Reducing meat consumption at work and at home: Facilitators and barriers that influence contextual spillover.

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Journal of Business and Globalisation, Journal of Fashion Marketing and Management, and *Journal of Marketing Communications*.

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Abstract

Using data from a real-world behaviour change intervention, this study contributes to the scarce and conflicting knowledge on contextual spillover, from the workplace setting to the home setting, as a specific type of spillover (i.e. knock-on effects of one behaviour to another). A social marketing intervention was staged in a workplace canteen in which red meat meals were replaced with white meat and vegetarian/vegan alternatives, together with an information campaign. Thirteen employees were interviewed twice (pre- and post-intervention totalling 26 interviews). The findings indicated the existence of a two-way pathway framework (for positive spillover and lack of spillover) which is supported by a range of factors. The findings allowed the grouping of these factors into facilitators and barriers of contextual spillover as well as a three-dimensional typology, both of these representing a contribution to existing knowledge. Overall, findings showed that a social marketing intervention in a workplace can lead to sustainable food consumption at home. However, these effects are influenced by barriers and facilitators which can lead to the manifestation of other types of behaviour (than the initial target one) or no changes at all (i.e. lack of spillover). Resulting practical implications are discussed.

Summary Statement of Contribution

This is the first study to focus on spillover effects from a real-world social marketing intervention focussed on meat reduction that explores contextual spillover (i.e. behaviour in one setting having impact in another setting). Through its design, the present study contributes to methodological gaps in existing research where a limited number of spillover studies have applied qualitative approaches in field-based behaviour change interventions. The outcomes of spillover from the work to the home

setting are significantly under-research compared to the home-work spillover and thus we advance understanding of this type of contextual spillover. We contribute to spillover theory through in-depth findings that suggests the existence of a two-way pathway framework (i.e. with positive and lack of spillover), and we extend the knowledge on influencing factors through the development of a three-dimensional typology that includes facilitators vs. barriers, internal vs. external locus (i.e. self, others and context), and the intensity of influence. The findings advise social marketers of the need for more attention to various types when implementing interventions while highlighting the potential to policy makers for wider sustainable diet changes through programmes in the workplace.

Keywords: contextual spillover; workplace setting; home setting; social marketing intervention; meat consumption

Introduction

What we eat has implications for our personal health and that of our planet. A quarter of global greenhouse gas (GHG) emissions come from the food sector, of which the majority (58%) come from rearing animals and the processing of animal products (Poore & Nemecek, 2018). Transforming Western diets towards more plant-based options is anticipated to play a key role in promoting global reductions in GHG emissions (Intergovernmental Panel on Climate Change, 2019). Such diets are also associated with improved human health, reduction in land use for food production, and improvements in biodiversity (e.g., Cobiac & Scarborough, 2019; Intergovernmental Panel on Climate Change 2019; Willett et al., 2019).

In the United Kingdom (UK), creating such a dietary shift has been identified as one of the core strategies to achieve the country's 'net-zero' carbon targets (Committee on Climate Change, 2020) and an 'optimised healthy diet' for the UK population – in accordance with WHO guidelines – is thought to hold the potential to reduce GHG by over 17% (Green et al., 2015). Fostering the transition to low-carbon, healthy diets in the UK (as well as other countries) will require profound changes to eating behaviours, including a significant reduction in red meat consumption (Willett et al., 2019). While incremental changes to dietary choice might be expected to occur over time (e.g., as general knowledge and awareness of the health and environmental impacts of such choice increases), the need to act quickly to address the climate crisis necessitates the design and delivery of targeted behaviour change interventions (Otto et al., 2020).

Interventions designed to affect behaviour change take broadly two forms: *information provision* (aimed at influencing the knowledge, beliefs and motivations of

an individual) and *structural change* (aimed at affecting the environment or context within which decisions are made) (see Steg & Vlek, 2009). Interventions can also comprise a combination of the two approaches. By structurally changing the relative availability of different meal options (e.g., offering more plant-based options and/or less meat-based options) and/or by providing information about the health benefits of certain foodstuffs; restaurants, cafés, and canteens can act to influence consumer choice (Bianchi et al., 2019; Geaney et al., 2013; Thaler et al., 2010). For example, in a recent study that doubled the availability of vegetarian meal options in a university canteen, there was an increase of between 41-79% in vegetarian food sales (Garnett et al., 2019). However, a review of interventions for healthy and sustainable diets showed that a combination of structural changes and information provision is likely to have the strongest impact on changing diets (Bailey & Harper, 2015).

Social marketing campaigns are popular tools for intervening to promote pro-environmental behaviour (PEB) change at an individual, community, and organisational level (Cox et al., 2012). Such campaigns have been used widely to promote many different forms of PEB, including: household water consumption (Lowe et al., 2015), workplace recycling, printing, heating/cooling (Gregory-Smith et al., 2015), energy consumption (Staddon et al., 2016), and some food-choice behaviours (Velema et al., 2018). However, while social marketing research has begun to examine how interventions might be designed to reduce food consumption or promote more healthy and sustainable diets (Bailey & Harper, 2015; Garnett et al., 2019; Peattie & Peattie, 2009), evidence for the effectiveness of such interventions and specific consideration of potential 'knock-on' or spillover effects caused by them remains scarce (e.g., Committee on Climate Change, 2020; Carrico et al., 2018).

While evaluations of behaviour change programmes are widely established (Gregory-Smith et al., 2015), the link between different PEBs (e.g., food and energy consumption) or contexts (e.g., work and home), is rarely accounted for. Spillover theory offers an avenue for accelerating a transformation to low-carbon lifestyles by contributing a better understanding of the links between PEBs (Nash et al., 2017). Thus, studying spillover effects is a promising approach to better understand the holistic relationship between PEBs within and between different contexts (e.g., work, home). Research on spillover effects is an emerging topic (see e.g., Jones et al., 2019). However, to date, most studies investigating spillover effects have focused on spillover between behaviours, while research investigating spillover effects between different contexts is still scarce. Especially effects of interventions (e.g., in the workplace) to other areas of life (e.g., home setting) have been understudied. Moreover, little attention has been placed on interventions specifically designed to reduce meat *consumption* practices, a particularly carbon intensive practice (Poore & Nemecek, 2018).

The current study aims to address these gaps directly by: (a) evaluating spillover effects of a social marketing intervention designed to reduce meat consumption among the employees of a large company based in the north of England; and (b) shedding light upon the facilitators of and barriers to *contextual spillover* effects (or a lack thereof) between the employees' workplace and their home. The workplace and home settings were chosen as these are where a large proportion of the adult population spends most of its time (Cox et al., 2012), plus the workplace is also recognised as an accessible context within which to deploy (social marketing) campaigns designed to affect environmental attitudes and behaviours (Klade et al., 2013; Cox et al., 2012).

In completing this study, we not only seek to identify evidence of contextual spillover but also offer more in-depth theoretical insight into the factors affecting the

range of possible contextual spillover effects by outlining a comprehensive contextual spillover framework (CCSF). In the remainder of the introduction we provide a brief outline of spillover theory (with a focus on behavioural and contextual spillover) before outlining the specific aims and objectives of the current study.

Literature Review

Spillover theory offers a lens by which to better understand how efforts to intervene on a target behaviour (PEB1) in a given context (A) might 'knock-on' to affect the same target behaviour (PEB1) in a different context (B), or even secondary non-target behaviours (PEB2) in the same (A) or different (B) contexts (see Galizzi & Whitmarsh, 2019; Truelove et al., 2014; see also Figure 1). The prospect of spillover occurring among PEBs has been widely discussed in recent years (for a review see Nash et al., 2017; Jones et al., 2019), producing several definitions of the phenomenon and methodological approaches to their study. Moreover, several studies have focussed on identifying key psychological (e.g., Lacasse, 2016; Steinhorst et al., 2015) and contextual (e.g., Littleford et al., 2014) factors that influence the likelihood of positive and negative spillover occurring (or inhibit spillover effects). For example, personal and social norms have also been identified as a facilitator of positive spillover (Bergquist et al., 2019; Steinhorst et al., 2015; Thøgersen 2004). In a quasi-experimental study that compared a context-based and a norm-based behaviour change intervention targeted at electricity conservation, only participants from the norm-based intervention showed an increase in water conservation behaviour, which indicates a positive spillover effect (Bergquist et al., 2019).

One type of spillover is commonly referred to as *behavioural* spillover. Behavioural spillover occurs where changes to a target (primary) behaviour, following

an intervention, have implications for non-targeted (secondary) behaviours (Nash et al., 2017). For example, a behaviour change intervention designed to reduce water usage at home (primary behaviour) might also affect the person's household electricity usage (secondary behaviour). Crucially, the secondary behaviour can be affected in the same manner as the original behaviour (e.g., decreasing water usage => decreasing electricity usage) – commonly referred to as *positive spillover* – or in the opposite manner (e.g., decreasing water usage => increasing electricity use) – commonly referred to as *negative spillover* (Thøgersen & Ölander, 2003).

Spillover Theory

Several theories have been used to explain positive and negative spillover in relation to PEBs. Two that are recurrently used to explain *positive* spillover effects are *cognitive dissonance theory* (Festinger, 1957) and *self-perception theory* (Bem, 1972). Cognitive dissonance theory (Festinger, 1957) suggests that people are motivated to avoid or resolve psychological tension caused by conflicting (or dissonant) behaviour or cognition (e.g., when a performed behaviour conflicts with prior behaviours, attitudes or values). In the context of positive spillover, one can see how the performance of one PEB (e.g., recycling at work) could beget further PEBs (e.g., conserving energy at work) as people seek to avoid the psychological discomfort that might come from acting inconsistently towards the environment.

