.org/10.3390/su11020473

Pecher, D., Boot, I., & Van Dantzig, S. (2011, January 1). *Chapter seven - Abstract Concepts: Sensory-Motor Grounding, Metaphors, and Beyond* (B. H. Ross, Ed.). ScienceDirect; Academic Press. https://www.sciencedirect.com/science/article/abs/pii/B9780123855275000073

Polletta, F., & Redman, N. (2020). When do stories change our minds? Narrative persuasion about social problems. *Sociology Compass*. https://doi.org/10.1111/soc4.12778

Pycroft, H. (2022, May 27). *Cost of living: 12% of British women are affected by period poverty*. www.actionaid.org.uk. https://www.actionaid.org.uk/blog/2022/05/27/costliving-12-british-women-are-affected-period-poverty

Ross, A., & Shoff, H. W. (2017). *Toxic Shock Syndrome*. Europe PMC. https://europepmc.org/article/nbk/nbk459345

Rubinsky, V., Gunning, J. N., & Cooke-Jackson, A. (2020). "I Thought I Was Dying:" (Un)Supportive Communication Surrounding Early Menstruation Experiences. *Health Communication, 35*(2), 242–252. https://doi.org/10.1080/10410236.2018.1548337

Sommer, M., Torondel, B., Hennegan, J., Phillips-Howard, P. A., Mahon, T., Motivans, A., Zulaika, G., Gruer, C., Haver, J., & Caruso, B. A. (2021). How addressing menstrual health and hygiene may enable progress across the Sustainable Development Goals. *Global Health Action, 14*(1). https://doi.org/10.1080/16549716.2021.1920315

Sparkman, G., & Walton, G. M. (2017). Dynamic Norms Promote Sustainable Behavior, Even if It Is Counternormative. *Psychological Science, 28*(11), 1663–1674. https://doi.org/10.1177/0956797617719950

Stangor, C. (2014). Principles of Social Psychology - 1st International H5P Edition. *Pressbooks.* https://opentextbc.ca/socialpsychology/

Tingle, C., Shailini Vora, S., Reid, M., Hampton, J., Cirefice, V. (2018). *BREAK THE BARRIERS: GIRLS' EXPERIENCES OF MENSTRUATION IN THE UK* [report]. Plan International UK. https://plan-uk.org/file/plan-uk-break-the-barriers-report032018pdf/download?token=Fs-HYP3v

The Period Lady. (2021, February 8). *Cost Comparison Reusable V Disposable Menstrual Products.* https://www.theperiodlady.co.uk/blog/cost-comparison-reusable-v-disposablemenstrual-products.html#:~:text=Read%20our%20article%20for%20more

World Wildlife Fund. (n.d.). *What do sea turtles eat? Unfortunately, plastic bags*. World Wildlife Fund. https://www.worldwildlife.org/stories/what-do-sea-turtles-eat-unfortunatelyplastic-bags#:~:text=The%20outlook%20for%20turtles%20that

UNICEF. (n.d.). *Menstrual hygiene.* https://www.unicef.org/wash/menstrualhygiene#:~:text=Every%20month%2C%201.8%20billion%20people%20across%20the% 20world%20menstruate.

UT Health (2019). *Period Products – The Good, The Bad, and The Ugly.* https://uthealthaustin.org/blog/period-products

University of Warwick. (2011). *Activity theory.* https://warwick.ac.uk/fac/soc/ier/glacier/learning/theories/activitytheory/

University of York. (n.d.*). Student Life Committee - About the University*, University of York. https://www.york.ac.uk/about/organisation/governance/sub-committees/specialcases/slc/#:~:text=To%20monitor%20ongoing%20developments%20relating

Vallie, S. (2023, January 18). *What to Know About Using Ice Packs After Childbirth*. WebMD. https://www.webmd.com/parenting/baby/what-to-know-about-using-ice-packs-afterchildbirth#:~:text=Postpartum%20ice%20packs%20are%20a

Van Eijk, A. M., Zulaika, G., Lenchner, M., Mason, L. H., Sivakami, M., Nyothach, E., Unger, H. W., Laserson, K. F., & Phillips-Howard, P. A. (2019). Menstrual cup use, leakage, acceptability, safety, and availability: a systematic review and meta-analysis. *The Lancet. Public Health, 4*(8), e376–e393. https://doi.org/10.1016/s2468-2667(19)30111-2

Verplanken, B., & Wood, W. (2006). Interventions to Break and Create Consumer Habits. *Journal of Public Policy & Marketing, 25*(1), 90–103. https://www.jstor.org/stable/30000528

