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## **Uncovering Dynamics of Sustainable Consumption by Product Substitution: An Exploration of the Appropriation of Non-Dairy Milk in Everyday Life**

Milena Büchs, Lucie Middlemiss, Josephine Mylan, Lucy Stevens

### **Abstract**

Many mainstream visions of sustainable societies are based on the assumption that less environmentally damaging products will come to replace existing ones, reducing the footprint of consumption and enabling daily life to continue relatively undisturbed. However, several previous studies on sustainable consumption have demonstrated that product substitution is not necessarily a straightforward process, often requiring an adjustment of practices. This paper explores the phenomenon of sustainable consumption via 'substitution'. To do this it uses the case of non-dairy milk or 'mylk', a product type which has risen rapidly in popularity in the UK in the past decade, accompanied by multiple claims of 'sustainability'. Using a mixed methods approach which combines quantitative data from the National Diet and Nutrition Survey (NDNS) with secondary qualitative data from the Mass Observation Archive, the paper examines the question: What characterises the process of substituting milk with mylk? We find that while the consumption of mylk has increased and that of milk decreased, this cannot be characterised as a straightforward case of substitution. Many people choose to consume mylk alongside milk, rather than cutting milk out of their diet entirely. Rising mylk consumption is not evenly spread in society. Rather, it is associated with higher incomes and education levels, being female and being aged 30-40. Using mylk instead of milk requires the engagement of new, sometimes conflicting, meanings around health and the environment. A range of situational factors such as household relationship constellations and health conditions present important drivers and barriers for mylk consumption. Finally, the analysis demonstrates the importance of systems of provision in increasing mylk consumption, questioning demand-driven explanations. Overall, our account suggests that even in apparently straightforward cases such as mylk, sustainable consumption via product substitution is a complex process, requiring adjustments in practices and meanings, and characterised by multiple drivers, barriers and inequalities.

### **Keywords**

Sustainable consumption; product substitution; plant-based milk; social practices; systems of provision; mixed methods

### **1. Introduction**

Diet is gaining increasing attention in debates about sustainability, particularly in relation to the problem of climate change. Food consumption contributes around 14.5% to global anthropogenic emissions (Gerber et al., 2013), of which the beef and dairy sectors are accountable for 60%

(Bellarby et al., 2013). Milk and dairy products are an important part of the UK diet, contributing 8% to all energy use from household food and drink (DEFRA, 2017).

The need to reduce the impact of high levels of meat and dairy consumption that characterise Western diets has been noted in the context of international efforts to address climate change, including the special report on land use by the Intergovernmental Panel on Climate Change (IPCC) (2019), and the IPCC 6<sup>th</sup> Assessment report (2022), as well as by numerous sustainability scholars (Clark & Tilman, 2017; Poore & Nemecek, 2018 ; Springmann et al., 2018; Willett et al., 2019). In addition, there has been rising public attention to the adverse environmental implications of intensive animal agriculture; negative human health effects of dairy milk consumption and increased awareness of the negative links between the dairy industry and animal welfare (Busch et al., 2017; Tsakiridou et al., 2010). One response to the growing body of evidence on some of these negative impacts of animal agriculture, has been to suggest that consumers should reduce intake by substituting meat and dairy with alternative non-animal products, such as non-dairy milk or ‘mylk’. We use the term ‘mylk’<sup>1</sup> to represent a category of non-dairy milk products marketed as replacements for dairy milk. The category of products includes a range of different milk replacement products, created using different ingredients (e.g. nuts, legumes, and grains) and processing technologies.

Milk consumption in the UK has almost halved since 1974, and remains on a clear downward trend (DEFRA, 2017). In contrast, consumption of plant-based milk alternatives is on the rise. While mylks were still a niche product a few decades ago (Mylan et al., 2019), almost a quarter of Brits were found to buy plant-based milk over a 3-month period in 2019 (Mintel, 2019).

This raises the question of whether we are witnessing a process of product substitution whereby the use of mylk gradually replaces the consumption of milk. If this was the case, it would fit well with a longstanding line of argument within the field of sustainable consumption, which suggests that individuals can choose to use more efficient products to reduce the footprint of their consumption, while retaining the existing routines and values that underpin their daily life.

However, several previous studies have argued that the adoption of new products is less straightforward than suggested by the idea of product substitution (e.g. Ozaki et al., 2013; Shove et al., 2012; Spurling et al., 2013). Informed by social practice theory and socio-technical studies, these publications show that sustainable consumption can be understood as a process of “co-production” between users and products or technologies. For instance, users often need to actively engage new meanings and skills when they adopt new products or technologies. This involves amending existing practices instead of continuing existing practices exactly as before (Ozaki et al., 2013).

In addition, the adoption of new products or technologies does not occur uniformly within society. Instead, they are shaped by socio-economic characteristics and other situational factors that can help or hinder individuals to adopt a new product. Furthermore, while product substitution focuses on consumer choice and the demand side of the economy as drivers of sustainable consumption, the supply side, i.e. production or systems of provision (Bayliss & Fine, 2020), are also likely to play an important role in advancing sustainable consumption. Insights from this literature highlight the significance of the type of goods and the needs they ultimately fulfil in shaping the relationship between production, consumption and consequently how products are appropriated in everyday life

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<sup>1</sup> We refer to plant-based milks as ‘mylk’ and animal derived milks as ‘milk’ throughout: consistent with the name adopted by the plant-based sector in response to the EU law, which states that the label ‘milk’ can only be used if the product is derived from a lactating mammal (Bolton, 2017).

(Fine, 2016) . This paper therefore explores dynamics associated with a single product type, as a lens to examine the wider process of product substitution as a mode of sustainable consumption.

The aim of this paper is to examine the dynamics of sustainable consumption via product substitution. To do this we use the case of mylk, a product currently gaining attention as a sustainable product alternative to dairy milk. Specifically we address the question: What characterises the process of substituting milk with mylk? The paper thus addresses the call made by Morris et al. (2019), to better understand how and why UK consumers are incorporating mylk into their diets, as an underexplored aspect of the phenomenon of sustainable production and consumption in milk/mylk that has gained momentum over the past two decades (Mylan et al 2019). A mixed methods approach is adopted which combines quantitative data from the National Diet and Nutrition Survey (NDNS) with qualitative secondary data from the Mass Observation Archive. The paper combines and interprets this data in relation to phenomenon of sustainable consumption as product substitution, a purpose for which the data has not previously been used.

Based on the findings from this research, this paper presents an empirically evidenced critique to the position of sustainable consumption via substitution, grounded in the novel analysis and interpretation of secondary quantitative and qualitative data previously used primarily for examining nutrition intake, nutrition and health, and changes in diet. At first sight, the rapid expansion of mylk consumption appears to confirm product substitution as a viable pathway to reducing the impacts of diet. However, we suggest that this high level 'success story' masks some important dynamics at play, which will have consequences for understanding if, how, and to what extent product substitution can contribute to sustainable consumption. In particular, milk is not simply substituted with mylk as many people choose to consume mylk alongside milk, rather than cutting milk out of their diet entirely. Using mylk instead of milk also often requires the engagement of new, sometimes conflicting, meanings around health and the environment. Furthermore, mylk consumption is shaped by a range of socio-economic and situational factors. In particular, mylk consumption people on low incomes or lower levels of education are far less likely to consume mylk, indicating that the higher price of mylk acts as a barrier for more inclusive sustainable consumption. Finally, the analysis demonstrates that it is important to examine systems of mylk provision to understand increased consumption of mylk, instead of just focusing on demand-side factors.