Self-perception theory (Bem, 1972) asserts that people tend to align their cognitions (e.g., attitudes, values, identities) with their past behaviour, which in turn has implications for their future behaviours. For example, if a person has acted altruistically in the past, they use this information to strengthen their self-perception as someone who is helpful and altruistic and will thus be more likely to engage in future altruistic acts.

Accordingly, this theory would suggest that a person's past PEBs strengthen their personal sense of being pro-environmental, leading to a tendency to engage in future PEBs (van der Werff et al., 2014).

In contrast to cognitive dissonance and self-perception theories, the concept of moral licencing has been used to explain *negative* spillover effects (Blanken et al., 2015). According to moral licensing, people are seen to use personal (or even vicarious, e.g., Meijers et al., 2019) examples of past (or intended) 'moral' behaviour (e.g., donating to charity, recycling at work) to cognitively and/or socially justify current (or intended future) indiscretions (e.g., not giving up time to help others, not recycling at home). In short, certain 'good' actions are used as a means of licensing 'bad' actions (or inaction) (Meijers et al., 2015).

In relation to environmental behaviours, this licensing or 'trade-off' mentality is exemplified in people's tendencies to endorse compensatory belief statements (so-called 'compensatory green beliefs' or CGBs) (Kaklamanou et al., 2015; Hope et al., 2018). Kaklamanou et al. (2015) found evidence that the greater a person's tendencies to endorse CGBs (e.g., not using a dishwasher can compensate for taking longer showers), the less likely they were to engage in pro-ecological behaviours. Accordingly, if people take the performance of a prior PEB as a justification for later indulgence, that moral licensing offers a reasonable explanation for negative spillover (or the absence of positive spillover).

Contextual Spillover

Contextual spillover occurs when interventions designed to affect change in a primary behaviour in one context have implications for the performance of the primary behaviour in a separate context (Nilsson et al., 2017). For example, when an

intervention designed to affect energy consumption behaviour in the workplace (e.g., switching off lights), affects a person's energy consumption at home. Similarly, in the case of contextual spillover, the spillover effects can be classified as *positive* or *negative* depending upon the direction of the influence (Littleford et al., 2014). Less research has investigated factors that influence contextual spillover effects, most of which focused on positive spillover pathways. For instance, using interview and survey data, Whitmarsh et al. (2018) identified a range of contextual and individual factors that influenced waste behaviours (e.g., recycling, reduced packaging, take own bags for shopping) across three contexts (i.e. home, work, and holiday). Factors that positively influenced consistency across settings, which the authors interpreted as contextual spillover effects, included perceived behavioural control over behaviour, knowledge, similar recycling facilities, personal norms, and identity (Whitmarsh et al., 2018). They also identified barriers that reduced consistency of PEBs across contexts including lack of facilities and information that reduced positive spillover effects between contexts leading to null effects (i.e. lack of spillover). Other studies found that similarities between the home and work context (e.g., similar equipment) influenced the likelihood of positive spillover between two settings, while differences between contexts were found to lead to a lack of contextual spillover effects (Littleford et al., 2014; Tudor et al., 2007). Notably, to our knowledge, no factors for negative contextual spillover pathways have been identified. Figure 1 shows a summary of factors of contextual spillover pathways that have been identified in the literature.

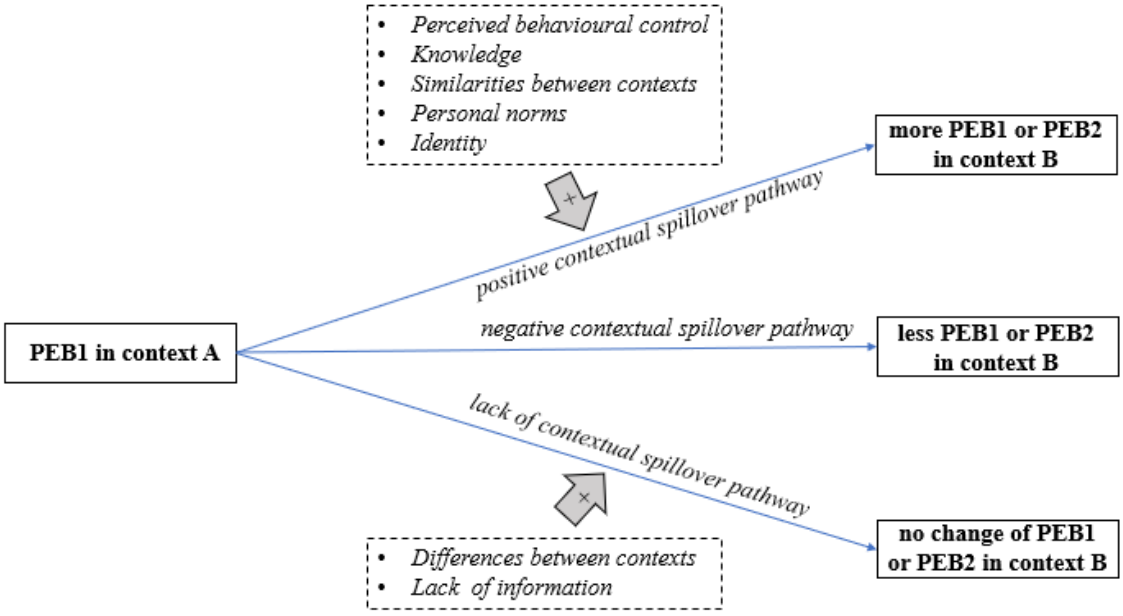

Figure 1: Comprehensive contextual spillover framework (CCSF): Framework illustrating pathways to positive, negative and lack of contextual spillover effects based on existing evidence on contextual spillover literature.

Note: PEB1 and PEB2 refer to different pro-environmental behaviours. Context 1 and context 2 refer to different contexts, e.g., work and home setting. The dashed boxes contain factors that positively influence the respective pathways of contextual spillover, indicated by + in arrows.

In the context of understanding PEBs, research has tended to focus on studying *behavioural* spillover effects *within* the same context (e.g., water conservation and electricity conservation within the household; Lauren et al., 2016), with less attention given to cross-contextual spillover effects. In particular, factors that influence spillover pathways between contexts have been under researched; however a better understanding of these would help design more effective interventions or limit expectations of expected spillover effects from interventions (Thøgersen & Crompton, 2009).

Research has begun to investigate this topic but there are several gaps in knowledge. For example, in terms of the types of behaviour studied, research into contextual spillover pathways has predominantly focussed on energy and water use (Littleford et al., 2014; Wells et al., 2016) and waste and recycling behaviours (Tudor et al., 2007); other behaviours, including dietary behaviours (like meat consumption), have received considerably less attention (Wynes et al., 2018). Also, prior contextual spillover research has focussed mainly on identifying examples of *positive* spillover between a common target PEB in different settings, for example, identifying consistency in energy conservation behaviours between the workplace and home (Littleford et al., 2014; Whitmarsh, 2018; Maki & Rothman, 2016) or the home and holiday setting (Schütte & Gregory-Smith, 2015; Whitmarsh et al., 2018). There has been much less consideration of the prospect of contextual spillover from real-world interventions (e.g., intervention at workplace => PEB at home) and/or attempts to understand the factors giving rise to positive, negative spillover or a lack of spillover (i.e. null effects). Moreover, while there is an assumption that the findings of spillover studies are generalisable to all PEBs, it is unclear as to whether this is the case, particularly in terms of specific dietary behaviours (like meat consumption) that form the basis of the current investigation.

The current study

The current paper sets out to develop a comprehensive theoretical framework for understanding the pathways to positive, negative *and* lack of contextual spillover (i.e. the comprehensive contextual spillover framework or CCSF; Figure 1). In doing so, we simultaneously build upon the core findings of the extant literature (summarised in Figure 1) and draw upon the findings of a new, qualitative study designed to assess

evidence of contextual spillover (or a lack thereof) between the workplace and home, following a social marketing intervention targeting meat consumption (revised CCSF; see Figure 3).

We also seek to address methodological limitations in previous spillover research. Specifically, methodological approaches to understanding spillover are dominated by quantitative research methods (e.g., surveys), with few studies using mixed methods or fully qualitative approaches (Elf et al., 2019; Whitmarsh et al., 2018; Verfuerth et al., 2019). Moreover, relatively few studies have considered the effects of 'real-world' interventions on spillover effects (Verfuerth & Gregory-Smith, 2018). The methodological approach utilised in the current study (i.e. interviews conducted before and after a real-world social marking intervention) directly addresses both these issues, and provides a rich qualitative dataset from which to assess the complexity and nuances underpinning the emergence or absence of spillover effects.

The two aims of this paper are (a) evaluating spillover effects of a real-world social marketing intervention designed to reduce meat consumption among the employees of a large company; and (b) shedding light upon the facilitators of and barriers to contextual spillover pathways (or a lack thereof) between the employees' workplace and their home.