Vora, S. (2020). The realities of period poverty: how homelessness shapes women's lived experiences of menstruation. *The Palgrave handbook of critical menstruation studies,* 31-47. https://doi.org/10.1007/978-981-15-0614-7_4

Walden University. (2019, February 14). *Why Do People Act Differently in Groups Than They Do Alone?* Waldenu.edu; Walden University. https://www.waldenu.edu/online-mastersprograms/ms-in-psychology/resource/why-do-people-act-differently-in-groups-than-theydo-alone

Water UK. (2016). *International flushability statement*. https://www.water.org.uk/newsitem/international-flushability-statement/

Waterlogic. (n.d.). *Bottle Filling Station Compact Automatic.* https://www.waterlogic.com/engb/water-fountains/bottle-filling-compact/

Wehle, D. H. S., & Coleman, F. C. (1983). Plastics at sea. *Natural History, 92*(2), 20-26. https://marinelab.fsu.edu/media/3071/1983_plastics-at-sea-natural-history-_text.pdf

Wen, T., Lee, S., & Wu, H. (2016). *A content analysis of guilt appeals in animal welfare campaigns.* https://dr.lib.iastate.edu/server/api/core/bitstreams/21c0a843-2d63-4fe0-a6dd4abb52b7af11/content

Williams, G. (2022). *How is the cost of living crisis affecting period poverty in the UK?* Economics Observatory. https://www.economicsobservatory.com/how-is-the-cost-of-living-crisisaffecting-period-poverty-in-the-uk

Zhang, P., & Bai, G. (2005). *An Activity Systems Theory Approach to Agent Technology.* https://www.diva-portal.org/smash/get/diva2:833667/FULLTEXT01.pdf

Appendix A: Detailed Problem/Intervention Table

Table 2

Detailed table identifying problems and proposed interventions

Intervention Title	Problem (What)	Moment of Intervention (When)	Intervention (What and When)	Logistics (How)	Concepts & Theories	Stakeholders Addressed	Limitations
Health Week*	Lack of education ahead of menstruation for parents and students	Primary school including before first period	Annual 'Health Week' in UK curriculum with parents' education evenings	Implement sessions for students and parents based on age and relevant information	Concept of more and improved education	Parents, Students, UK department of education	Funding, opt-out of sex education for students, parents who choose not to attend
Period Packages	Young menstruators are not prepared when they get their first period	Distributed ahead of first period (to be used at moment of first period)	Period Package	Distribute a package with information, instructions & sustainable products during health week	Installation Theory, Activity Theory	Parents, Students, Schools, UK department of education	Funding, distribution difficulties, potential of no repurchase after first use
Gynaecologist	Lack of information about sustainable menstruation	Drop-In Consultations and gynaecological screening appointments	Open Hours, opportunity to discuss during Screening Tests	Reminders during health week and notificationreminders	Installation Theory, Boosting, Anticipatory Guilt, Signalling	Gynaecologists, NHS, Menstruator	NHS staffing limitations, menstruators avoiding/forgetting gynaecology appointments
Postpartum*	Lack of awareness for sustainable options for postpartum bleeding and subsequent menstrual cycles	During pregnancy appointments, classes and postpartum doctor visits	Reminders at pregnancy/postpartumvisits & at hospital post birth	Extending knowledge and options for sustainable postpartum products	Installation Theory – intervention during other life change	OBGYNs, NHS, Woman giving birth	Lack of desire to add one more task at new born stage
UK Restroom Installation: **Functionality; Narrative Signage**	Menstruators don't always have the competences to properly use their menstrual cup	Moment of use (removal or insertion) in the stall	Signage in stalls to implore effective cup technique	Instructions in stalls with narrative directions & visuals	Narratives, Installation Theory, Boosting, Activity Theory	Menstruators, Manufacturers, Universities	Funding costs from universities (though they are very low)

