



Literature Reviews

Towards an Integrated Approach to Food Behaviour: Meat Consumption and Substitution, From Context to Consumers

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Abstract

Background: Human diet is increasingly acknowledged as a critical issue in global health and sustainability challenges.

Aim: This article draws on meat consumption and substitution to illustrate how two features facilitate an integrated approach to understanding food behaviour: (1) framing such behaviour in a wider historical, sociocultural and environmental context; and (2) acknowledging the role that psychological processes play in consumer willingness and propensity to engage in a given diet.

Conclusion: To mobilize large-scale changes towards healthier and more sustainable dietary choices, the article concludes with a call for developing conceptual, methodological and delivery tools that: (1) consider the context in which food habits take place; and (2) identify and engage with different groups of consumers.

Keywords: food behaviour, nutritional changes, sustainable food consumption, meat consumption, meat substitution, plant-based diets

Psychology, Community & Health, 2016, Vol. 5(2), 152–169, doi:10.5964/pch.v5i2.169

Received: 2015-10-01. Accepted: 2016-03-30. Published (VoR): 2016-08-08.

Handling Editors: Cristina Godinho, ISPA – Instituto Universitário, Lisbon, Portugal; Marta Marques, CIPER, Faculty of Human Kinetics, University of Lisbon, Lisbon, Portugal; ISPA – Instituto Universitário, Lisbon, Portugal

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Introduction

Noncommunicable diseases (NCDs) have been depicted as one of the major health and development challenges of the 21st century, in terms of both the human suffering they cause and the devastating social, economic and public health impact they inflict (World Health Organization [WHO], 2014). For instance, estimates for the European region have indicated that the five main NCDs – cardiovascular diseases, cancer, diabetes, chronic respiratory diseases and mental disorders – are responsible for up to 86% of all deaths and 77% of health expenditures (World Health Organization [WHO], 2011). Recent estimates at the global level have suggested that while more than 40% of deaths due to NCDs are premature (i.e. affecting people under 70 years of age), the majority of these deaths are preventable through interventions that tackle shared risk factors, such as unhealthy diet (WHO, 2014).

In face of such pressing needs to increasingly address how people regulate their food behaviour, this article proposes that a full and integrated approach to understanding such behaviour requires addressing different levels of explanation, from macro (historical, cultural, economic) to micro-level (psychosocial, psychological) factors. The article draws on the topic of meat consumption and substitution to illustrate this idea, as a shift from animal-

based to more plant-based diets is increasingly acknowledged as an issue in global health and sustainability challenges (Allievi, Vinnari, & Luukkanen, 2015; Sabaté & Soret, 2014; West et al., 2014).

Specifically, the article begins by presenting a summary of the roots, trends, drivers and consequences of eating meat (i.e. macro-level factors). Afterwards, it highlights that psychological processes play a critical and proximal role in explaining individual willingness and propensity to engage in a given diet. In this regard, the article outlines evidence on how psychological variables such as attitudes, preferences and beliefs (i.e. micro-level factors) are connected to willingness and intentions concerning meat consumption and substitution. Finally, the article concludes with the idea that interventions in food choice will likely need to go beyond generalist and undifferentiated (i.e. “one size fits all”) approaches, if they are to effectively mobilize large scale dietary changes to address global health and sustainability challenges.

Situating Food Habits: Macro-Level Determinants and Consequents of Meat Consumption

Roots

Throughout history, most communities of human beings (*homo sapiens*) and human ancestors have been drawing on meat consumption as a means to provide essential nutrients that support human growth and development (Leroy & Praet, 2015; McAfee et al., 2010). Although there is archaeological evidence that some hominids were using hunting tools more than 500000 years ago, the core revolution in human-animal relationships arrived with the transition from hunter-gatherer to agricultural societies (Dunavan, 2011). With the advent of this new paradigm for communal living, which started at around 10000-12000 years ago, humans have domesticated some species of animals for several purposes such as supporting the agricultural workforce (e.g., plough the field) and to be used as food source. With regard to food source, throughout life these animals would be used to provide edible body secretions (e.g., milk, eggs) and, after being slaughtered, to provide edible portions of meat (Dunavan, 2011; Lawrie & Ledward, 2006). Meat would progressively come to be associated with several symbols, rituals and taboos that distinguished it as a food item, and invested with a special status going beyond its functional purpose (Fessler & Navarrete, 2003). Historically, the amount and type of meat that was eaten – and how it was eaten – differed greatly depending on cultural, economic, and geographical factors, some of which are embodied even in current traditions (Brittin, 2011). For instance, among the first species to be used for meat were turkeys and llamas in the American continent; pigs, horses and chicken in some regions of Eurasia; and sheep, goats and cattle in the Middle East (Brittin, 2011; Dunavan, 2011).