## 2. Literature review

The analysis of mylk consumption in the UK is informed by several bodies of literature which we briefly discuss here. We explain the concept of product substitution and its role in economic analysis, and discuss the relationship between product substitution and sustainable consumption by reviewing ideas on types and processes of change from the sustainable consumption and social practices literatures. To what extent these ideas have been applied in studies on milk and mylk consumption will be reviewed throughout.

Product substitution refers to the substitution of one product with another, similar product, e.g. a substitution of sugar with sweetener, incandescent light bulbs with LED lightbulbs, petrol cars with electric vehicles, etc. The phenomenon of substitution plays an important role in mainstream economics in understanding elasticities of demand: by how much consumer demand decreases in response to an increase of the price of a specific product will partly depend on how substitutable that product is. Understanding substitutability is particularly important for studies on the impact of the introduction of taxes that aim to incentivise the reduction of certain types of consumption, e.g. of sugary drinks, tobacco, or environmentally damaging products. Existing studies show that taxation

of harmful products is more effective if consumers can easily switch to similar, less harmful products, even though the side effects of the alternative product use need to be carefully considered too (Chaiton et al., 2020; Harmon, 2019; Rydberg, 1994; Zhen et al., 2014).

However, how product substitution relates to debates on sustainable consumption, what the process of product substitution involves and how it happens, are less well understood. The sustainable consumption and social practices literatures have identified different types of sustainable consumption and related degrees of change, for instance “weak” vs. “strong sustainable consumption” (Akenji, 2014; Lorek & Fuchs, 2013), “reform, revolution and reconfiguration” within sustainable consumption and production (SCP) (Geels et al., 2015), or “recrafting” vs. “substituting” social practices (Spurling et al., 2013).

Both the “weak sustainable consumption” and “reformist sustainable consumption and production” positions assume that environmental targets can be achieved through technological innovation while values, behaviours, consumption levels, and economic systems can remain largely unchanged. This view has been extensively critiqued by “strong sustainability” scholars, who argue that the core mechanism suggested – relying on consumers to substitute less impactful products for environmentally damaging products, thereby enabling the continuation of existing ways of life within the current economic system – will not deliver the scale and depth of change required (Akenji, 2014; Lorek & Fuchs, 2013). Proponents of this position argue that more far-reaching changes in level and types of production and consumption as well as underlying economic systems is needed to stay within planetary limits (Hobson, 2013; Lorek & Fuchs, 2013; Middlemiss, 2018).

The distinction between “weak” vs. “strong” sustainable consumption is similar to that between “reformist” and “revolutionary” sustainable consumption and production positions, where reformist approaches emphasise the role of change at the individual level (e.g. choice of more energy efficient products) while “revolutionary” approaches focus more on the role of macro-level change (Geels et al., 2015). Geels et al. (2015) criticise this distinction as too simplistic and unhelpful for policy discourses. They propose to add a third position of “reconfiguration” which formulates an alternative to the reformist or revolutionary approaches. From the perspective of reconfiguration, changes in both daily life practices *and* wider socio-technical systems are required to achieve environmental targets (ibid.). However, reconfigured practices and socio-technical systems do not present a complete overhaul of societal ‘deep structures’, rather, they build on and develop elements of existing practices and systems, enabling societal functions to be delivered in new ways.

Based on the social practices approach, which Geels et al. (2015) characterise as an exemplar of the “reconfiguration” perspective, Spurling et al. draw a useful distinction between “recrafting” and “substituting” practices. Social practices have been conceptualised by Shove (e.g. 2012) as consisting of three main elements: meanings, skills and materials. “Recrafting” practices refers to examples in which a specific practice is largely maintained while individual elements or relationships between elements of practices need to be amended. An example is the practice of driving a car: this practice can be “recrafted” by switching from a conventional car to a hybrid or electric car. The new type of car represents a change in the “material” element of practice. However, to be able to successfully drive a hybrid or electric car, meanings and skills also need to be adjusted, such as choosing the right speed, breaking with a foot pedal instead of a hand brake, and adjusted meanings of sustainability and comfort (Ozaki et al., 2013). In contrast, the substitution of a practice involves greater change of all elements of practice. For example, riding a bicycle could replace driving a motorised vehicle, where this substitution would require a very different type of vehicle (material) and a whole new skill set of cycling. Such substitution would also need to be associated with a range of different meanings, e.g. around sustainability, slow travel, health and fitness, etc.

How do these debates about different positions within sustainable consumption and production relate to product substitution? The “weak” and “reformist” positions suggest that environmental objectives can largely be achieved through product substitution, i.e. the adoption of less carbon intensive products and technologies, without wider changes in behaviours or systems. However, the study by Ozaki et al. (2013) suggests that product substitution is not necessarily as straightforward as often assumed. To take their example of driving: While driving as a practice can continue with hybrid or electric vehicles, it is an amended, “recrafted” practice compared to driving a conventional car as it involves not only a new product (material) but also recalibrated skills and meanings (Spurling et al., 2013).

The extent to which practices need to be “recrafted” when products are substituted is likely to vary between different products and practices. In this paper, we focus on the substitution of milk with mylk and ask what this substitution involves: to what extent does this substitution (of the material element of practice) require an amendment of meanings and skills? Spurling et al. suggest that changing diets, e.g. by reducing the intake of meat or dairy, or switching to a wholly vegetarian or vegan diet, involves the “recrafting” of the practice of eating as it involves new meanings and skills: “Focusing on practices of eating makes clear that changing how and what we eat is about much more than choosing different products. What and how we eat is about tastes, sociability and conviviality, cultural conventions (e.g. a ‘proper meal’), competency, routines (e.g. three meals a day) and income. It is all these elements together that make eating what it is” (2013: 35). Similarly, O’Neill et al. (2019) have emphasised that adopting more sustainable diets is likely to involve not only changes in the types of food consumed, but also related meanings and skills. To our knowledge, there are no studies yet that examine in which ways food practices have to be “recrafted” through the integration of mylk in one’s diet. Are milk and mylk easy to substitute? Which meanings are associated with milk and mylk consumption, and does the consumption of mylk require new skills? We will investigate this question based on qualitative Mass Observation Archive Data.