UK Restroom Installation: **Hygiene Maintenance; Sanitizing Basins**	Lack of ability for menstruator to use the cup without leaving the stall to sanitize it	Moment of needing to sanitize cup between removal and reinsertion	Sanitizing water basins	Water basin in the stall allows menstruator to sanitize cup without moving	Installation Theory, Activity Theory	Menstruators, Manufacturers, University	Funding concerns, requires connection to plumbing
UK Restroom Installation: **Hygiene Maintenance; Sanitizing Wipes**	Lack of affordance allowing menstruator to sanitize cup before basins are installed	Moment of needing to sanitize cup between removal and reinsertion	Biodegradable menstrual wipes	Basket of biodegradable menstrual wipes provided on restroom counters	Installation Theory, Activity Theory, Signalling	Menstruators, Manufacturers, University	Might discourage university from investing in basins (making this the permanent intervention)
UK Restroom Installation: **Disposal; Voting Bin Design**	½ UK menstruators flush products after use (Blair et al., 2022) – causes financial, health & environmental harm	Moment of disposal choice – avoiding habit of flushing	Voting disposal bin design	Pop-culture, controversial question voting bin design to entice bin disposal	Installation Theory, Controversial question benefits, Anonymity benefits, Behaviour Transportation	UK government, Marine life, Healthcare system, Universities	Doesn't reduce use of disposable products, just flushing, funding
UK Restroom Installation: **Social Regulation Button-Meter**	Menstruators are social norms & signalheavily influenced by s	Moment of social signalling and extending identity of self through actions	Regulatory button – meter	Button with meter indicating how many baby turtles saved by menstruators	Installation Theory, Dynamic norms, Metaphors, Anticipatory guilt, Signalling, Extension of self (identity)	Menstruator, University	Not enough turtles saved on meter could backfire

**indicates brief direction of intervention rather than deep analysis*

Appendix B: Calculations

Cost calculations (linked to section 4.1)

Boots' website has prices ranging from £1.05 to £12.99 for a box of tampons. With 35 options to choose from, the average price is £3.06 (calculated by adding up prices of all tampon box options and dividing by the number of options).
The average menstrual cup costs £23 (The Period Lady, 2021).
As such, the upfront profit for a retailer (which translates to increased profit to the manufacturer) would be 7.52 times higher – a 651.6% upfront increase (see figure 19) – with a menstrual cup purchase than the purchase of a box of tampons.

Figure 19
Omni Calculator

$$\% \text{ increase} = 100 \times \frac{(\text{final} - \text{initial})}{|\text{initial}|}$$

100 x ((23 – 3.06) / (3.06)) = 651.634%

Saved baby turtles calculation (linked to section 4.4)

The average pack of pads contains 36 grams of plastic, with an individual pad's packaging producing 2.5 grams and the pad itself producing 2.4 grams of plastic (Natracare, 2019). It only takes 14 grams of ingested plastic to kill a baby turtle (Godin, 2021). As such, 5.83 flushed pads can kill 1 baby turtle (2.4/14). With 1 out of 2 UK menstruators flushing their sanitary products

(Blincoe, 2016), that means (on average) the avoidance of 11.66 pads (5.83*2) can save 1 baby turtle. The average menstruator in the UK uses 22 products during 13 cycles annually, creating the potential to save almost 2 baby turtles *every month*, and an annual 24.5 baby turtles per menstruator by trading disposal products for reusable ones.

Menstrual cup savings for the menstruator (linked to section 4.1)

A study conducted found that, on average, a UK menstruator spends £10.24 per month on menstrual products. Over the 40-year average menstrual lifetime (ages 12 – 52) (NHS, 2018), it adds up to £4,916 per menstruator (Hampson, 2019). A menstrual cup, that lasts 10 years, costs about £23 (The Period Lady, 2021). As such, cups would cost a menstruator about £92 (23*4) over their menstrual lifetime.

This means that menstrual cups could save a menstruator somewhere around **£4,824** (4,916 – 92) over their lifetime.

Appendix C: Future Technology

Sanitizing Technology: (linked to section 4.2)

While sanitizing water basins are a good way to provide sanitizing affordances to menstruators within public restroom stalls immediately, advances in technology could illuminate more advanced solutions and interventions in the future. FLOW, a start-up based in Florida (USA), is at the forefront of innovation, working to create portable sanitizing stations for individual menstruators (see figure 20).

Figure 20
FLOW Portable Sanitizing Station (IndieGoGo, n.d.)

The concept is a small, portable machine that combines rotational energy and UV light to clean, sanitize and dry the menstrual cup, without getting up between removal and insertion (IndieGoGo, n.d.). Though the design exists, they are at the beginning stages, looking for support – mainly financial to build a working prototype and get the product off the ground.

This is a brilliant opportunity for manufacturers and/or universities. A universities' investment to fund this research could orient technology design to fit individual restroom stall installations. This design would not only benefit (and be sold to) other universities, but also to the government at large for implementation in all public restrooms. Manufacturers have a similar opportunity to get in on the ground-level, as investment in this innovation would open a new market for sanitizing stations amongst individuals and institutions.