Trends

Historically a relatively scarce food item, throughout the last century there was a massive and global shift towards an increased consumption of meat (together with other animal-based products in general), and a decreased consumption of grain and plant-based foods (Chopra, Galbraith, & Darnton-Hill, 2002). Across different contexts and cultures, although more recently with particular incidence in developing countries, this shift materializes a global approach to the standards and lifestyles of industrialised western countries, in which animal-based products occupy a central position in food practices (Delgado, Rosegrant, Steinfeld, Ehui, & Courbois, 1999; Stoll-Kleemann & O’Riordan, 2015).

Drawing on data from food balance sheets to illustrate this shift, available comparative statistics on meat supply as a proxy for meat consumption show how global levels have been steadily rising from 1961 (i.e. around 23 kg per capita) to 2011 (i.e. around 42 kg per capita) (Food and Agriculture Organization of the United Nations [FAO], 2015). While food balance sheets do not accurately reflect levels of per capita consumption, they are often considered valuable indicators of consumption trends, and widely used to guide agricultural and food policy (Henchion, McCarthy, Resconi, & Troy, 2014).

As illustrated in Figure 1, all continents represented in the figure have generally shown slight to marked increases (rounded values: Asia, 5-31 kg; Africa, 14-19 kg; Europe, 47-76 kg; America, 60-87 kg), while the world average has almost doubled and is expected to keep increasing until 2050 (Pelletier & Tyedmers, 2010). Situating this example in a less geographically diverse context (Figure 2), again for illustrative purposes, the data emphasize a trend towards higher levels of consumption in all European regions (rounded values: Western Europe, 66-87 kg; Northern Europe, 63-80 kg; Eastern Europe, 42-65 kg, but with a major gap and decrease after the dissolution of the Soviet Union; Southern Europe, 27-82 kg).

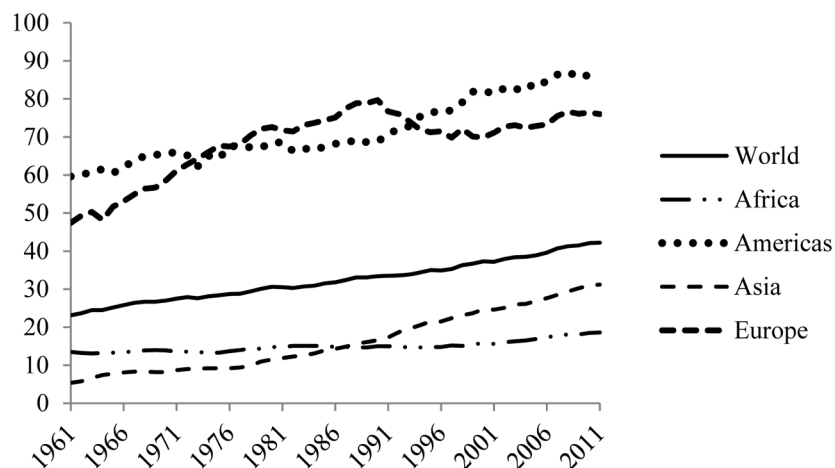


Figure 1. World meat supply (kg/Capita/Year; FAO, 2015).



Figure 2. Europe meat supply (kg/Capita/Year; FAO, 2015).

Drivers

A brief overview of the data demonstrating a large scale shift towards more meat-based diets suggests that there are key structural components underlying such shift, and three drivers interacting with each other – economic development, convergence in the food industry, and urbanization – are believed to have played a critical role in the global increase of meat consumption (Stabler, 2011; Steinfeld, Mooney, Schneider, & Neville, 2010).

Regarding economic development, income increase among the population is considered a key predictor of increased meat consumption at the country level (Delgado et al., 1999). This tendency has been demonstrated for instance in the classic statistical observation known as Engel's Law (Houthakker, 1957), which proposes that absolute food expenditure rises as the household income increases, although the relative spending decreases. In other words, although a smaller percentage of the total income is spent with food in relative terms (i.e. considering the whole household budget), food expenditure rises in absolute terms. A greater consumption of animal-based products like meat and dairy is among the factors that explain rises in absolute food expenditure driven by increased income per capita (Sans & Combris, 2015).