Methodology

The data presented in this study draw on semi-structured interviews with employees of a private sector company (based in the North of England), in connection with a meat consumption intervention. Overall, 13 individuals were interviewed twice in their workplace setting (pre- and post- intervention), amounting to a dataset of 26 interviews (see Appendix A for more details of coding procedure). We used a social marketing

behaviour change intervention targeted at reducing employees' red meat consumption. The intervention was co-designed and implemented alongside representatives from the private sector company (see Appendix B for more details). The intervention used a combination of structural change in the form of reduced meat availability in the canteen, and information provision in the form of an information campaign and social normative messaging in the canteen. The present study contributes to gaps in existing research where, to the authors' knowledge, there are no studies that have applied qualitative approaches in behaviour change interventions focussed on reducing meat consumption as a form of PEB that might lend itself to contextual spillover (i.e. effects from the workplace setting to the home setting).

Structural Change: Reduced Meat Availability

The collaborating company provides simple meals (e.g., salad bar, jacket potato, sandwiches, cold meat cuts) for free to their employees, and a choice of two hot meals which are offered at a subsidised price. According to the chef, about 700 employees eat the canteen food daily. While the company is located close to off-site cafés and supermarkets, the free/subsidised food and an organisational culture of eating with colleagues in the canteen makes it a popular and highly frequented place. Prior to the intervention, vegetarian or plant-based food options were limited, and the majority of sandwich and jacket potato fillings contained processed red meat (e.g., ham, roast beef, roast pork), and most of the time the two hot meal choices both contained meat. The free food choices from the salad bar (especially sandwiches and jacket potatoes) were most popular among employees, although depending on the available options, the chef reported that on average 100 hot meals were sold daily.

In collaboration with the canteen chef at the private sector company and based upon recommendations made by the United Nations Food and Agriculture Organization (Fischer and Garnett, 2016), new menu items were developed that reduced the quantity of available meat-based foods by 70%, while increasing plant-based and non-processed food items. During the one-week intervention in the summer of 2017, the hot food menu was changed to include one vegan meal and a meal where the red meat option (e.g., beef, lamb) was swapped for white meat (e.g., chicken, turkey) or pork (e.g., ham). It should be noted that ham in particular was a salad bar item that the employees felt strongly about keeping. After the one-week intervention, the menu reverted to having limited vegetarian options, although the chef kept some of the most popular menu choices (e.g., sweet potato and spinach salad).

Changes in the availability of choices in the workplace canteen followed the 'nudge' or choice architecture approach. Nudging has been found to support behaviour change more generally (Thaler et al., 2010), as well as specific behaviours such as workplace diets (Geaney et al., 2013). Hence, this approach seemed promising as a component of the social marketing intervention used within this study.

Information Provision: Information Campaign

An information campaign was launched alongside the new menu, which aimed to increase awareness of the impacts of food choice in terms of CO_2 emissions, water use and land use (see Figure 2). The information was delivered in the form of posters and leaflets, displayed in prominent places in the canteen and placed upon each table within the canteen.

The presented information was based on previous research findings that highlighted the link between food choices and environmental impact (Fischer &

Garnett, 2016; Giadini, 2016; Green et al., 2015; Scarborough et al., 2014). Information was chosen as an additional component of the social marketing intervention as it had been identified as a key factor for changing PEBs (Abrahamse & Steg, 2013). The information included normative messaging, which has previously been found to be effective and associated with spillover effects (Bergquist et al., 2019). To make social norms more salient, a message saying "58% people at the partner organisation aim to increase or already eat sustainable foods" was used in the information campaign. This message was based on the cumulative number of employees in stages 3 and 4 retrieved from the pre-intervention survey's stages of change scale (Bamberg, 2013), discussed below.

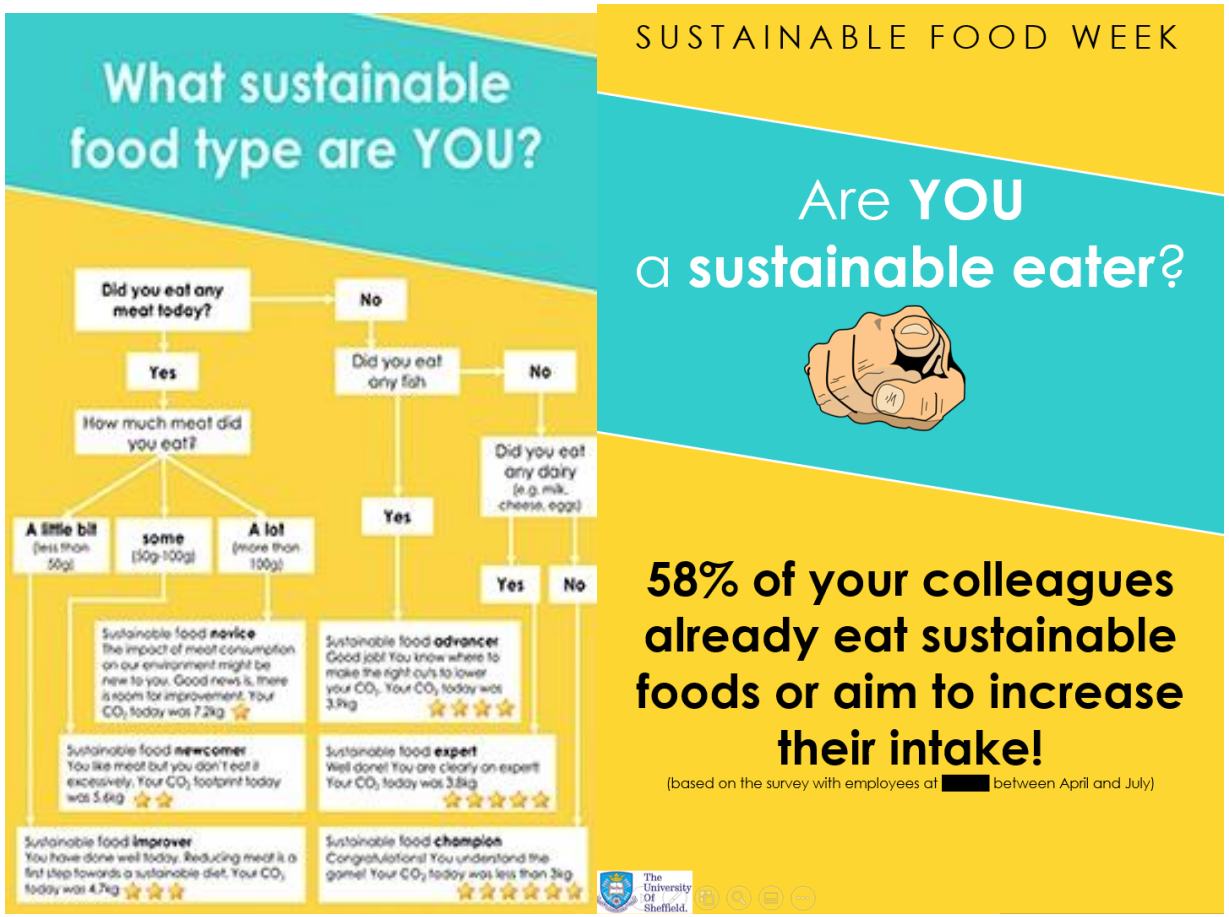

Figure 2. Examples of posters and leaflets from the information campaign.

Interview procedure and sampling

Semi-structured interviews were conducted four to six weeks before and four weeks after the behaviour change intervention. Interviews were held in the company's canteen or in a café nearby. The interviews took between 30 and 60 minutes and were recorded and later transcribed by the first author or a professional transcriber. Before taking part in the interviews, participants were provided with an information sheet about the interviews and signed a consent form. All prospective participants were offered a £10 shopping voucher as payment for their participation in the interviews. Ethical approval for the study was received from the University of Sheffield.

Participants were recruited via a short online survey that was distributed through various channels within the company (e.g., internal email list and flyers with a survey link). Participants were asked if they wished to take part in some semi-structured interviews associated with the project, and recruitment occurred in advance of the intervention being launched. The survey contained several questions about their current food choices (e.g., frequency of meat consumption), whether they used the canteen regularly, and an adapted version of a 'stages of change' scale (Bamberg, 2013), which was used to assess the current state of an employee's transition towards a more sustainable diet. Participants were asked which statement best described their current level of sustainable food consumption; e.g., '*At the moment, I don't pay attention to whether my food is sustainable or not. I'm happy with the current food I consume and see no reason why I should change it*.' (Stage 1), '*Because I'm aware of many problems associated with unsustainable food consumption, I already try to use sustainable food alternatives as much as possible. I will maintain or even increase my already high level of sustainable food consumption in the next months*.' (Stage 4). Initially, 23 prospective

interviewees who represented all stages of change (Bamberg, 2013) and regularly ate in the canteen were contacted. Of these, 13 agreed to take part in both the pre- and post-intervention interview phases and thus form the sample for this study (see Table 1 for participant details). Education levels ranged from GCSE/O level to Master's degree, with most participants having obtained an undergraduate degree. Participants had worked between 6 months and 7 years at the company. Further details are displayed in Table 1.

Questioning in the interviews focused on: (1) participants' personal food-choice behaviours and pro-environmental behaviours at work and at home; (2) their perception of sustainable diets; and (3) any changes made after the behaviour change intervention (for second interview only). The interview guide was designed based on gaps identified in the literature with the aim to understand underlying processes and barriers of contextual spillover effects. The pre-intervention interviews (T1) included questions around the perception of sustainable diets, food consumption and diet types, and general PEBs at work and home. The post-intervention questions (T2) included the same questions as at T1 and an additional block of questions to assess any changes after the behaviour change intervention; including questions about participants' perception of the intervention, how their colleagues reacted, and changes in their own diet or other behaviours in relation to the intervention.