Sterilizing Technology: (linked to section 4.2)

While sanitizing is crucial between each use of a menstrual cup, sterilization is also recommended safety at least once a month (once a menstrual cycle) (Fornix, 2021). Often, this requires boiling the menstrual cup on the stove for about 20 minutes. However, technology has been created to avoid boiling requirements for sterilization. There is a burgeoning market for small sterilization devices for menstruators' private residences (see figure 21).

Figure 21

JUJU Portable Sterilization Device

Using steam technology, this JUJU device only requires the menstruator to insert the cup and wait a few minutes for sterilization. JUJU is not the only company on the market producing portable sterilizing stations for menstruators. This is another opportunity for either universities – or manufacturers – to adapt technology for fiscal and social gain. In the process of innovating sanitizing stations for restroom stalls, sterilization technology can be added to optimize affordances for menstruators. Being among the first to invest in this technology could reap significant rewards in the market and the social spheres.

Appendix D: Water Basin Technology

Technology for compact, medical grade, stainless steel water basins has been implemented in medical practices for years. Likely experienced by the public most often in dental offices, these

basins are designed to take up little space, and have been used to provide rinse affordances to dental patients without having to move from the dentists' chair (see figure 22).

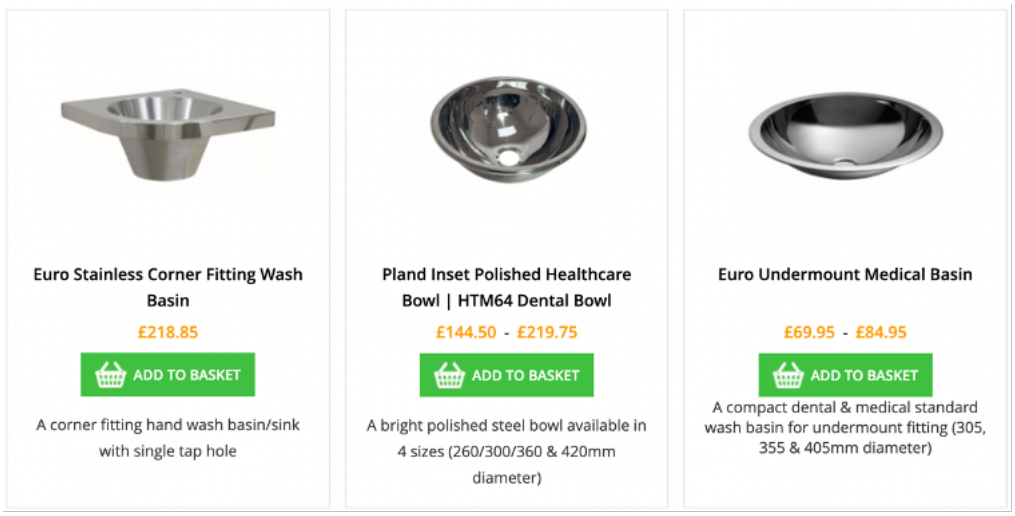
Figure 22

Patient spitting in basin without getting up from chair at the dentist (Colgate, n.d.)

As such, this technology is ideal for implementation in restroom stalls. Several types of basins are on the market, featuring a range in prices from about £60 to £300 (see figure 23). Several designs fit squarely in corners, as would be ideal for a stall.

Figure 23

Basins on the Market



A few basin options on the market, including a corner design

Implementation in restroom stalls – beginning with accessible stalls – unlocks a new market for these basins. There is room for innovative adjustment to create custom basins, but even the ones that exist could be sold to universities, organizations and institutions that feature public restrooms for installation and use.

Appendix E: Meter Technology

Some UK universities already implement a button response system in public restrooms (see Appendix F). Moreover, existing water bottle refilling stations use digital counters to indicate to the user how many plastic water bottles have been saved (or avoided) by members using the refilling station (see figure 24).

Figure 24

Water Bottle Refilling Station with Meter (Waterlogic, n.d.)

Each time a user fills their bottle from the station, the digital counter (on the top right corner of the station) increases. This makes individual and collective impact less abstract and more salient to the user.

The combination of these two existing technologies could quickly and efficiently create the social regulation button-meter suggested in intervention 3.4.

Appendix F: Existing Installations

Some university campuses, including LSE (see figure 25) already feature Ballot Bin's to channel cigarette disposal behaviour.

Figure 25

Ballot Bin on LSE's Campus

The technology used to install the button currently featured in a women's public restroom at LSE (see figure 26) can be modified to create the menstruation regulatory button-meter.

Figure 26

Button Featured in LSE's Women's Restroom