In addition, we also examine in this paper how the adoption of mylk is shaped by socio-economic and situational factors, and which role systems of mylk provision play. All consumption, and associated environmental impacts, are shaped by socio-economic and situational factors such as relationships. This patterning of sustainable consumption is relevant from a social justice perspective, because it means that some people have greater capacity than others to reduce their environmental impacts while others may bear higher costs associated with these impacts (e.g. carbon taxes, negative health impacts, etc.). For instance, it is well-known that richer and highly educated people tend to consume more and have higher carbon footprints than poorer and less well educated people (Büchs & Schnepf, 2013; Ivanova & Wood, 2020; Middlemiss, 2018). Existing research on the relationship between socio-economic characteristics and sustainable consumption suggests that patterns of sustainable consumption are complex. For instance, while high income is associated with a range of high carbon behaviours such as driving a car and flying (Büchs & Mattioli, 2021; Gössling et al., 2009; Lucas et al., 2016), high income and high education is also associated with certain, especially more costly, types of sustainable behaviours such as driving a more energy efficient or electric car (Haustein & Jensen, 2018; Vassileva & Campillo, 2017), installing solar panels on their roof (Sigrin et al., 2015; Stewart, 2022) or purchasing organic food (Brył, 2018). When it comes to the adopt of vegetarian diets, previous research has found that non-meat eaters or meat reducers are more likely to be female, young and more educated (Koch et al., 2019; Neff et al., 2018; Pfeiler & Egloff, 2018). Previous qualitative research has also shown that a range of situational factors, especially people’s relationships, play an important role in shaping energy use and sustainable consumption (Middlemiss, 2018: 178-180; Middlemiss et al., 2019). Godin and Sahakian (2018) have stressed the role of relationships, availability of time and other situational factors for

the adoption of more sustainable diets. To the best of our knowledge, there is no study yet that examines the relationship between socio-economic characteristics or other situational factors and the adoption of plant based milks in the UK.

Finally, several previous studies have highlighted that the analysis of (sustainable) consumption cannot just be understood by focusing on consumer choice and the demand-side of the economy, but also needs to involve an understanding of production or systems of provision (Bayliss & Fine, 2020; Mattioli et al., 2020; Middlemiss, 2018: ch. 10). Some authors even suggest that production, and associated strategies of marketing, shape consumer demand, turning the mainstream economics idea that production responds to consumer demand on its head (Bayliss & Fine, 2020). Existing research has emphasised the crucial roles of production and state regulation (including for school milk in the UK) in establishing dairy milk as a common consumer good (Atkins, 2005; Otomo, 2014; Simon, 2013). Morris et al. (2019) identified various framings of mylk in relation to human health and sustainability by mylk producers, dairy farmers and social movement activists, with consequences for the governance of wider food system 'de-animalisation'. Mylan (2019) has examined the role of innovation in mylk production and distribution in the rise of mylk consumption. In this paper, we examine ways in which systems of mylk provision support the adoption of mylk as reflected in respondent narratives.

### 3. Methods

#### 3.1 Quantitative data and method

For the quantitative analysis, we utilise the National Diet and Nutrition Survey (NDNS). The NDNS is funded by Public Health England, the Food Standards Agency, the Food Standards Agency in Northern Ireland, Food Standards Scotland, the Department of Health, Social Services and Public Safety (Northern Ireland), and the Food Safety Promotion Board (Safefood) (Ireland); it is led by the Medical Research Council Elsie Widdowson Laboratory and data is collected by NatCen Social Research the Northern Ireland Statistics and Research Agency. The survey covers a representative cross-section of the UK population in each survey round. The surveys include children under 16 but for this study we restrict analysis to people aged 16 and over which achieves a sample size of 8,322 individuals.

The analysis is based on the merged data files for the individual surveys and the person level diaries from survey years 2009-2018/9 (ten survey rounds). The individual survey files include a question on whether a respondent has eaten any "rare foods", one option of which is "non-cow's milk", including plant based milks like soya, rice, oat, almond, and coconut milk, as well as dairy milks like goat and sheep's milk. The first survey year 2008 is excluded from our analysis because it does not cover questions on alternative milk consumption, in itself an indication that mylk has only more recently become a more widely used and socially accepted product. The person level diary files provide information on whether the respondent consumed dairy milk (skimmed, semi-skimmed, whole or one-percent) in grams. Based on these variables, we create a dummy variable that indicates whether a respondent consumes mylk or not.

The analysis focuses on how the consumption of mylk is distributed across socio-economic groups. Here we focus on characteristics covered in the individual interview files, including household income, age, gender, presence of children in the household, education level, health status, and whether the respondent considers themselves to follow a vegetarian or vegan diet. Relationships between mylk consumption and socio-economic characteristics are examined through bivariate analysis based on Chi-squared tests, and multiple logistic regression analysis. The dependent

variable is whether an individual consumes mylk, i.e. it includes people who consume both mylk and milk.

We create income quintiles for the bi-variate analysis which is possible up to year 2015, and use income tertiles for the regression analysis which covers the whole period. The original education variable in the NDNS provides the age at which the respondent completed full time education. We create a dummy variable that is coded 1 if the age of completing full-time education is 19 or over to represent attendance of higher education”, and 0 otherwise. The NDNS question on health asks the respondent how they rate their general health on a scale from 1 “very good” to 5 “very bad”. We reverse the coding for this variable for the analysis so that 5 stands for “very good” and 1 for “very bad”.

To correct for sampling and response bias, as well as different population and sample sizes across years, we create a combined weight based on individual year weights provided by the NDNS. The regression analysis excludes regression outliers (standardised residuals <-3 or >3, ca. 1% of all observations).

### 3.2 Mass Observation data and method

The Mass Observation Archive<sup>2</sup> is a unique qualitative resource that captures qualitative diary-like data on everyday life in Britain. Qualitative prompts, termed ‘directives’, are sent three or four times a year to a non-random sample of volunteer respondents from across the UK, also known as ‘observers’ (Courage, 2019). This method enables an open and authentic response, which results in a variety of mediums used by the observers such as stories, lists, letters, drawings, photographs and memoirs. For the milk Directive, questions about milk consumption were sent to the mass observers throughout the UK. The Directive included questions ranging from direct questions such as ‘What, if any, milk do you regularly buy?’ and more open-ended prompts such as ‘Please share any memories of having milk delivered to your doorstep’ (Mass Observation Archive, 2019). Volunteer respondents are more likely to be female, and more likely to be over 40 years old, so this is not a representative sample. It does however give an insight into a range of opinions and perspectives.

The Mass Observation Projects team digitised the 111 anonymised milk Directive 2019 responses for the project, enabling safe and protected access to the files online. Some responses consisted of just a paragraph, others were up to 3 sides of typed A4. The data was uploaded into NVivo, a qualitative data analysis programme. We adopted a semi-inductive approach to coding the interviews as we started with focusing on explanations of milk choice, especially the “meanings” that respondents attached to milk/mylk consumption, following a social practices approach which identifies “meanings” as an important element of practices (Shove et al., 2012). More inductively, we developed the categories of “circumstances” and “provisioning systems” which describe the drivers and barriers to milk/mylk consumption that arise from respondents’ dispositions, economic and relationship circumstances, as well as the role that production and market distribution of products have on consumption. These categories reconnect the more recent social practices literature with earlier versions that highlighted more strongly the role of unequal distributions of power and resources in shaping social practices (e.g. Giddens, 1984).

Mass Observation Archive (MOA) data has been criticised for its lack of demographic representation (Courage, 2019). Other methodological challenges include blurry or missing details within the sample

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<sup>2</sup> Mass Observation Archive, available at <http://www.massobs.org.uk/>



and the idiosyncratic way that respondents choose to write in (Uprichard et al., 2013). As secondary qualitative data source, it also has the drawback that it cannot be subject to questioning in a way that primary data can. Given the nature of the sample, generalisations drawn here are analytical rather than statistical, and subject to further refinement. They do however offer some valuable insights into why people consume milk/mylk. A limitation specific to the topic of this paper is that the MO milk directive did not explicitly ask about milk alternatives.