Another key feature in the shift towards more meat-based diets refers to a convergence in the food industry, framed in the globalization of the market and production methods (Stabler, 2011). While economic development has driven an increased demand, a global dissemination of the mass production and distribution model has pushed to an increased offer. This consisted in a growing concentration into large centres of industrialized production and specialized slaughtering units. As a result, the end-consumer found animal-based products cheaper and more accessible, while the additional costs to the environment and public health were externalized (i.e. not directly covered by the producer, the seller, or the consumer). In turn, this model was sustained by an abundance of cereals and cheaper fuel (both often subsidized), ensuring animal feed and the distribution of animal products in a global setting, which has been favourable to market liberalization and technological innovation to maximize productive efficiency (Steinfeld et al., 2010; Stoll-Kleemann & O'Riordan, 2015).

In tandem with economic development and the global convergence in the food industry, urbanization also plays an important role in changing food patterns. Among these changes there is a general increase in the consumption of fat, sugars and animal-based products, and a decrease in cereals and high-fibre foods (Popkin, 2001; Stabler, 2011). Likewise, such changes emerge in association with eating patterns that favour quicker and more convenient meals that are ready to eat or partially prepared, which are contingent on the offer from food services and gastro-nomic establishments.

The interplay of these three drivers in the shift towards increased meat consumption provides a good illustration of how food habits are inextricably linked to the context in which they occur. As the context changes, food habits tend to change accordingly. Such changes are continuous: for instance, socio-demographic variables such as place of residence (urban vs. non-urban) and social class have been observed to be associated with meat eating habits (Gossard & York, 2003), but it has been argued that traditional socio-demographic differences on this regard are being blurred by the increased accessibility and affordability of different food products (Beardsworth & Bryman, 1999).

In brief, following a set of structural and contextual changes, eating high amounts of meat has become a widespread, shared and cherished practice to which many consumers in western industrialized societies feel entitled to (Fiddes,

1991). Likewise, many developing countries seem to be moving towards western standards in this regard (Delgado et al., 1999; Stoll-Kleemann & O'Riordan, 2015).

Consequences

While it is a truism to acknowledge that context impacts human behaviour, it is no less evident that human behaviour also impacts the larger context in which it occurs. Increasing scientific consensus suggests that current human activities are critical drivers of ongoing alterations on Earth's ecosystems, which may lead to abrupt and potentially irreversible environmental changes at the local and global levels (Rockström et al., 2009). Human diet and environmental sustainability are closely connected, and much research has been depicting how animal based products, including meat, are putting a heavy burden on the environment in terms of greenhouse gas (GHG) emissions, biodiversity loss, land usage, water footprint and reactive nitrogen mobilization, particularly when compared to most nutritionally equivalent plant-based foods (e.g., Stehfest et al., 2009; Stoll-Kleemann & O'Riordan, 2015). For instance, animal metabolism requires an average of 6 kg of plant protein to yield 1 kg of meat protein, which means that only around 15% of the protein in feed crops is turned into food for human consumption, whereas some 85% are wasted in the process (de Boer & Aiking, 2011; Pimentel & Pimentel, 2003; Smil, 2001). It has also been argued that if current crop production used for animal feed and other non-food uses (including biofuels) was targeted directly for human consumption, around 70% more calories would become available, potentially providing enough calories to meet the basic needs of an additional 4 billion people (West et al., 2014). In short, these examples illustrate a backdrop where the production of animal based products, including meat, entails significant losses in terms of protein and caloric efficiency, when compared to most nutritionally equivalent plant-based foods. A global transition towards a more plant-based diet has thus been called for to reduce the ecological footprint of food systems and meet the regulatory capacity of the earth (Sabaté & Soret, 2014; van Dooren, Marinussen, Blonk, Aiking, & Vellinga, 2014; Westhoek et al., 2014).