The interview transcripts were analysed using thematic analysis (see Braun and Clarke, 2006), aided by the qualitative data analysis software NVivo (NVivo, 2014). The initial coding of themes was completed, and a second coding of an example transcript was conducted by two co-authors of this paper, who agreed with the coding. The reported results focus on the dominant overarching patterns and themes raised by

participants, however themes of lower prevalence that were considered relevant to the research questions are also identified and reported (Braun & Clarke, 2006).

Table 1. Participant information

ID	Gender	Age	Job role	Stages of Change (T1)	Stages of Change (T2)
104	Female	18-25	Payment Team	Stage 1	**Stage 3**
108	Female	26-35	Engineer	Stage 2	Stage 2
117	Male	26-35	n/a	Stage 2	Stage 2
107	Male	26-35	Operations	Stage 2	Stage 2
110	Female	36-45	Digital manager	Stage 2	**Stage 4**
106	Female	26-35	Analyst	Stage 2	n/a
129	Female	36-45	Customer Service	Stage 2	Stage 2
112	Female	26-35	Analyst	Stage 3	**Stage 4**
105	Male	26-35	Technical support	Stage 3	Stage 3
126	Female	36-45	Team leader	Stage 4	Stage 4
131	Male	26-35	Junior Engineer	Stage 4	Stage 4
102	Male	36-45	Software Engineer	Stage 4	Stage 4
132	Male	46-55	Sales	Stage 4	Stage 4

Notes: Stages of Change (Bamberg, 2013) indicate participants' level of sustainable food consumption retrieved from the pre-intervention survey. The stages represent the following: Stage 1 – Precontemplation: Not aware of environmental impact of food consumption and no intention to change food consumption; Stage 2 – Contemplation: Intention to increase sustainable food consumption, but perceived as impossible; Stage 3 – Implementation: Considering to increase sustainable food consumption, but unsure of concrete actions or how to implement them; Stage 4 – Maintenance: High awareness of environmental impact of food consumption and trying to use sustainable food alternatives where possible. ID numbers were given at random to anonymise the interview data. *Bold:* Changes in Stages of Change at T2. n/a = did not fill in survey at T2.

Findings and Discussion

The findings are divided into two parts. First, we present evidence for positive and lack of contextual spillover pathways that link the workplace intervention with changes or the absence of changes in PEBs at home. This section focusses on evidencing and discussing pathways to contextual spillover effects, which have been discussed in the literature review. Notably, we found positive and lack of spillover pathways, but no

evidence for a negative spillover pathway. Second, we present factors that influence the identified contextual spillover pathways. This section focuses on facilitators and barriers to the positive and lack of contextual spillover pathways. These findings are presented in a revised comprehensive contextual spillover framework (revised CCSF; Figure 3). Finally, we develop a three-dimensional typology that includes facilitators vs. barriers, internal vs. external locus (i.e. self, others and context), and discuss practical implications.

Contextual Spillover Pathways

We analysed the interview data focussing on the themes of contextual spillover pathways. A positive contextual spillover pathway describes the link between a PEB1 in context A – here reducing meat consumption at work through the structural changes made during the intervention – and a positive change in PEB1 (reducing meat consumption at home) or other PEBs in a context B – here the home context. Hence, in our analysis we interpreted, for example, an increase in meat reduction at home (i.e. a positive change of a PEB in the home context) as evidence for the positive contextual spillover pathway (see also Nilsson et al., 2017). Similarly, we interpreted negative change of PEB1 (e.g., an increase in meat consumption) or other PEBs (e.g., energy use) at home as evidence for a negative contextual spillover pathway. Where interviewees reported no change of PEB1 or other PEBs at home or other contexts, this was interpreted as a lack of spillover.

Positive Contextual Spillover Pathway

Positive changes in PEBs at home were most dominant among the findings and provided evidence for the positive contextual spillover pathway. Within the positive

contextual spillover pathway, we identified three types of positive PEB change and a general increased awareness of the topic of sustainable food. These include (a) a reduction of red meat consumption, (b) an increase of local food consumption, and (c) information seeking. We also found increased awareness around the topic of sustainable food.

The first type of PEB change was a reported reduction of red meat consumption at home, and in some cases when eating out, that participants linked to the intervention at work. Red meat consumption was targeted by the workplace intervention, hence, according to spillover theory (Nilsson et al., 2017), the positive spillover pathway would result in a reduction of red meat consumption at home. Additionally, we identified different patterns and strategies in meat consumption change that led to a positive change and formed the positive contextual spillover pathway. For instance, some participants reported reductions in red meat consumption at home and as a family by swapping red meats (e.g., beef, lamb) for white meats (e.g., chicken).

> *"just replacing the majority of red meat with white meat […] generally we have meat at most meals and we can get away from that, in fact I don't necessarily need to have meat in every meal" (107, male, 26-35; post-intervention interview)*

This form of compensatory behaviour has previously been linked with negative PEB change (i.e. negative spillover; Kaklamanou et al., 2015) and behavioural inconsistency (i.e. lack of spillover; Capstick et al., 2019). However, we found that compensatory behaviours can also achieve a positive change in PEBs, in our case an overall red meat consumption reduction, and form part of the positive contextual spillover pathway. These compensatory behaviours can be characterised as *other-dependent* and often preceded a negotiation process with other household members (see next section and Table 2).

Rule-making for meat consumption is another strategy we identified. This included the establishment of rules or behavioural intentions for time periods in which no meat was consumed (e.g., meat-free Mondays, vegetarian month).

> *"we're trying to do the meat free Monday" (131, male, 26-35; post-intervention interview)*

While setting rules or behavioural intentions have previously been linked with health-related behaviour change (e.g., smoking; Webb & Sheeran, 2010), to our knowledge, self-set rules have not been previously identified as a pattern of positive contextual spillover pathways. These rules were time- and context-dependent and would only apply on specific days (e.g., Mondays) or in specific contexts (e.g., at home). For example, participant 110 separated the contexts of restaurants, home, and workplace as well as lunch and dinner time and applied different rules for when she would eat meat.

> *"if I went out, […] I really would probably not try the vegetarian or vegan option as a main course. […] nearest I get to vegetarian or vegan food at home would be if I made soup. So in the winter I would always make soup, so I make soup to bring for my lunch all the time […] So, in the winter at lunch time I would not have meat […] for my dinner I would definitely have meat or fish. I do eat quite a bit of fish. But yeah, I probably wouldn't go for a full-on vegetarian dinner on an evening" (110, female, 36-45; post-intervention interview)*

The second dominant theme of the positive contextual spillover pathway was identified as consumption of local produce that was characterised by an increase in consumption of supermarket products from the UK. For example, participant 131 talked about how he bought strawberries from the UK instead of strawberries from Spain, even though the latter were cheaper. Noticeably, consumption of local produce was strongly linked to the context of the decision making (i.e. supermarket), as exemplified by participant 104; hence it is classified as context-dependent behaviour change.

> *"I was shopping on Saturday and I went to get some strawberries. And there were like two different punnets. Some somewhat cheaper than the other. The cheaper ones were from Spain whereas the other ones were from the UK. So, I thought, well I get the UK ones because we can grow strawberries, why do I need to get them from Spain. So little things like that, where the origin is a*

certain thing, whereas previously I might not have." (131, male, 26-35; post-intervention interview)

"I […] actually try to look where food is coming from and whereas before I never, you know, I was just buying more seasonal vegetables, but actually that came from New Zealand, but why did it come from New Zealand? So it is the difference for me" (104, female, 18-25; post-intervention interview)

A dominant reason for the increased consumption of local produce was the participants' perceived easiness of increasing local food consumption while reducing meat consumption was considered more difficult in comparison, as illustrated by a quote from 106. Participants tended to perceive consumption of local produce as an easier PEB associated with sustainable food than reducing meat, although some participants engaged in both behaviours.

"It is easier to get locally produced vegetables than to eat less meat" (106)

This finding supports the notion that positive spillover pathways link more difficult PEBs (e.g., reducing meat consumption) with subsequent, easier PEBs (e.g., buying local food) (see e.g., Truelove et al., 2016; 2014). This is consistent with previous studies, which found positive spillover pathways from a green purchase behaviour intervention to low-cost PEBs (e.g., switching off lights; Lanzini & Thøgersen, 2014). However, the present study is the first to find these effects in the area of meat consumption, an area that has received little attention in previous spillover research.

Information seeking was identified as the third dominant theme of the positive contextual spillover pathway, although this theme overlaps with buying local produce, indicating that the themes are interlinked. Information seeking is characterised by an active and a passive form. The active form typically took place in the supermarket or other places where the participants would buy food, and was related to participants

talking about how they started to look for indicators of sustainability when food shopping.

> *"I actively look kind of if there is any indicator of it's more sustainable or less sustainable kind of thing" (107, male, 26-35; post-intervention interview)*

> *"for me the difference is that when I go to the shop I think more about what I'm eating, and when I go to buy something I think more about where it came from." (104, female, 18-25; post-intervention interview)*

The passive form of information seeking was characterised by participants paying more attention to topic-related information around them. For example, participants paid more attention to news or documentaries related to sustainability and food consumption. For some participants, this led to the formation of an intention to change their behaviour in the future or to further explore a topic, as illustrated by 112.