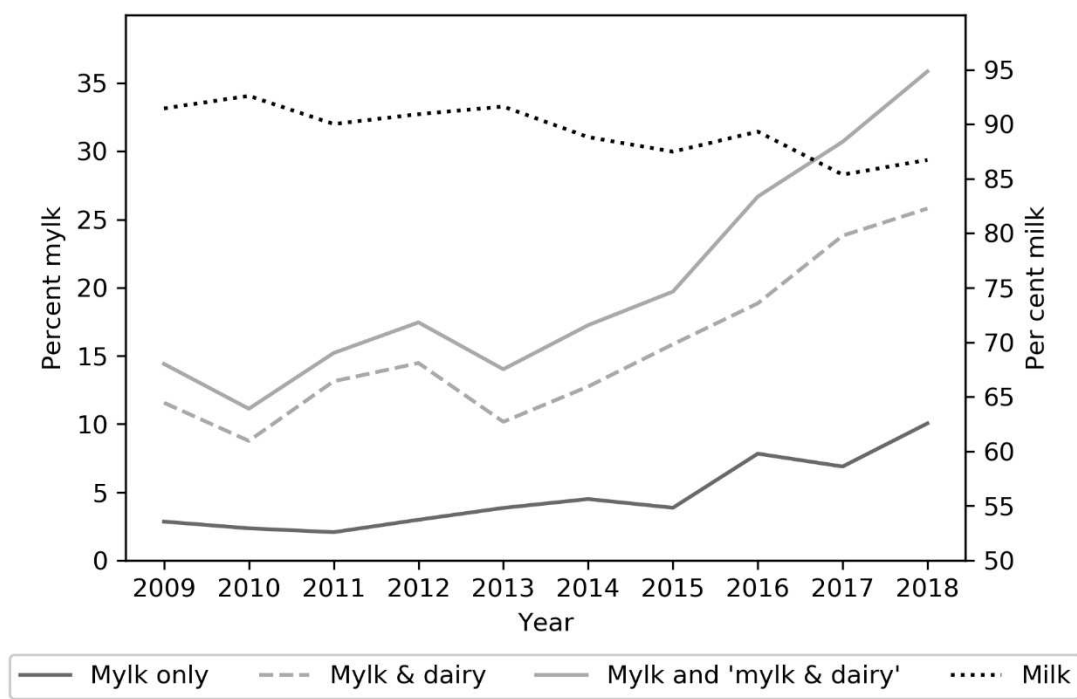
## 4. Results

### 4.1 Trends of mylk consumption

In all years combined, around 20.4% (Std. Error 0.44) of the population aged 16 and over consumed milk alternatives. Consumption of milk alternatives increased over the survey period from 14.4% in 2009 to 35.9% in 2018/9 (Fig. 1). The percentage of those who state they follow a vegetarian or vegan diet also increased in this period, from 1.9% in 2008 to 5.2% in 2018/9, and a decrease in respondents who noted the consumption of cow's milk in their diary, from 91.4% in 2009 to 86.7% in 2018/9. But as results in the next paragraph demonstrate, the increase in mylk consumption cannot be straightforwardly linked to an increase in the uptake of vegetarian or vegan diets.

However, the consumption of mylk often coincides with the consumption of cow's milk. On average across the survey period, around 76.7% of respondents who consume milk alternatives also consume cow's milk, and around 15.4% of those who consume cow's milk also consume milk alternatives. Only around 4.8% of the over 16 year olds exclusively consumed milk alternatives over the survey period. Over time, we see an upward trend in the consumption of milk alternatives without additional cow's milk, rising from below 2.8% between 2009 to 2011 to 10.1.8% in 2018/9 (Fig. 1). The proportion of vegetarians and vegans among those who only consume mylk has stayed fairly stable over time at around 8% (compared to around 3% in the whole dataset).

**Fig. 1: Per cent of the population consuming alternative milk**



Note: Data from the NDNS Survey 2009-2018/9, n=8,322.

**Table 1: Types of non-cow’s milk consumed**

	<b>% of sample</b>	<b>% of alternative milk consumers</b>
<b>Rice</b>	4.05	13.08
<b>Soya</b>	16.33	52.77
<b>Oat</b>	4.92	15.88
<b>Almond</b>	18.08	58.43
<b>Coconut</b>	14.15	45.72
<b>Sheep’s</b>	0.75	2.43
<b>Goat’s</b>	4.95	15.99
<b>Other non-cow’s</b>	1.9	6.14
<b>N</b>	2,084	606

Note: Data from the NDNS Survey 2016/7-2018/9, population aged 16 and over. The table only displays data for the last three survey years because they include some types of non-cow’s milk that previous survey years do not include.

Data from the MOA suggests that ‘mixing milks’ mainly happens because some people use different milks/mylks for different purposes: “I regularly buy semi-skimmed cow’s milk and roasted almond milk, occasionally coconut milk. I drink the non-dairy in my breakfast cereal and have dairy in my coffee” [D4736c]. Several respondents mention that they prefer cow’s milk in hot drinks like tea and coffee because some of the alternative mylks can curdle: “I bought soya milk for a while instead of dairy milk. However, it did not taste as nice and worse still it curdles when used in coffee. So I am now happily back to drinking cow’s milk again” [M6807c].

Of course at the household level, several types of milk may be purchased to cater for different needs and preferences of different household members (but note that the consumption data from the NDNS are at the individual level).

#### 4.2 “Recrafting practices” – meanings and mylk consumption

As discussed in Sections 1 and 2, previous research that is informed by social practice theory and socio-technical studies has argued that the adoption of new products often involves a change in meanings and skills, resulting in a “recrafting” of practices (Ozaki et al., 2013; Spurling et al., 2013). The analysis in this section uses MOA data to understand the meanings that respondents associate with milk and mylk consumption. Meanings circulate in society through the media and in social networks. Meanings also manifest themselves in individuals’ beliefs, attitudes and values. We report meanings here as they were stated by respondents, but we do not discuss the factual correctness of these meanings/beliefs. The analysis focuses on the role of meanings in “recrafting” practices as we did not find examples of adjustments of skills related to mylk consumption.

#### Health

People frequently encounter discourses around ‘healthy’ and ‘unhealthy’ food in their lives, be it through media and advertisement, their social networks or advice they receive from doctors or other professionals. Many MOA respondents expressed views about the healthiness or otherwise of

milk and mylk, and often these 'meanings' were given as one of the reasons why they preferred one over the other. Both benefits and risks for health were mentioned in relation to milk and mylk. The protein, calcium and vitamin content of milk was often referred to as a benefit.

"I have never had any problem following this advice [to drink a pint of milk a day], and it was always promoted as a complete food, full of protein and goodness" [A6936abc].

"I continue to use milk because of its calcium and vitamin content" [A6788abc].