Such a transition also conforms closer to general public health recommendations, promoting increased exposure to health-protective items such as the ones provided by fruits, vegetables and whole grains, and decreased exposure to hazardous elements such as saturated fat and high cholesterol (Craig, 2010; Pistollato & Battino, 2014). Again situating the European context as an example, Westhoek et al. (2014) examined the effects in the European Union (EU) of replacing 25–50% of animal-derived foods with plant-based foods on a dietary energy basis. They found that halving the consumption of meat, dairy products and eggs would achieve very significant benefits both from environmental and health perspectives, namely an estimated 40% reduction in nitrogen emissions, 25–40% reduction in greenhouse gas emissions, 23% per capita less use of cropland for food production, and a 40% reduction in the intake of saturated fat that would lead to a reduction in cardiovascular mortality. Such a shift would also be expected to result in a significant improvement in both air and water quality in the EU (Westhoek et al., 2014). Intensive meat production has also raised food safety issues that are believed to increase the risk of human and animal health problems. For instance, multidrug-resistance in bacteria may result also from widespread delivery of antibiotics in animal production units (e.g., Johnson et al., 2009; Love, Davis, Bassett, Gunther, & Nachman, 2011). Outbreaks of foodborne illnesses (e.g., BSE; swine fever; avian influenza) and human exposure to dioxins and exogenous hormones have also often been associated with intensive meat production (e.g., Andersson & Skakkebaek, 1999; Knowles, Moody, & McEachern, 2007).

Another source of broader concerns surrounding current meat production and consumption standards is the anthropogenic suffering (i.e. suffering caused by human action) that these standards entail for other sentient animals (Singer & Mason, 2007). During the last century, advances in neuroanatomy, physiology and behavioural sciences

have provided strong support for the notion that non-human animals experience positive and negative subjective feelings, moods and emotions (Broom, 2014; Gregory, 2008). These may include for instance pain, fear, anxiety, grief, affection, pleasure, playfulness and engagement (Bekoff, 2007; Broom, 2014). However, in order to boost productivity, standard practices in the livestock industry often include forced deprivation of outdoor contexts and contact with natural living environments, exposure to painful stimuli, impossibility of engaging in natural behaviours, mutilation, overcrowding and inadequate living conditions, disruption of natural maternal cycles and offspring development, among other features that may elicit broad negative subjective experiences (Compassion in World Farming, 2009; Foer, 2010). Given its scale and intensity, the livestock industry is thus believed to be by far the greatest generator of animal pain and suffering in the planet (Ball & Friedrich, 2009), with around 65,000,000,000 land animals being slaughtered annually (FAO, 2013). Accordingly, a transition towards a more plant-based diet might also help alleviating harm and death to sentient animals used in the livestock industry (e.g., Foer, 2010; Singer & Mason, 2007).

Food Choice, From Context to Consumers: Micro-Level Determinants of Meat Consumption and Substitution

As illustrated in the preceding section, different contextual factors at distinct levels may influence eating behaviour. Food-related features (i.e. chemical and physical properties which are perceived in terms of sensory attributes, such as flavour and texture) also play a role in the self-reinforcing loop of taste gratification and satiety (Contento, 2011; Köster, 2009). However, apart from direct influences on diet, the wider context and food-related features also exert their influence largely through individuals' psychosocial processes, which play a central role in food behaviours (Contento, 2011). In effect, numerous factors have been found to be valued by consumers regarding general food choice and preference, such as perceived quality/freshness, convenience, taste, price and trustworthiness (e.g., Glanz, Basil, Maibach, Goldberg, & Snyder, 1998; Lennernäs et al., 1997). Furthermore, eating patterns are established within the context of social networks and relationships like family, peer-groups and colleagues (e.g., Contento, Williams, Michela, & Franklin, 2006). This is also the case in our focal topic: a number of variables at the social and individual level seem to play a fundamental role in meat consumption and substitution.

Social Psychological Models of Meat Consumption

The primary social psychological model that has been applied to meat consumption is the Theory of Planned Behaviour (TPB; Ajzen, 1991). Although other established models to understand food intake exist (e.g., Conner & Armitage, 2002; Furst, Connors, Bisogni, Sobal, & Falk, 1996; Sobal & Bisogni, 2009; Verstuyf, Patrick, Vansteenkiste, & Teixeira, 2012), to the best of our knowledge only the TPB has been systematically used in the study of meat consumption.