> *"I'm sure I just saw something on the news about it, whereas before I would just have skipped over it." (107, male, 26-35; post-intervention interview)*

> *"I was watching a show about how different veg get grown a certain way. […] so that is another thing that I really want to get into, I think. […] I looked into the whole wonky veg box and I am really interested in some of it." (112, female, 26-35; post-intervention interview)*

A fourth theme that can be related to the positive contextual spillover pathway is increased awareness. This non-behavioural subtheme is characterised by interviewees talking about an increased awareness, followed by an explanation for why they had not changed some behaviours at home (e.g., reducing red meat). Participants tended to talk about how they were generally thinking about the sustainability of their food, but often without making any changes.

> *"It certainly made me think more about food, I mean, who knows, I might be a vegan in 5 years or something. […]." (117, male, 26-35; post-intervention interview)*

> *"I think it is something I thought about doing recently anyway. But I think the whole sort of sustainable stuff being surrounded by this sort of sustainable eating sort of brought it into focus and a little bit more in my head. So I have, it affected me." (108, female, 26-35; post-intervention interview)*

> *"I thought it was really useful, even if it doesn't directly change the way our eating habits, I think it is putting something in there to then make you think about like 'maybe next time I won't have XYZ and a veggie option instead'." (107, male, 26-35; post-intervention interview)*

Both information seeking and increased awareness indicate that internal processes have been affected by the workplace intervention, however these were not necessarily associated with changes in actual behaviours. Information seeking and increased awareness are interlinked but differ, with information seeking being an active response (i.e. a person actively seeking further information) while increased awareness is passive (i.e. a person being more aware of a topic). Even so, seeking information and an increase in awareness can be important steps towards behaviour change, as highlighted in the self-regulation model by Bamberg (2013). In previous studies, an increased awareness has been associated with behaviour change (e.g., environmental awareness and waste behaviour; Jones, Jackson, Tudor, & Bates, 2012). In this study, the workplace intervention only lasted one week, and to achieve long-term changes both in the work and home context, further support may be required such as reminding consumers of the effect of their choices, and structural support such as choice architecture approaches (e.g., Thaler et al., 2010).

Our measure of the stages of change show that three participants moved one or more stages up in the stages of change process (see Table 1). While their reflections from the interviews indicate that they have made changes to their PEBs at home, no patterns were found among these three participants that set them apart from those who did not move in the measure of stages of change. This is likely due to the small sample size. Possibly, subthemes among those who change stages in the stages of change measure would emerge from the data of a larger sample. Nonetheless, the upward movement in the stages of change process with no downward movement in the sample is an indication of the effectiveness of the intervention.

Lack of contextual spillover pathway

The lack of contextual spillover pathway was characterised by interviewees specifically talking about the absence of change to PEBs at home or in other contexts. Typically, participants were aware of changes that they could have made (e.g., reducing red meat consumption at home) but chose not to, often followed by justifications and other reasons for the absence of change.

Two patterns were identified in the lack of contextual spillover pathway. On the one hand, participants who had already talked about small positive changes they had made in relation to the intervention (e.g., increasing local food consumption) or who had an increased awareness, also tended to reflect on the changes they did not make (e.g., reducing meat consumption). These interviewees tended to justify and reflect on how much change they were willing to make or perceived they could do but also reflected on changes they were not willing to engage in, often relating to external factors that limited their ability to change PEBs (see also next section). These justification strategies included arguments ranging from lack of control over PEB changes to perceived costs (e.g., high costs of reducing meat consumption).

> *"I do as much as I can, but I'm not going to massively go out of my way to only buy organic food or only eat meat twice a week and stuff like that. […] I do as much as I can and some of it is out of my control, […], I do my bit there, dip my toe in it." (110, female, 36-45; post-intervention interview)*

> *"It made me aware of changes I could make, definitely. And, kind of pushed it slightly up the priority list maybe. But not like a huge deal, it's something I'd like to sort at some point. But maybe not now. […] I suppose because the cost is high. So, you know, taking up recycling is a bit of an extra faff but I can't really justify not doing it to myself. But changing you know how much meat and dairy I consume is, like it's a noticeable change." (117, male, 26-35; post-intervention interview)*

Participants could have used justification strategies to solve cognitive dissonance between internal factors (e.g., personal norms, ideals, guilt) and engaging in unsustainable behaviours (e.g., eating red meat) (see also McDonald et al., 2015). While

previous research has identified justification strategies in relation to environmentally harmful behaviours (e.g., flying; McDonald et al., 2015), we identified justification as a barrier to PEB change that acts as a factor diverging from the positive spillover pathway to the lack of contextual spillover pathway (see Figure 3). In our study, justification strategies were the internal negotiation processes of our participants and can be classified as self-dependent.

By identifying internal reflection and justification processes as a barrier to PEB change, these findings provide insights into the lack of spillover pathway more generally, which has previously been less understood (e.g., Wells et al., 2016). Our findings show that participants have an awareness of PEBs that they could change but justify making limited or no change. This could explain why previous research has found an increase in awareness related constructs (e.g., environmental identity) subsequent to a behaviour change intervention while not finding secondary PEB changes (i.e. lack of expected positive spillover) (e.g., Poortinga et al., 2013). As such, our findings make a valuable contribution to spillover theory by identifying factors that result in the lack of contextual spillover pathway.

The second pattern within the lack of spillover pathway – reframing of past behaviours – was characterised by participants reflecting on the influence of the workplace intervention on reviewing past behaviours in a new light. Typically, participants talked about how 'green' they had always been without realising it, which they tended to use as an explanation for why they needed no further changes in PEB.

> *"I've always bought British produce […] now I realise how good it is to get stuff locally as opposed to the other end of the planet." (105, male, 26-35; post-intervention interview)*

> *"I guess [the workplace intervention] reinforced some of my already existing beliefs I suppose. […] I like to eat, I like the idea of eating sustainable food. I know it's a good thing. So if you have information that is telling you what you are doing is a good thing. It is reinforcing." (102, male, 46-55; post-intervention interview)*

> *"I suppose it's just, I don't eat a huge amount of red meat, but I also kind of cut lamb out, but the meat that I eat is predominantly chicken, which isn't the worst. And I suppose I am thinking about it. I suppose I'm thinking more about buying veg and buying local veg because I want to have more vegetables in my diet. So I guess that was implied that I eat less meat anyway." (104, female, 18-25; post-intervention interview)*

The reframing of past behaviours could underlie internal processes through aligning previous behaviours (e.g., buying British produce) with the message of the workplace intervention (e.g., sustainable food consumption is better for the environment) to avoid cognitive dissonance (Gregory-Smith & Winklhofer, 2013; McDonald et al., 2015; Schütte & Gregory-Smith, 2015). However, in contrast to the previous pattern where participants focused on what has not changed, here participants changed their view of past behaviours. An explanation for this process could be a desire for behavioural consistency. The consistency principle has previously been described as an underlying factor for consistency of PEBs across time and contexts, and has been associated with positive spillover pathways (e.g., Whitmarsh et al., 2018) and behavioural inconsistency with a lack of spillover (Capstick et al., 2019); notably in the absence of a behaviour change intervention. In the presence of a behaviour change intervention, however, behavioural consistency would mean not engaging in the behaviour that was promoted in the intervention (e.g., meat reduction). Hence, in the present study, the consistency principle would act as a barrier to the positive contextual spillover pathway and instead promote the lack of contextual spillover, which is what our data show.

Noticeably, both positive and lack of contextual spillover pathways seem to occur simultaneously, rather than in their distinct forms as proposed in previous studies and theoretical frameworks (e.g., Truelove et al., 2014; Dolan and Galizzi, 2015). Little is known about why multiple spillover pathways occur simultaneously. One study has shown that positive and negative spillover can occur simultaneously, which the authors

suggest may result in an overall lack of spillover (Lacasse, 2016), although this study used quantitative methods with limited insights into spillover pathway processes. In the present study, the inconsistencies in PEB change after the workplace intervention could be explained by compensatory green beliefs (e.g., justification of environmentally damaging behaviours), which previous research identified as a process that people use when their pro-environmental credentials are threatened, that leads to inconsistent PEBs (Hope et al., 2018). Similarly, it could be that the participants were undergoing a process of change, as proposed in the self-regulation model by Bamberg (2013). According to this model, the development of new environmentally sustainable habits occurs in four stages (precontemplation, contemplation, implementation, maintenance), which people go through before changing a behaviour long-term. We measured the stages of change in relation to sustainable food before the interviews (see Table 1) and observed that particularly participants in the precontemplation and contemplation phases talked both about positive changes that they engaged in and PEBs they did not engage in but were more aware of or intended to change. Although this is an indication of an ongoing change process that could explain the simultaneous occurrence of both positive and lack of contextual spillover pathways, further research is needed to gain a better understanding of this process.

Summary

Thus far, these findings show that a workplace intervention that promotes red meat reduction can affect employees' food-related PEBs at home and in other contexts (e.g., supermarket). We find predominantly positive changes in food-related PEBs at home – which is indicative of a positive contextual spillover pathway – including a reduction in red meat consumption, an increase in purchasing local produce, information seeking,

and an increased awareness. These findings complement previous research, which established a positive relationship between social marketing interventions and positive spillover pathways (e.g., Baca-Motes et al., 2012; Evans et al., 2012; Kaida & Kosuke, 2015; Lanzini & Thøgersen, 2014; Steinhorst & Matthies, 2016). However, we also find the absence of behaviour changes that were explicitly expressed by participants, which is indicative of lack of contextual spillover pathways. We found no indications for negative changes in PEBs after the workplace intervention (i.e. negative contextual spillover pathway), although it is possible that participants did not talk about these or were not aware of any negative changes. It is also possible that employees who engaged in negative changes (e.g., increasing red meat consumption) after the workplace intervention did not want to take part in an interview.