Even though many respondents seem to have been aware that mylks can be fortified with calcium and vitamins, some saw milk as the more 'natural' product:

"None of the plant-based milks have the nutrients found naturally in cow's milk and have to be fortified with additional vitamins and minerals, requiring additional processing" [B3227c].

However, the fat in milk was often seen as problematic and as a potential reason to switch from full fat milk to semi-skimmed milk, or to a milk alternative:

"The reason for changing 35 years ago to skimmed milk from full-fat milk was that health concerns were raised then about the consumption of fat in our diets" [M6790abc].

"..... it's a woman thing. Can't be seen to be using FULL FAT unless you want to be FULL FAT yourself" [P3373abc].

Some respondents expressed hesitation about the consumption of soya milk because of stories they heard about its potential to mimic oestrogen:

"I started eating dairy again when I was pregnant with my daughter: at the time there was something in the news advising pregnant women not to eat soya, as apparently it could mimic oestrogen and cause male babies to be 'feminised' (don't quote me on that; this was 15 years ago but I think that was the gist! Anyway it was convincing enough for me to give up soy during that time)" N6845.

## Environmental

Many MOA respondents mentioned environmental considerations in relation to their milk / mylk consumption. For some, the greenhouse gas impact and animal welfare issues around milk consumption was a reason to switch to plant-based mylks:

"My husband and I drank cows' milk until the beginning of 2019, when we decided to move to a plant-based diet for environmental impact reasons" [S6928abc].

"Even if I could I don't think that I would go back to dairy products. There are a lot of welfare issues over the treatment of cows, the amount of CO2 emissions they produce and the amount of space needed to keep them" [M4463abc].

However, for other respondents, awareness of the environmental impacts of milk was not a sufficient reason to reduce or stop milk consumption:

"I feel guilty for buying cow's milk because it is not kind to cows, but so far it hasn't stopped me using it I'm afraid. That's because I haven't found an alternative that I like" [H6804c].

“Though I am admittedly concerned about the contributions of methane from cattle farms to global warming, this hasn’t been a big enough incentive for me to move away from my favourite type of milk” [L6792abc]

Some respondents also expressed environmental concerns about mylks, e.g. in relation to deforestation for soya, monocultures and GMO in soya production, the high water footprint associated with almond milk production, and the greater food miles for most types of mylks compared to cow’s milk. Some respondents explicitly referred to these arguments to weigh up between different mylk options.

“The stories of hidden GMO crops with soya and untold environmental damage caused by the large scale growth of soya plantations has totally put me off using it, also the carbon footprint is too big, given most of it comes from South America or the US” [M6807c].

“We have oat milk in the fridge now – lower carbon footprint than soya milk, do not want to support soya plantations” [M6726abc]

Concerns about waste packaging were frequently mentioned in relation to both milk and mylk consumption, and for some respondents packaging was a factor for the type of milk they bought:

“I have concerns about single-use plastics. This is why I get my milk delivered in reusable glass bottles” [C6937abc]

“Currently I buy Alpro soya and coconut milk. The containers are recyclable and that is a factor when I buy them, however unfortunately and surprisingly in Brighton they do not recycle these containers” [W6724abc].

### Tea / coffee culture

Meanings of how a ‘proper’ cup of tea or coffee has to be made, and habitual ways of making tea and coffee were frequently mentioned as a driver of milk consumption. People in the UK typically drink tea with fresh milk, and sometimes sugar. One 80-year-old woman explained that: “We add [milk] to our tea without even thinking about it”. Coffee, a more recent addition to British culture, is also frequently consumed with fresh milk. As mentioned in section 3.1, many people bought an entirely separate milk just for their hot drink consumption at home, some even if they otherwise used alternative mylks. Even if respondents explicitly said they disliked milk, they would often still use it in tea or coffee, as if this form of consumption was different to milk consumption in general.

The directive also showed signs of change, however. One respondent says that it is now “unusual for anyone to express surprise when I ask them for black tea”, despite the fact that “for many years I used to get the raised eyebrow treatment or be asked whether I was lactose-intolerant. No, I used to say... I just don’t like putting milk in my tea and coffee” (M3190). While tea with milk is still very much a constant for many British people today, it does seem that we are in a period of changing attitudes, where it has become acceptable and perhaps the ‘new norm’ for people to consume hot drinks in a variety of ways, with or without milk.

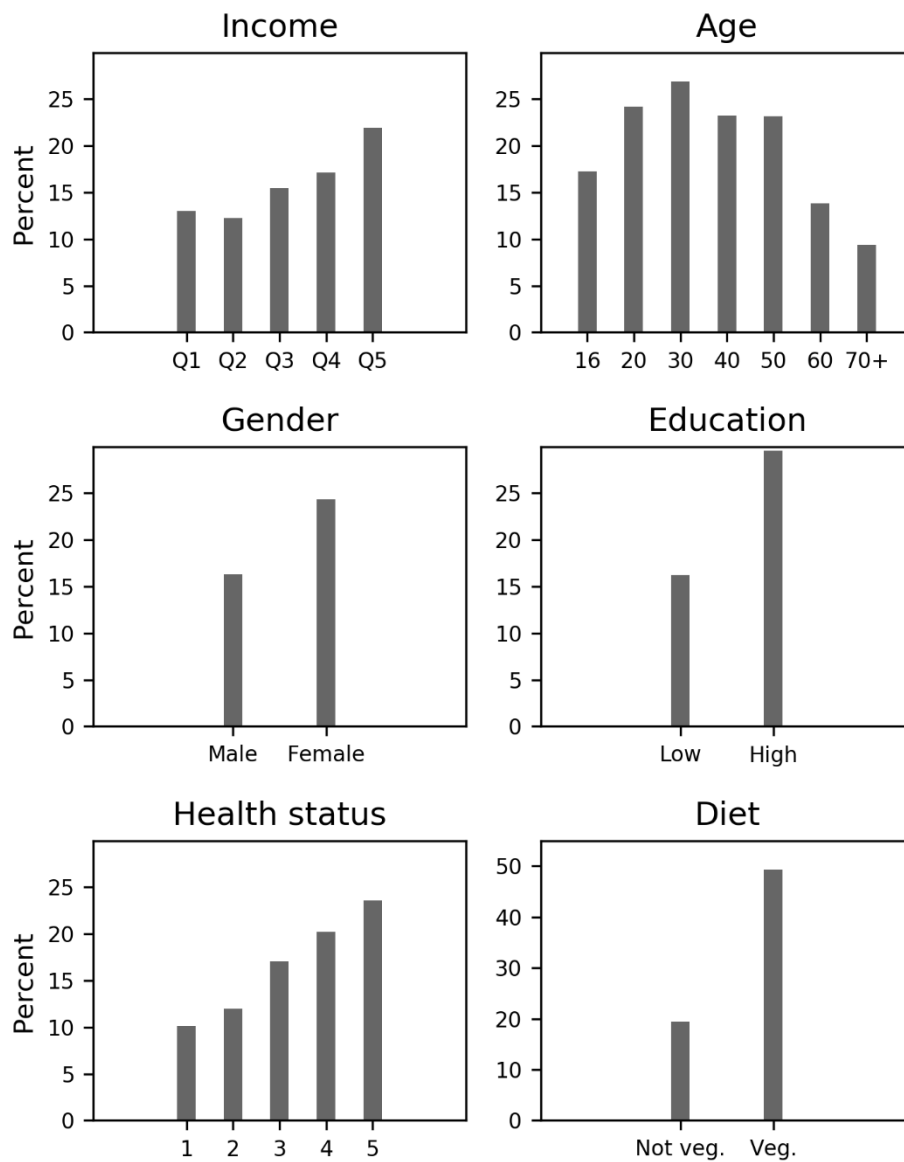
### 4.3 Socio-economic and situational factors