Acknowledging the large range of factors that potentially influence eating behaviour, the TPB highlights the role of intentions as proximal determinants of food choice, which in turn are affected by attitudes (i.e. an overall evaluation of the behaviour), subjective norm (i.e. whether others think one should or should not perform the behaviour), and perceived behavioural control (i.e. the extent to which the behaviour is perceived as controllable) (Conner & Armitage, 2002, 2006). More specifically: attitudes are predicted by beliefs about the outcomes of a given behaviour, and the evaluation of these outcomes as positive or negative; subjective norm is predicted by the perceived pressure from significant others regarding the behaviour and the motivation to comply with their expectations;

and perceived control is determined by control beliefs. It is argued that the various factors impacting food choice at more distal levels may act through the attitudes, beliefs and perceptions held by the individual (Shepherd, 1999). Thus, more favourable attitudes and subjective norm towards a given behaviour, along with greater perceived behavioural control, will result in stronger individual intentions to perform the behaviour (Ajzen, 2001). Furthermore, a keystone of this theoretical framework is that intentions and behaviours are seen as causally connected.

As regards to meat consumption in particular, research applying the TPB to meat eating highlights the role of intentions as proximal determinants of consumption, which in turn are affected by attitudes, perceived behavioural control and, to a lesser extent, subjective norm (Povey, Wellens, & Conner, 2001). Intentions to eat meat have been found to predict actual consumption, and incorporating a measure of habits concerning meat eating was observed to increase the explanatory capacity of the TPB model (Berndsen & van der Pligt, 2005; Saba & Di Natale, 1999). However, experiencing mixed feelings about meat (i.e. higher levels of ambivalence) was associated with weaker relationships between attitude and intention (Sparks, Conner, James, Shepherd, & Povey, 2001). More ambivalent meat eaters were also found to hold less positive attitudes towards meat, and more likely associate meat eating with negative feelings, moral concerns, and risks for health and the environment, in comparison to less ambivalent meat eaters (Berndsen & van der Pligt, 2004).

Values, Identity and Beliefs

Apart from the set of studies which have applied the TPB model to the topic of meat consumption, much research on this topic has been conducted without a clearly defined, established and integrative psychosocial theoretical basis. However, it is often the case that studies on meat consumption measure variables which are clearly of psychological and/or social nature, such as values, identity and beliefs. For instance, as regards to associations between personal values and food preferences, meat eaters tend to score higher in authoritarianism, social dominance orientation and prejudice against minorities than non-meat eaters (Allen, Wilson, Ng, & Dunne, 2000; Vesper, Taylor, & Singer, 2015). Additionally, endorsement of inequality and hierarchy were observed to form the basis of the meat attitudes and consumption of high meat identifiers (Allen & Ng, 2003). A recent study exploring the psychological processes underlying such associations has suggested that right-wing adherents tend to eat more meat for two main reasons: they push back against the threat that meat avoidance supposedly poses to traditions and cultural practice; and they are more prone to hold beliefs of human dominance and superiority over animals (Dhont & Hodson, 2014). Several studies have also found that meat consumption is associated with male identity (Prättälä et al., 2007; Rothgerber, 2013), which may result for instance in meat eaters being perceived as more masculine than non-meat eaters (Ruby & Heine, 2011). Indeed, gender is generally considered a strong predictor of meat consumption, with men usually showing higher levels of consumption than women (Kubberød, Ueland, Rødbotten, Westad, & Risvik, 2002).

There is also a range of findings supporting the notion that meat is invested with a higher status and a special socially constructed meaning which distinguishes it from other foods. For instance, many consumers portray meat as a necessary dietary component which holds unique sensory properties such as taste and texture, and believe that plant-based meals are nutritionally deficient (Bohm, Lindblom, Åbacka, Bengs, & Hörnell, 2015; Kenyon & Barker, 1998; Lea & Worsley, 2001). Indeed, there is evidence suggesting that people tend to hierarchize different food options, and meat usually ranks the highest position, followed by fish and other animal derived products, whereas plant-based foods (which include cereals, vegetables and fruits) tend to be portrayed as less valued (Douglas & Nicod, 1974; Schösler, de Boer, & Boersema, 2012). Meat can be seen as the central axis that structures a meal, subordinating the rest of the ingredients to its predominant position (Douglas & Nicod, 1974).

And even meals which do not have any portion of animal flesh often use ingredients that are selected, cooked and plated in a way that replicates the models in which meat is the structuring axis (Gvion-Rosenberg, 1990).