We identified several subthemes that provide insights into the processes that underlie the positive and lack of contextual spillover pathways. Previous research predominantly used quantitative research methods, which proved to be limiting when identifying the underlying mechanisms that explain a lack of spillover. By exploring the the effects of a real-world workplace intervention and reflecting on behaviour changes with participants both before and after the intervention, the current research provides a more in-depth perspective on contextual spillover pathways. We identified strategies that participants used to manage behaviour changes, and the lack thereof, after the workplace intervention and classified their locus of dependence (i.e. self-, other-, context-). In the next section, we will explore factors that affect the contextual spillover pathways and present the findings in a revised comprehensive contextual spillover framework (revised CCSF; Figure 3). Finally, we develop a typology of these factors in relation to their locus of dependence (see Table 2).

Facilitators and barriers that influence contextual spillover effects

Additional to the strategies identified in the previous section (i.e. compensatory behaviour, rule-making, received easiness of PEB, justification, reframing of past behaviour, and compartmentalisation between work and home setting), we identified two further factors that influenced the positive and lack of contextual spillover pathways. These include differences between the home and work setting and differences in perceived behavioural control.

Differences between contexts

Differences between the home and work context are characterised by both physical and social differences and acted as a barrier to the positive contextual spillover pathway. Two subthemes were identified: where differences were perceived as a discontinuation of participants' social roles and social dynamics (e.g., responsibility) or a difference in perceived control over behaviour changes that enabled or disabled them to engage in the same behaviour in both contexts.

Where differences were perceived as a discontinuation of social roles and social dynamics, participants tended to reflect on established family patterns, roles, routines and practices which differed to those at work. For example, participant 102 reflected on the established patterns in his home environment which acted as a barrier to his changing PEBs at home. Similarly, participant 110 talked about established patterns at home that she finds easier to maintain than to consider changing these behaviour patterns.

> *"[The workplace intervention] didn't really have an effect on me. Can't say anything other than that really. […] It's probably because the, my work and home life is so different, so separate. […] I guess when you go home, then you are entering a new environment when you are coming from work. And then you have all the different issues to deal with, planning shopping, what you are*

used to eating at home with your family, so there is some quite established sort of patterns at home. (102, male, 45-54; post-intervention interview)

"[her husband] tends to cook and he, so we just tend to have it, it's a default position, I think. And it is just easier. I don't cook very often at home so M cooks and I'm quite happy to have whatever he makes." (110, female, 36-45; post-intervention interview)

This compartmentalisation between the home and work lives and practices could be a strategy used to avoid conflicts between different social norms and roles. For instance, Bartiaux (2008) suggests that compartmentalisation is a strategy to avoid contradictions between new information (e.g., workplace intervention) and established household practices, and to cope with ambiguities. By compartmentalising the home and work context, lifestyle changes that would disrupt social normality (e.g., changing established patterns at home) can be avoided. This could explain the gap between information about a behaviour (e.g., through the intervention) and the lack of behaviour change at home (i.e. lack of contextual spillover pathway). This can be characterised as a self-dependent barrier of the positive contextual spillover pathway as it is a coping mechanism to reduce conflict.

Differences in perceived control

Within this pattern, a dominance was identified with regards to differences in perceived control over behaviour changes and empowerment and influence on other people. Two subthemes were identified within this pattern, namely (1) differences in perceived control between the home and work setting, and (2) perceived lack of control over behaviours. At home, participants perceived a greater influence on and from others (i.e. family and household members) in comparison to the workplace (i.e. colleagues).

"At work, I mean, you know, people do what they do and it's up to them really. I look after other things. At home I can influence my family." (126, female, 36-45; post-intervention interview)

> *"I guess I try harder at home because at work, even if I do something really well, then someone else can come and ruin it. Whereas at home I'm in control of what happens. If I do recycling correctly, then that's the way it gets done." (106, female, 26-35; post-intervention interview)*

Differences between the home and workplace as social settings are likely to be specific to the context of this study; i.e., the workplace structure of the collaborating company where the research took place and the participants' individual household dynamics. Nonetheless, the findings are indicative for other workplace settings where hierarchies, job responsibilities, and employee empowerment will play a role in how employees engage in PEBs at work (e.g., promoted through workplace interventions) and affect contextual spillover pathways. Workplace interventions with employee involvement and measures to empower employees to engage in PEBs both at work and at home could counter a perceived difference in control between the work and home context. For example, in a review, Endrejat et al. (2015) analysed factors that facilitate energy conservation in workplaces and suggest that participatory workplace intervention designs could increase commitment and motivation and empower employees to engage in PEBs. Similarly, in the self-regulation model, Bamberg (2013) suggests that in order to move from the contemplation to the action phase (i.e., engaging in PEBs) an intervention needs to support behavioural planning and empower behaviour change.

The second pattern is characterised by a perceived lack of control over changing certain behaviours. The perceived lack of control was identified as a facilitator and barrier to positive spillover effects from the work to home setting. For example, participant 110 talked about having changed her meat consumption while not feeling in control to change other behaviours such as recycling, car use, and where she buys her food (i.e. supermarket vs. local, organic market). Similarly, participant 106 reported that she did not feel in control of changing any food-related behaviours other than the origin

of the food (i.e., British produce), which resulted in her compromising in changing the PEB that she felt she had control over.

> *"I have stopped eating as much meat as I used to have. But I don't think that anything else at work changed, because I can't change that. I can't change the fact that I don't appear to recycle or make it easier for people to recycle. […] I worked from home last week every day and I probably twice last week had meat at lunch time and that was a convenience thing. I was just like oh, I'll grab a ham sandwich, because it was just the easiest thing to make." (110, female, 36-45; post-intervention interview)*

> *"I think the only moment, the only realistic thing that I could really keep tabs on it where my food is coming from." (106, female, 26-35; post-intervention interview)*

While participants talked about not being in control of changing PEBs, an underlying factor could be the perceived easiness or difficulty of the change. The importance of perceived easiness of PEBs has already been discussed above and the similar pattern identified here in the context of perceived control further confirms its importance. An explanation for the importance of easiness of PEB change could be the low-cost hypothesis. The low-cost hypothesis proposes that people have a tendency to engage in easy and low-cost PEBs over more difficult and costly PEBs (Diekmann & Preisendörfer, 2003). Thøgersen and Crompton (2009) have applied the low-cost hypothesis to spillover theory and argue that positive spillover effects, if they occur, are more likely to occur for easy and small behaviours (Thøgersen & Crompton, 2009). Our findings provide empirical evidence for this hypothesis. Moreover, we find that participants not only engage in PEBs that are perceived easier (as discussed in the previous section), but in some cases experience a lack of control in changing more difficult behaviours altogether. For contextual spillover pathways this means that difficult behaviours are less likely to change whereas easier behaviours are more likely to change.

Both perceived lack of control over behaviour change and perceived differences of control between settings seem to act as a barrier to post-intervention behaviour

change. While the perceived difference in control between the home and work setting can be identified as a barrier to positive contextual spillover, a perceived lack of control over behaviour change can be identified as a factor that deviates contextual spillover effects from changing 'difficult' behaviours (e.g., reducing meat) to changing easier, more controllable behaviours (e.g., local food). These findings contribute to previous research findings showing the influence of perceived behavioural control on pro-environmental behaviours more generally (Greaves et al., 2013) and contextual spillover (Littleford et al., 2014). Littleford et al. (2014) suggest that a higher behavioural control in the workplace increases the likelihood of consistent behaviours across the home and work setting (i.e. contextual spillover pathway). However, while previous research identified lack of perceived behavioural control as a factor influencing contextual spillover effects, the current research finds that it is a barrier to the positive contextual spillover pathway and leads to a diversion of behaviour changes (e.g., instead of reducing meat consumption, increasing local food consumption) or prevents behaviour changes altogether. Hence, a lack of perceived behavioural control has a negative influence on the positive contextual spillover pathway and can act as a facilitator of the lack of contextual spillover pathway (see Figure 3). More specifically, the findings indicate that people with perceived low control over their behaviours tend either not to engage in any secondary PEBs (i.e., lack of spillover) or to engage in PEBs which they feel more in control of (e.g., local food produce).

> *"I do make sure though that I turn screens off and not wasting loads of paper in the printer and a lot of things like that. But there is not many things I could do that would be considered as not environmentally friendly in a search or not sustainable." (108, female, 26-35; post-intervention interview)*

> *"I don't know when food comes into season, so I don't really know, so without consulting an allotment manual I don't know how to choose in the supermarket whether something is grown under artificial conditions or whether it happens to be in season. So, yeah, just where the food*

comes from is an easily controllable thing where I can choose food quite easily." (106, female, 26-35; post-intervention interview)

Where previous, predominantly quantitative research, showed mixed findings with limited explanations for a lack of spillover or spillover to other behaviours, the findings from this study contribute to a better understanding of spillover processes. Future research should further investigate the role of perceived behavioural control as a barrier in different settings, especially linked with perceived differences between settings.