As discussed in the literature review, sustainable consumption is shaped by socio-economic characteristics and a range of situational factors. In this section, we first examine the relationship between mylk consumption and socio-economic factors based on the National Diet and Nutrition Survey. We then consider a range of situational factors that respondents to the Mass Observation Directive mentioned in their accounts of milk and mylk consumption. These factors can be understood as wider structural or physical drivers or barriers to the adoption of mylk. Cost, taste, health and people's relationships emerged as important themes. Cost and relationships refer to partly structural circumstances where, for instance, people's financial situation, social identity and social networks can influence practices of sustainable consumption. While taste and health are not purely physical phenomena – they always also involve meanings and beliefs – they usually have a physical dimension, represented in bodily reactions such as disgust, sickness, ingestion, rashes, etc.

#### Socio-economic factors

The consumption of alternative milk differs considerably across socio-economic characteristics and tends to be higher among better situated people. For example, around 28.4% of people with an equivalised household income in the top quintile consume alternative milk, but only an average of 12.9% of people in the bottom two income quintiles. Around 29.6% of people with at least a first degree consume alternative milk, compared to only 16.2% of those who did not attend higher education. Alternative milk consumption also varies by age. It is highest among people in their 30s with 23.0%, but under 10% and under 5% among the over 70 and 80-year olds respectively. Alternative milk consumption is higher among women compared to men with 24.3% versus 16.3% respectively. It is also higher among people with better subjective health (23.6% among those with "very good" health compared to 10.1% among those with "very bad" health). People who consider themselves to follow a vegetarian or vegan diet are also far more likely to consume alternative milks than people who do not, with 49.3% compared to 19.4% respectively. Of course vegans would not consume dairy milk at all, but since "vegetarian" and "vegan" diet are combined in one variable, we cannot examine how much more likely vegetarians are to consume mylk compared to non-vegetarians. There is no significant difference in the consumption of alternative milks depending on whether children are in the household or not. Chi-squared tests are significant at the 0.1% level for all of these categories (see Table A1 in the annex).

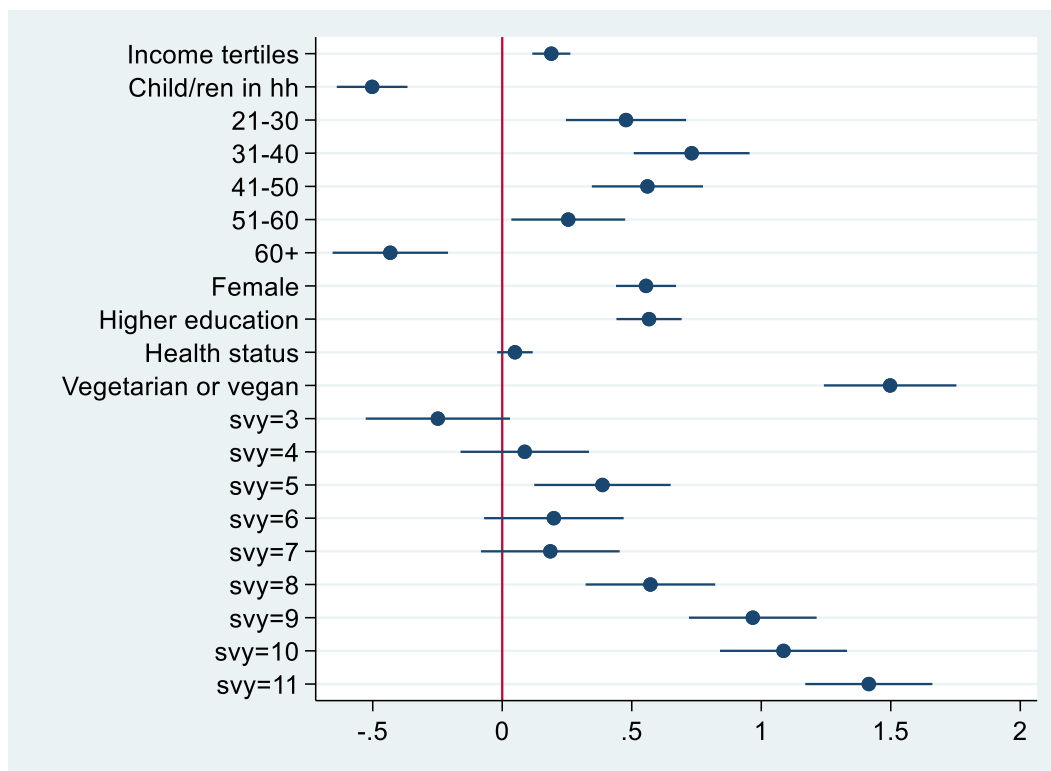
**Fig. 2 Distribution of alternative milk consumption by socio-economic characteristics**



Note: Data from the NDNS Survey 2009-2018/9, n=8,322. Income graph: “Q” = income quintile; Education graph: “Low” = has not participated in higher education, “High” = has participated in higher education; Health status graph: subjective health status from 1 = very poor to 5 = very good”; Diet graph: “Not veg.” = not vegetarian or vegan, “Veg.” = vegetarian or vegan diet.

Results from a logistic regression with mylk consumption as the dependent variable (1=consumption, 0=no consumption) confirms that consumption varies strongly by socio-economic characteristics. Controlling for all other factors, people with higher incomes, high education, in their 30s, those with vegetarian or vegan diets, and women are significantly more likely to consume alternative milk than their counterparts. While there was no significant difference between people with and without children in the bi-variate analysis, having children significantly reduces the likelihood of consuming milk alternatives, controlling for all other factors (see Fig. 3 and Table A2 in the appendix).

**Fig. 3: Logistic regression on alternative milk consumption**



Note: Data from the NDNS 2009-2018/9, N=6,942. The coefficients are in log odds. The error bars show the 90% confidence interval.

### Cost

The MOA data provides supports the finding from the NDNS analysis which showed that people on lower incomes were significantly less likely to consume alternative mylks compared to people on higher incomes. Several MOA respondents mention the higher price of alternative mylks as a disadvantage and barrier to consuming more mylk. For instance, two respondents who usually consume cow's milk remark:

“I like soya, almond and oat milk but I imagine it would be quite expensive to buy the amounts I use“ [N5744abc].

“The other day I was at Sainsbury's and stopped at the alternative milk section in the interests of research. I saw oat, soya, cashew, coconut, almond, hazelnut and one I'd never heard of before: pea (...) mylk (as it was spelt on the carton). (...) My first reaction was to pull a face, and then to be shocked at the price: £2.50 for a litre“ [B3227c].