Challenges in Meat Substitution

Several studies exploring consumer acceptance of environmentally sustainable alternatives to meat have suggested that large segments of consumers are not willing to move towards meat substitution (Hoek et al., 2011, 2013; Schösler et al., 2012). Even when acknowledging advantages which may accompany higher use of meat substitutes (e.g., ethics; weight control), issues such as the lower sensory attractiveness of these products were identified as critical barriers to consumer acceptance (Hoek et al., 2011, 2013). For instance, in a study by Hoek et al. (2011), the less consumers were using meat substitutes, the more they wanted these products to be similar to meat. For some consumers, repeated exposure to meat substitutes may increase the liking of these products over time (Hoek et al., 2013). However, it has been suggested that acceptance of meat substitutes in the meal context may be hindered if the meal formats and hierarchies with which consumers are familiar are challenged (Schösler et al., 2012). This is arguably because availability, familiarity, ease of use and fit with accustomed meal patterns also shape consumers' food choices, thus individuals may be unable or unwilling to make active efforts to break away from existing conventions (Schösler et al., 2012; Wansink, 2002). Other possible explanations to understand consumer unwillingness towards meat substitution may refer, for instance, to defensive tendencies against cognitive dissonance (e.g., risk information avoidance; Gaspar et al., 2016), habit strength (e.g., Verplanken & Wood, 2006), and meat risks/benefits communication context (e.g., Regan et al., 2014).

Notwithstanding, there are also many reports of consumers who show willingness to change their meat consumption habits, or tend to avoid/exclude meat from their diet (Grunert, 2006; Ruby, 2012; Schösler et al., 2012; Tobler, Visschers, & Siegrist, 2011). Common motivations for reducing or avoiding/excluding meat consumption are health, environmental and ethical concerns (Beardsworth & Bryman, 2004; Fessler, Arguello, Mekdara, & Macias, 2003; Fox & Ward, 2008; Graça, Oliveira, & Calheiros, 2015; Tobler et al., 2011); and, to a lesser extent, spiritual purity and disgust at the sensory properties of meat (Ruby, 2012).

Recent findings have suggested that an affective connection towards meat consumption may be a key feature in how consumers perceive and construe their eating habits, the wider impact of their habits, and the possibility of change. In particular, Graça, Oliveira, and Calheiros (2015) identified three distinct profiles of consumers along the axes of intensity and valence of affective connection to meat: a pattern of attachment to meat consumption (positive valence and higher affective intensity – signs of dependence on meat consumption; denies/relativizes impacts; unwilling to change habits; pro-meat arguments and self-exonerations), a pattern of disgust (negative valence and higher affective intensity – signs of moral internalization; affirms harm emphasizing animals as victims; excludes meat from diet), and a pattern of avoidance (neutral to negative valence and lower affective intensity – signs of detachment towards meat consumption; frames impact in mass production and food insecurity; willing to change habits). It has also been suggested that consumers who are more attached to meat consumption may experience feelings of dissonance and loss aversion – which arguably trigger a process of moral disengagement – when prompted to consider the impact of meat, and the possibility of changing habits (Graça, Calheiros, & Oliveira, 2015, 2016).

The Meat Paradox

Apart from factors which are traditionally valued in general food choice and preference (e.g., price; taste; safety), specific factors such as health, animal welfare and environmental features have also been identified as relevant

to consumer choice and preference concerning meat (Frewer, Kole, Van de Kroon, & de Lauwere, 2005; McCarthy, O'Reilly, Cotter, & de Boer, 2004; Verbeke, Pérez-Cueto, de Barcellos, Krystallis, & Grunert, 2010). However, while many individuals do express concerns with health, environmental and/or animal welfare issues surrounding meat, it is often the case that such concerns are not harmonized with the choices they make as consumers (Graça, Calheiros, & Oliveira, 2014; Holm & Møhl, 2000; Verbeke et al., 2010). For instance, recent evidence on the “meat paradox” shows how meat consumption can generate a significant tension between people’s aversion to animal harm and their desire for meat (Loughnan, Bastian, & Haslam, 2014). More specifically, Loughnan et al. (2014) note that most people find animal suffering emotionally disturbing and do not want to see animals harmed, but engage in a diet that requires them to be killed and usually to suffer. This meat paradox can be avoided through a behavioural choice which is abstaining from eating meat, and moral concern for animals has indeed been identified as one of the core dietary motivations of vegetarians and meat avoiders (Fox & Ward, 2008; Ruby, 2012). Nevertheless, feelings of psychological tension associated with the meat paradox can also be alleviated through a set of cognitive mechanisms that help to reduce dissonance (Loughnan et al., 2014; Piazza et al., 2015). One such mechanism is to ascribe diminished mental capacities and perceived capacity to suffer to animals which are considered appropriate to human consumption. Meat eaters were found to be motivated to deny minds to food animals when they are reminded of the link between meat and animal suffering, and expectations regarding the immediate consumption of meat increased mind denial (Bastian, Loughnan, Haslam, & Radke, 2012). In a different study, meat eaters were also motivated to perceive animals which were experimentally categorized as food as less sensitive to pain and less worthy of moral consideration (Bratanova, Loughnan, & Bastian, 2011). Similarly, experimental manipulations of eating meat have been found to reduce moral concern for animals in general, and the perceived moral status of the eaten animal (Loughnan, Haslam, & Bastian, 2010).