These findings extend previous research on contextual spillover effects which found that similarities and differences between the home and work setting (e.g., similar equipment) influenced the likelihood of positive spillover between two settings (Littleford et al., 2014; Tudor et al., 2007). While previous studies found that similarities and differences were relevant for physical environments or practices around specific equipment (e.g., switching the TV or the computer off in the home/ workplace; Littleford et al., 2014), the findings from the current research suggest that perceived differences in social roles and responsibilities in the different settings can be a facilitator for positive contextual spillover effects, for example when behaviour change is supported in the household, but also a barrier to positive spillover effects, for example when employees feel unempowered to make changes at home. The current findings extend previous contextual spillover research by providing a more nuanced understanding of differences between settings, especially perceived differences in social roles and empowerment. Moreover, we found that differences between settings influenced inconsistencies in contextual spillover effects reported by participants. For instance, some participants reported having made changes to some behaviours (e.g., buying local food produce), indicating a positive contextual spillover pathway from the

social marketing intervention, but the same participants also reported not having made changes to other behaviours (e.g., reducing meat consumption), indicating a lack of contextual spillover pathway (see Figure 3). These findings make a novel contribution to better understanding spillover processes and shed light on factors that explain crossovers between the positive and lack of contextual spillover pathways.

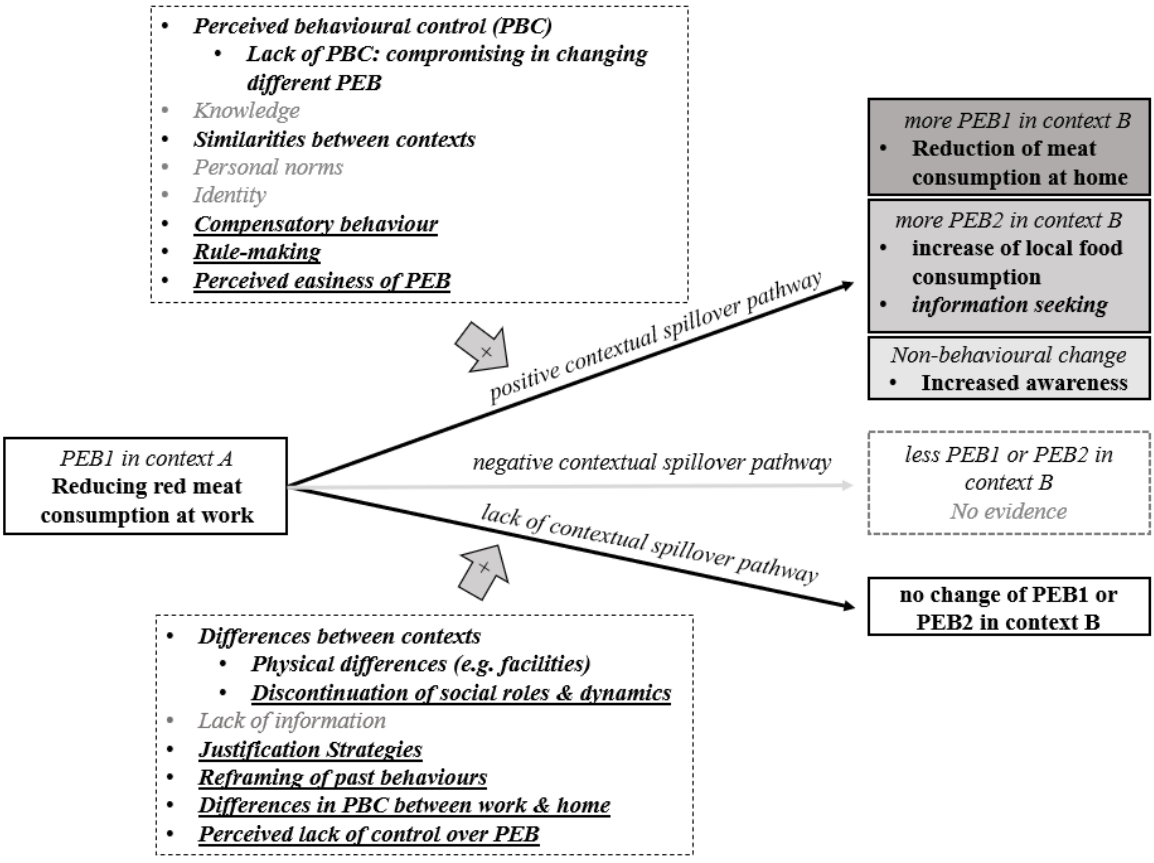

Figure 3: Revised comprehensive contextual spillover framework (CCSF) showing contextual spillover effects and influencing facilitators and barriers based on the interview data. Bold arrows indicate evidenced pathways; grey arrow for negative contextual spillover pathway indicates no evidence was found. Grey shaded boxes summarise types of PEB from impactful (darker shade) to non-behavioural (lightest shade). Dashed boxes include identified factors for pathways. Bold font = factors identified in contextual spillover literature and confirmed in present study; grey font = factors identified in contextual spillover literature and not confirmed in present study;

bold and underlined font = new factors identified in present study. Arrows with + indicate positive influence on respective pathway

Typology of spillover facilitators and barriers and practical implications

The findings were developed into a typology of factors that facilitate and/or challenge positive spillover effects. They indicate the locus (i.e. self-dependent, other-dependent, context-dependent), which indicates the intensity of influence ranging from low to high, and the type of influencing factor (i.e. facilitator, barrier) (Table 2). The locus gives an indication of where future interventions can intervene to facilitate positive spillover effects (or reduce the absence of it). For instance, the self-dependent factors can be influenced by using informational strategies such as targeted messaging, feedback or strengthening individuals' values (for an overview of intervention strategies, see e.g., Steg & Vlek, 2009).

Both self-dependent facilitators and barriers that were identified in this study relate to managing experienced dissonance triggered by the intervention (see Cognitive Dissonance Theory; Festinger, 1957). Our findings suggest that, while some people dissolve dissonance by changing behaviours (leading to positive contextual spillover) (e.g., buying local instead of reducing meat), others change their cognition (leading to lack of spillover). Cognitive Dissonance has previously been used to explain positive spillover effects between behaviours (e.g., Nilsson et al., 2016), however there was little evidence to suggest an influence on contextual spillover effects.

To address *other-dependent* factors, practitioners need to consider people's social group and the dynamics in these groups. This requires a good understanding of the social norms in these groups and, especially when focussing on contextual spillover effects, an understanding that the social group dynamics differ between contexts. For

example, the factor perceived behavioural control may be a strong barrier in the workplace but not in the home or vice versa. A person who experiences a high level of control over their food choices at work, for instance, can experience a low level of perceived control over their food choices at home due to other household members' influence on their food choices. To facilitate positive contextual spillover effects, interventions need to consider and address these potential barriers. For example, in the example intervention presented in this paper, a recipe booklet and a communication guide could have supported employees that intended to change the food choices in their households.

The *context-dependent* factors require the least influence on individuals and instead should focus on making behaviour changes easier in order to facilitate positive contextual spillover effects. This approach is already in wide use in the form of *nudging* or *choice architecture* (see e.g., Thaler et al., 2010). While nudging alone is unlikely to result in drastic behaviour changes, especially for the difficult to change behaviours like meat consumption, changing the context to support behaviour change and disrupt habits can be a useful tool for practitioners to pave the way to positive contextual spillover effects.

Table 2: Typology of spillover facilitators and barriers and practical implications

Type / Locus	**Facilitator of positive contextual spillover**	**Barriers to positive contextual spillover resulting in a lack thereof**	**Recommendations for policy makers & practitioners**

Self-dependent	• Perceived lack of control over PEB change → compromise in changing to different PEB	• Reframing strategy of past behaviour • Justification strategy (e.g. justifications for not changing meat consumption) • discontinuation of social roles and social dynamics → compartmentalisation between work & home • Perceived lack of control over PEB change (e.g., perception not to be able to reduce meat consumption)	• Support behavioural planning and empower behaviour change (see e.g., Bamberg (2013) • Intervention focused on supporting psychological capability through cognitive and/or behavioural skills (e.g., cooking classes, sustainability meal 'hacks', etc.) (see e.g., Michie et al., 2011)
Other-dependent	• Compensatory behaviours (e.g. swapping red for white meat)	• Differences in perceived behavioural control between work & home context (e.g. feeling of control over recycling at home but not at work) • Differences between perceived responsibilities in different contexts (e.g. being responsible for recycling at home but not at work)	• Social norm interventions (see e.g., Farrow et al., 2017) • Group feedback and commitment intervention (for a review see Lokhorst et al., 2013)
Context-dependent	• Rule-making (e.g. meat-free Monday; meat-free month) • Perceived easiness of behaviour change (e.g. buying local produce)	• Physical differences (e.g. different facilities, equipment) • Discontinuation of social roles & dynamics	• Nudge interventions focusing on choice architecture to make PEB easier (see e.g., Thaler et al., 2010; Garnett et al., 2019); for example, introducing meat-free Mondays.

Conclusion

The current research examined two questions regarding contextual spillover pathways with a specific focus on the PEB of meat reduction. First, what spillover effects occur from a social marketing intervention in the workplace to pro-environmental behaviours in the home setting? And second, what facilitators and barriers influence contextual

spillover effects between the work and home setting?