### Relationships

Consumption is often presented as an individual choice, but it is typically influenced by people we live with, by friends and family, and professionals we interact with (Middlemiss, 2018: 178-180). This is particularly evident for food consumption where household level consumption is shaped by the tastes and needs of different household members, and where the practices of one household

member might influence practices of other household members. The MOA data provides many examples where household purchasing is shaped by the different needs and tastes of its members. Several respondents mention that they bought more cow's milk when their children were young: "I have never been much of a milk drinker. I bought a lot of milk when my sons were growing up, but now only get through about two pints per week" [B5725abc wrong number on directive], and respondents mention that they purchase different milk/mylk for visitors: "It's been handy to have almond milk in as more friends move to a vegan/non dairy diet" [G4466abc].

Some of the respondents explain how their own milk/mylk consumption is influenced by other people around them. In the following example, a respondent was encouraged by his vegan daughter and some friends to use more plant-based mylks:

"Being traditionally English I have grown up with dairy milk and despite becoming vegetarian in my teens, remained blissfully unaware of the process by which dairy cows are kept in milk production. It was my daughter that became vegan about 5 years ago and started drinking non-dairy. About the same time a work colleague who is vegan, extolled the virtues and benefits of non-dairy and I was determined to give it a try" [D4736c].

Several respondents also stated that they would be happy to completely switch to alternative milks if it was just them in the household, but that the habits and preferences of other household members make this difficult:

"If I was just buying for myself I think I would look into alternatives (...), but it would be difficult to persuade the partner to change his tastes or routine (cost, availability and convenience of local supermarket)" [V3773c].

### Taste

Whether someone likes or dislike the taste, consistency or smell of milk or mylk was mentioned very often as a decisive factor for or against consumption:

"I have never liked milk, my dislike stemming from the little half pint bottles of milk we had at school, which had been stood on top of a radiator, so it was nearly warm but not quite. I hated it then, and now" [K798abc]

"As an aside all other milk products, almond/soya etc. are, in my opinion, bloody awful they are tasteless, diaphanous liquids, of ill repute!" [O4521abc]

Taste often seemed to trump ethical preferences or health considerations: "I feel guilty for buying cow's milk because it is not kind to cows, but so far it hasn't stopped me using it I'm afraid. That's because I haven't found an alternative that I like" [H6804abc].

### Health

Some respondents noted that they reduced their milk intake or were using mylks instead due to health issues such as milk protein allergy, lactose intolerance, irritable bowel syndrome, colon cancer or asthma, sometimes following their doctor's advice:

"My husband suffers from lactose intolerance and is unable to consume even the minutest amounts of dairy produce" [B5725abc wrong number on directive]



“My main reason for changing to goat's and soya milk has been health-related. I've suffered a lot of gastro-intestinal problems in the past (including Irritable Bowel Syndrome and colon cancer) and was advised by a nutritionist to avoid cow's milk” [H1745abc].

#### 4.4 Reconfiguration: systems of mylk provision

Systems of provision – the ways in which provision of a good or service is organised in the economy (Bayliss & Fine, 2020) – are also very important in shaping milk and mylk consumption as demonstrated by Mylan (2019), suggesting that increasing the consumption of mylk may require “reconfiguration”, involving not only changes at the level of the consumer but also at the level of production (Geels et al., 2015). Wider provisioning infrastructures are often beyond individual consumers’ control. They create consumption landscapes which provide clear incentives or disincentives for the consumption of specific types of goods and services, for example by making certain products readily available or less accessible; through pricing structures; and through the way in which products are typically packaged. In this section, we examine perceptions by MOA respondents of the ways in which the provision of mylk influences their consumption. In this context, we also discuss the role of advertising which is often driven by producers and which feeds into the creation of some of the meanings associated with mylk consumption as discussed in Section 4.2.

##### Availability and market structure

Availability of products through market and non-market provision plays an important role for consumption. Several MOA respondents mentioned ‘free school milk’ schemes that they had experienced in childhood and that encouraged milk consumption: “I'm old enough to have had milk provided free at school and I can recall drinking it on its own” [04521abc].

Employers can also play a role in the provision of milk and thus play a role in normalising milk or mylk consumption. As one respondent notes: “[Cow’s] milk is provided at work by our employer (since we British are fuelled on tea, and most of us, I imagine, take tea with milk)” (M6844).

Greater availability of alternative mylks in supermarkets and cafes is likely to be an important factor for the observed increase in consumption. Several respondents mention that they had noticed a broader range of milks being available in shops which seems to have encouraged some to try them out of curiosity:

“I know that there are now lots of other “milks” like almond, soya, etc. (...). I have dabbled with other milks occasionally and I do quite like them, but I don’t use enough to justify buying them” [R1025c].

Some respondents seemed to see cafés as sites of experimentation, but also a space in which milk or mylk consumption was public and frequently questioned. Vegan cafés, for example, were places where non-vegan respondents could try mylk: “One of my favourite cafés in a nearby town is a vegan café, so I will have a cappuccino made with oat milk when I go there.” (J6917). One respondent wrote that: “I had to specify “cow’s milk” in a cafe the other week and felt like a moderately awful person” (C5847). This suggests that the nature of public milk drinking in tea and coffee has changed for some, although the norm is still very much milk not mylk.

Many statements refer to the lack of consumer power when it comes to the ways in which milk is provided. Several respondents express concern that the low price of milk in supermarkets represents a bad deal for farmers. The wish to support the local/UK economy is sometimes mentioned as a

reason to stick with cow's milk and dairy products instead of alternative mylks which are predominantly produced outside of the UK, as this respondent remarks: "I think it's sad that the farmers get paid so little for their milk, it's no wonder many of them are going out of business, and for that reason alone, I would carry on with dairy milk" [K789abc].

### Marketing

Commercial marketing and public sector promotions play an important role in influencing social meanings around milk and mylk, and hence consumer beliefs and attitudes. Several MOA statements reflected on the role that marketing played in forming their own or others' milk consumption habits:

"I have always been a great fan of milk, and could not live without it. When I was young, a popular advertisement encouraged us to drink a pint of milk every day. I have never had any problem following this advice" [A6936abc].

"My mother-in-law also believed milk was the Superfood. She liked her 'gold top' i.e. Jersey milk which was creamier. Later came the advertising slogan – 'Drink a Pint a Day'" [P1326c].

Of course, the provision of free school milk discussed above has not only made milk more available to large cohorts of children, but also carried a positive promotional message.



Child At Corner Of Co-op – Haswell, 1960.

Source: <http://ppparchive.durham.gov.uk/photos/picviewer.asp?next=742>

Alternative mylks are also marketed in specific ways, e.g. as more environmentally friendly or healthy.



Picture credit: <https://www.livekindly.co/sweden-oat-milk/>

Some MOA respondents comment on the ways in which alternative mylks are marketed. For instance, one respondent in her mid-40s perceives alternative mylk consumption as a “fad” aimed at a younger generation that she does not regard herself to be part of:

“I know there’s a lot more choice in coffee shops nowadays what with being able to have dairy, soya ,rice milk, coconut milk etc. I think half the time it’s a fad with the young ones, ... the university set of “oh yah I love the planet and absolutely have to be seen ordering a skinny latte with milk of a golden eagle etc. etc.”. Sorry, cut the crap and give me normal moo moo juice please” [P3373abc].