Conclusions: Calling for an Integrated Approach to Food Behaviour

This article proposes that an integrated approach to understanding eating behaviour is facilitated by two features: (1) framing such behaviour in a wider historical, sociocultural and environmental context; and (2) acknowledging the role that psychological processes play in consumer willingness and propensity to engage in a given diet. While not providing a comprehensive review of the literature, the article draws on the topic of meat consumption and substitution to illustrate this idea. Specifically, an overview of several variables which are known to play a role in meat consumption and substitution indicates that different levels of explanation are required to understand behaviour in this regard (Figure 3).

The outline of meat consumption from its roots to current trends, drivers and consequences suggests that it has become invested with a fundamental role in social representations of food and meal, particularly in western societies. This is consistent with knowledge on the importance of features such as structure and familiarity in local food habits, and recovers the notion that such habits are ingrained in a wider arrangement of social values and shared conventions that may have little to do with the principles of nutrition (Le Gros Clark, 1968). But it does not act against the role of more proximal variables in understanding individuals’ dietary choices. On the contrary, it stresses that eating habits are reflective of personal appraisals within a given culture and context. Thus, far from being mutually exclusive, both views complement each other and neither of them stands by itself.

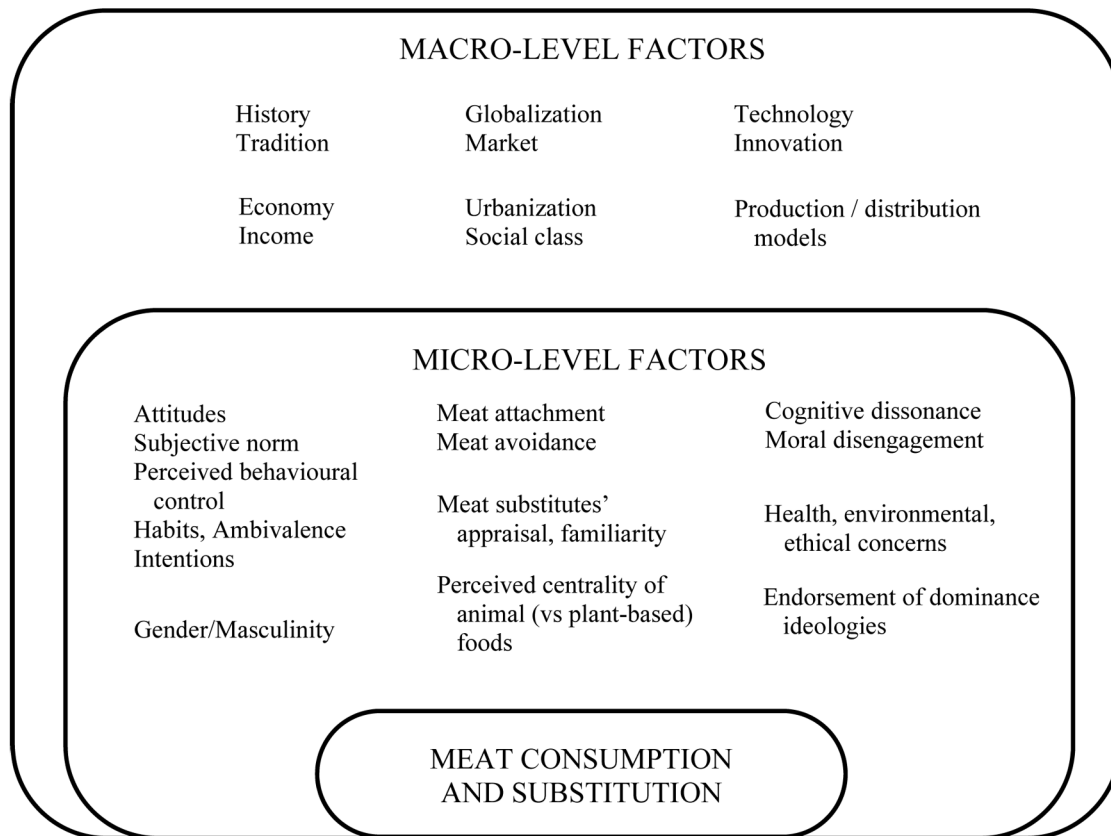


Figure 3. Macro and Micro-Level Factors Which Play a Role in Meat Consumption and Substitution.

One of the key interventions globally advocated to promote public health and address poor eating habits is to implement public awareness programmes on diet (e.g., WHO, 2014). However, as noted by Fiddes (1991), when practitioners and policy-makers deliver dietary guidelines and expect a willing public dutifully to adapt their behaviour, they may be deceiving themselves in failing to consider the roles beyond nutrition that food and eating play in people's lives. Likewise, they may fail to contemplate how different factors at distinct levels – from macro to micro-level variables – may interact and influence behaviour.

As it becomes increasingly acknowledged that awareness and sensitization campaigns alone are often not enough to effectively change eating habits, many scholars are in favour of more focused interventions to change such habits (e.g., Godinho, Alvarez, & Lima, 2013; Schwarzer, 2008; Silva, Marques, & Teixeira, 2014; Verplanken & Wood, 2006). In fact, the outline provided on several variables relevant to meat consumption and substitution indicates that there are key issues at distinct levels which are linked to food choice and behaviour (Figure 3). These issues seem to go well beyond nutritional considerations alone. Additionally, it is apparent that there are different profiles of consumers with distinct patterns of needs and preferences regarding a given dietary option. Different segments of consumers regarding meat consumption and willingness towards meat substitution have indeed been identified (e.g., Graça, Oliveira, & Calheiros, 2015; Latvala et al., 2012; Verbeke et al., 2010). Thus, it follows that the effectiveness of initiatives aimed at encouraging a shift towards more plant-based diets will likely benefit from designing, implementing and evaluating interventions which are targeted and tailored to specific groups of consumers, adding to more generalist and undifferentiated (i.e. "one size fits all") approaches.