Using qualitative data to explore the spillover effects of a real-world social marketing intervention in a workplace, we found evidence for both positive and lack of contextual spillover pathways that led to a range of PEB changes related to the context of sustainable diets in the home, and a lack thereof. Notably, we found that both pathways occurred simultaneously, which could partially be explained by several strategies that participants used to manage their behavioural and cognitive response to the social marketing intervention (see Figure 3). In a second step, we further investigated underpinning facilitators and barriers that influence the spillover pathways between the work and home settings. We identified two factors, namely differences between settings and differences in perceived behavioural control that made the lack of contextual spillover pathway more likely. We integrated the findings with existing evidence of factors influencing contextual spillover pathways in a revised comprehensive contextual spillover framework (CCSF, Figure 3). Moreover, we developed a typology of spillover facilitators and barriers and identified practical implications.

Overall, these findings shed light on the complexity of contextual spillover effects and make a valuable contribution to spillover theory by providing further evidence for factors and strategies influencing spillover pathways and by identifying new ones. Moreover, this study addresses several relevant issues around the consumption of meat, contextual spillover effects of a social marketing intervention in real-world settings, and pathways that can facilitate a transformation towards healthier and more sustainable diets. This sheds light on spillover effects of meat consumption – a behaviour with a high negative environmental impact which to date is understudied (Bailey et al., 2014).

Main findings and theoretical contributions

Our findings show that a social marketing intervention in a workplace can facilitate sustainable food consumption at home and, therefore, contribute to a reduction of individual CO_2emissions. However, multiple barriers and facilitators can influence positive contextual spillover pathways, resulting in different behaviour changes (e.g., local food consumption instead of meat reduction) or no changes at all (i.e. lack of spillover).

We present our findings via the Comprehensive Contextual Spillover Framework (Figure 3) which extends current knowledge by identifying strategies and factors that influence the positive and lack of contextual spillover pathways. By integrating existing literature with our current findings, we provide a comprehensive framework that reflects the current evidence for factors that influence contextual spillover pathways. A key finding was the simultaneous manifestation of positive spillover and lack of spillover and the proposed strategies that explain the simultaneous occurrence. This is an interesting finding and contribution, and shows that this phenomenon is more dominant than previously thought and something that research and practice needs to take into account. Lastly, we developed a typology of facilitators and barriers to the positive contextual spillover pathways, based on which we made recommendations for policy makers and practitioners to increase the likelihood of positive spillover effects (see Table 2).

To our knowledge, the current study is the first to evaluate contextual spillover effects from a social marketing intervention focussing on sustainable food that utilised qualitative methods. The presented findings contribute a more in-depth perspective on contextual spillover processes and offer insights into contextual spillover pathway processes and strategies, and factors that influence these. While we found no evidence

for negative contextual spillover pathways, which have previously been theorised in the spillover literature, we provide insightful evidence for positive and lack of spillover pathways and further the understanding of these.

Practical contributions

Overall, it was shown that dietary programmes in the workplace can accelerate a shift towards more sustainable diets. These findings make a novel contribution to spillover theory by providing evidence from a real-world setting and a better understanding of positive contextual spillover effects from the workplace to the home setting. The identified facilitators and barriers to contextual spillover effects (i.e. differences between contexts, perceived behavioural control, and context dependent dynamics) highlight the importance of a setting (e.g., work, home) in enacting pro-environmental behaviours. Businesses, practitioners/social marketers and policy makers should consider these aspects when designing policies and social marketing campaigns, as detailed, with a few examples below.

Firstly, policies at national level that regulate the availability of vegetarian and vegan friendly meals could play a role in the forward development of sustainable food availability. For example, in 2017, in Portugal a law was implemented that made vegetarian options mandatory in all public canteens within six months after the law was passed (Cardoso et al., 2018). The findings presented in this paper suggest that such a policy accompanied by a well-designed social marketing campaign could affect a lower meat intake at home as well as other, related behaviours, such as seasonal food consumption behaviour, local food consumption, and generally an increased awareness of environmental sustainability-related issues.

Secondly, such policies could be complemented by social marketing campaigns at a national level (highlighting the need for individual responsibility across life contexts; unlike current campaigns that tend to focus mainly on personal consumption choices) or internal marketing campaigns (run within organisations for their employees) that would communicate to individuals about meat-free diets and their benefits, ways to achieve more balanced and environmentally-friendly diets (e.g., through compensation and personalised decision-making rules or heuristics), and methods to gradually switch to such meat-free consumption. A critical self-dependent factor that we identified in our study is perceived control and a lack thereof, which can make the difference in whether an individual changes their behaviour after an intervention or not. Hence, interventions that support behavioural planning and empower behaviour change (see e.g., Bamberg, 2013) and interventions focused on supporting psychological capability through cognitive and/or behavioural skills (e.g., cooking classes, sustainability meal 'hacks') (see e.g., Michie et al., 2011) would facilitate the positive contextual pathway and promote wider changes in PEBs.

Simultaneously, communications included in these campaigns can convey to individuals the steps needed to increase the perceived easiness of meat reduction and the ways to reduce the barriers to perceived behavioural control. Given that we found that individuals use a series of justification strategies which are responsible for the lack of contextual spillover, it is important that the messages contain content that is psychologically framed to counteract the identified strategies. Social norm interventions (see e.g., Farrow et al., 2017; Abrahamse & Steg, 2013) or group feedback and commitment intervention (for a review see Lokhorst et al., 2013) could counter in particular other-dependent barriers through perceived belonging and increasing norms around changes.

Context-dependent factors could be supported by interventions that make the desired PEB easier, for example through nudge interventions (see e.g., Thaler et al., 2010; Garnett et al., 2019). Interventions that support mental heuristics and rules around behaviour change could also be an approach that would help gradual change, for example through the introduction of meat-free Mondays to facilitate individuals' self-set rules. Overall, it is important to tailor interventions and policies to the target group (see e.g. McKenzie-Mohr, 2000; Klöckner & Ofstad, 2017) and to combine intervention approaches (Steg et al., 2005)

Lastly, the current research highlighted differences between perceived empowerment and responsibilities within different contexts alongside difference in infrastructure when comparing the workplace environment with the home one. This implies that organisations wanting to foster a more significant behaviour change that goes beyond the work setting would also need to consider psychological training sessions (e.g., in small groups/teams or one-to-one) for their employees in order to equip individuals with the confidence and knowledge to deal with such barriers and take ownership of any changes required within their homes and broader life.

Limitations and future research directions

As the first study to investigate contextual spillover effects between work and home from a social marketing intervention focussing on diet change, the present research has several limitations. First, the research is exploratory in nature and was limited to a small cohort of interviewees. A larger sample is required to confirm and validate these findings, ideally from studies that implement diet-focussed social marketing interventions in a workplace. Nonetheless, the current research makes a valuable contribution to understanding processes of contextual spillover effects, and could be

seen as a building block for future research investigating the role of social marketing interventions at work for a low-carbon lifestyle transformation.

Future research should further investigate factors that underlie contextual spillover effects; especially from the workplace to the home setting, as the workplace constitutes a place for learning and offers the opportunity to promote PEBs (Klade et al., 2013). Particularly in workplaces that have canteens (e.g., public sector), social marketing interventions could play a key role in reducing meat consumption (Garnett et al., 2019) and lead to wider sustainable lifestyle changes.

Moreover, longitudinal mixed methods research in particular would be suited to track these changes more rigorously over time and could potentially uncover further processes of contextual spillover effects. Our workplace intervention lasted for just one week, and in order to achieve long-term changes both in the work and home context, and to monitor such changes, an extended intervention and follow-up could be attempted. Such research would contribute to a better understanding of the expectations and limitations of social marketing interventions and their potential for spillover effects.

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Appendix A

Step-by-step template analysis of interview data based on Braun and Clarke (2006)

Phase	Procedure in this study
1. Phase: Familiarising with your data	Interviews were transcribed and transcripts read several times.
2. Phase: Generating initial codes	An initial template was constructed based on the theoretical framework (i.e. deductive approach). Interview transcripts were coded systematically in line with the initial template
3. Phase: Searching for themes	The codes were collated into themes within the initial template and, where appropriate, new themes were identified.
4. Refining themes	Themes were checked in relation to the entire data set and the initial template was modified accordingly.
5. Defining and naming themes	Themes were refined by an iterative analysis of each code in each theme and each theme was re-evaluated in relation to the theoretical framework. A final template was produced.
6. Second coding	One of the co-authors of this paper second coded two transcripts.
7. Producing the report	The final themes and examples were reported in the results section and supported and illustrated by extracted examples.

Appendix B

Stages of behaviour change intervention design

Phase	Collected data	Aim of the phase	Timeline
1. Pre-intervention survey and interviews	Survey & interview data.	Identify employees' current food consumption, readiness to change to a more sustainable diet (i.e. stages of change; Bamberg, 2013), and ideas for changes they would like to see in the canteen. Collect baseline data to assess spillover effects after the intervention.	May – June 2017
2. Development of behaviour change intervention	/	Choose target behaviour; integrate responses from employees and Bamberg's stage-specific techniques to develop a new menu and information material for the behaviour change intervention; i.e. sustainable food week.	June 2017
3. Workshops	/	Test acceptance of new menu among employees	Late June 2017
4. Behaviour change intervention	/	Sustainable food week: Test new menu for a week in the canteen. Provide information about sustainability & food.	10th – 14th July 2017
5. Post-intervention survey and interviews	Survey & interview data.	Assess whether spillover effects occurred.	July – August 2017