Another respondent remarks on the profitability of the mylk industry, implicitly questioning it marketing messages: “I stick to cow’s milk and have no interest in other trends. (...) I think all these alternative milks are a bandwagon that many have jumped on and highly profitable for the firms involved” [M1327c].

These examples demonstrate that mylk marketing does not equally appeal to all people in society. While the messages or images that mylk marketing invokes can encourage some to consume mylk, they can act as barriers for others.

## 5. Discussion

This paper set out to contribute to the sustainable consumption and production literature by examining the process of product substitution of milk with mylk. Based on social practice theory and insights from socio-technical studies, we examine whether the process of substituting milk with mylk really is as straightforward as “weak sustainability” approaches might suggest, and what characterises this process. Our study has relevance for other areas of sustainable consumption via product substitution as it uncovers processes of “recrafting” social practices, “reconfigurations” of production and consumption, as well as social patterns of these processes which are likely to apply to other product categories too.

Our findings confirm that in the UK the consumption of milk has been falling while that of mylk has been rising over the study period of 2009 to 2018. This is good news from an environmental perspective as plant-based mylks have shown to have considerably lower emissions and environmental impacts than dairy milk (BBC, 2019; Poore & Nemecek, 2018).

However, the NDNS data also show that these trends do not represent a simple case of product substitution. While the share of the population that consumes plant-based mylks has indeed increased by 7 percentage points over the study period, the share of people who consume both milk *and* mylk has increased even more, by 14 percentage points. Rather than completely substituting milk with mylk, people seem to increasingly consume milk alongside mylk. Increased mixing of milk and mylk consumption could be in line with a general increase in ‘flexitarian’ diets (Malek & Umberger, 2021). The qualitative MOA data offered insights regarding possible reasons for this phenomenon of dietary mixing as mylk and milk are often used for specific purposes, e.g. mylk over cereal or for cooking, and milk in tea or coffee. Additional factors are at play at the household level, where the needs and preferences of different household members or visitors need to be catered for, requiring both mylk and milk to be purchased by the household.

This study therefore suggests that the increasing consumption of mylk in the UK is not a simple case of product substitution, but rather an instance of the “recrafting” of practices (Spurling et al., 2013) which involves changes in several “elements of practice” which Shove, Panzar et al. (2012) identify as skills, meanings and materials. While changes in skills did not feature in the qualitative MOA data, many participants talked about the various meanings associated with mylk and milk consumption. Here it was evident that new meanings are enrolled by practitioners when they start using mylks, for instance related to environmental and health impacts. This aligns with previous sustainable consumption studies which argued that people do not ‘passively’ adopt new technologies without changing practices, but that the use of new products requires an active recrafting of different elements of practice. Compared to the study on the adoption of hybrid vehicles (Ozaki et al., 2013), we find that the adoption of mylk involves different processes of recrafting, as it involves a more complex adjustment of meanings and less of a recrafting of skills. This suggests that processes of product substitution are likely to differ from product to product. Further research can shed light on the challenges involved in recrafting practices related to other low carbon product categories.

A second finding in this study is that the rise in mylk consumption does not represent a simple case of product substitution because it is not happening evenly across the population. Mylk still tends to be substantially more expensive than milk which is likely to be one of the reasons why mylk consumption is closely associated with higher income and higher education. This finding raises questions of justice, which have also been identified in other fields of sustainable consumption, as “green lifestyles” are not equally affordable for everyone (electric vehicles, home insulation or roof top solar are prominent examples). Mylk consumption also varied significantly with age with 30-40 year-olds being most likely to consume mylk. While younger people may generally be more willing than older generations to try milk (or meat) substitutes, the price tag associated with mylks may be an inhibiting factor for people under 30.

The MOA data suggested that several other situational factors shape the substitution of milk with mylk. In particular, people’s relationships with other household members or close friends, and their health situation, can act as important drivers or barriers to consuming mylk or milk. For instance, having someone in the household who is allergic to milk or has adopted a vegan diet, can encourage other household members to try and consume plant-based mylks. These findings highlight that sustainable consumption via product substitution is shaped by social patterns, inequalities and relationships. This is likely to be relevant for other product categories too and hence a topic that future research should engage with.

Finally, the data has demonstrated how important changes in the provision of mylks have been for encouraging increasing consumption. We find that advertising and greater visibility and availability of mylks in supermarkets and food outlets like cafes has normalised mylk consumption and made it

easier for people to experiment with the consumption of different types of mylk. This supports the argument made in sustainable consumption studies that consumption is not just driven by consumer demand but shaped by production itself (Bayliss & Fine, 2020). These findings also suggest that increasing mylk consumption can be understood as a processes of “reconfiguration” (Geels et al., 2015) and “strong sustainable consumption” (Lorek & Fuchs, 2013) because it does not only involve choice at the level of the individual consumer but a broader reconfiguration of production and societal norms.

## 6. Conclusion

Reducing food-related emissions in the UK remains an important part of an overall strategy to meet net zero climate targets. Limiting dairy and meat consumption can make a relevant contribution here. A variety of plant-based products are now readily available that can substitute for meat and dairy products, including plant-based ‘mylks’. The “weak sustainable consumption” position assumes that emission reductions can be achieved by consumers choosing more environmentally friendly products without deeper changes in attitudes or lifestyles. This study set out to examine how the process of substituting milk with mylk can be characterised: is dairy milk increasingly replaced with mylks? What changes are involved in the adoption of mylk, and what are drivers and barriers of adoption? By examining these questions we aim to increase understanding of processes of product substitution relevant to sustainable consumption and production.

The findings from this study show that the increase of mylk consumption in the UK does not represent a straightforward case of product substitution, but a complex process in which people increasingly combine the consumption of milk and mylk. Furthermore, mylk consumption requires the engagement of new meanings, and is shaped by socio-economic and other situational factors, as well as systems of mylk provision. This finding suggests that sustainable consumption through product substitution is more complex than often assumed. This raises several questions, which could be the subject for further research, and it has implications for stakeholders.

Questions for future research that our finding raise include: To what extent might the increased mixing of milk and mylk consumption enhance or limit future carbon reductions from households’ milk consumption? How could mylk marketing and policies support a more even adoption of mylk across social groups? Since processes of product substitution likely vary across different consumption domains, future research could also compare these processes across different product categories, examining characteristics of “re crafting practices” and “reconfigurations” of production and consumption. This would lead to a more comprehensive understanding of the complexities, drivers and barriers to sustainable consumption through product substitution.

Recommendations for stakeholders such as retailers, product manufactures and policymakers aiming to stimulate more sustainable consumption via product substitution include that they should broaden their view beyond a focus on information and availability. In addition, they should consider how the meanings that constitute practices will have to change to broaden the adoption of new products; how people’s relationships and other circumstances can support or hinder adoption; and how adoption can be supported among disadvantaged groups to reduce inequalities in sustainable consumption. For the specific case of mylk consumption, as well as other sustainable products, this could involve devising policies and strategies that reduce the price differential between the standard and the more sustainable product to make such products more affordable to younger people and those on lower incomes.

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