Focused approaches provided by stage theories of health behaviour change may offer a useful framework in this regard: one fundamental assumption in these theories is that individuals in different stages require different approaches so that they can change or acquire a given behaviour (e.g., HAPA model; Schwarzer, 2008). For instance, the HAPA model distinguishes between a motivational phase, which leads to forming a behavioural intention, and a volitional phase, which leads to translating the intention into action. Individuals will firstly need to be motivated to change, and only then they should benefit from acquiring and employing a set of skills to implement the desired change (Godinho et al., 2013; Schwarzer, 2008).

In brief, drawing from the current review, this conclusion stresses the relevance of moving beyond research and interventions that take individuals as passive subjects and mere recipients of information. It calls for developing conceptual, methodological and delivery tools that identify and engage with different groups of consumers. Moreover, it is important that such tools are able to contemplate specific features of the context in which food habits are situated. Besides simply delivering information about food and nutrition, it is necessary to understand consumers, their dietary choices, and the context of their choices. It may be unreasonable to expect interventions to have uniform effects in settings and consumers with sharply different characteristics. Multilevel studies which integrate macro and micro-level factors (Figure 3) are thus required to expand knowledge and guide interventions on food choice in general, and meat consumption and substitution in particular.

Finally, in adopting an integrated approach to food behaviour, it is not conceivable to engage in a nutrition vacuum that filters out sustainability issues. As global changes in Earth's ecosystems are widely recognized to raise very significant concerns in terms of human development (Rockström et al., 2009), it should be expected that endeavours aimed at promoting public health would strive to actively contemplate environmental considerations in their agenda. It no longer seems reasonable to deliver dietary guidelines without accounting for the wider impacts of different dietary choices. Otherwise, metaphorically, it is as if trying to invigorate an organ at the expense of possibly poisoning the whole body.

Funding

This work was supported by a grant from the Portuguese Foundation for Science and Technology (FCT; Reference SFRH/BD/79487/2011).

Competing Interests

The author has declared that no competing interests exist.

Acknowledgments

The author is grateful to the reviewers who provided important feedback to improve the paper.

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