



## Conference on ‘Understanding the role of sex and gender in nutrition research’ Irish Postgraduate Symposium

### Consumer perceptions of healthy and sustainable eating

Daniel Hazley\*<sup>1</sup> and John M. Kearney

*School of Biological, Health and Sports Sciences, Technological University Dublin, Dublin, Ireland*

The current food system is unsustainable. It encourages unhealthy food choices, increasing the risk of non-communicable diseases, and has a substantial environmental impact, responsible for around a third of all anthropogenic greenhouse gas emissions. Improving both public and planetary health will require dietary change. To promote this transition, it is crucial to understand how consumers conceptualise healthy and sustainable eating. The aim of this review was to examine how adults from high-income countries interpret healthy and sustainable eating, with a specific focus on Ireland and the UK. As healthy eating and sustainable eating are often conceptualised as distinctive constructs, we explored each of these separately before examining how consumers perceive them together. Most consumers have a reasonable understanding of what constitutes a healthy diet, with many echoing aspects consistent with dietary guidelines. However, consumers' perceptions of healthy eating often extend beyond these health-centric recommendations, incorporating concepts such as the pleasure of eating and supporting mental well-being. Sustainable eating, on the other hand, is less well understood. Most consumers overemphasise the importance of eating local, organic food and reducing packaging and underestimate or are unaware of the environmental impact of red meat consumption. These findings provide a clear opportunity to improve public awareness of healthy and sustainable diets. Moreover, they emphasise the need to promote the synergies between healthy and sustainable dietary practices. However, knowledge alone will not be enough to change behaviour. Future interventions should also seek to overcome consumers' competing dietary priorities and create system-wide changes.

**Keywords:** Perception; Healthy eating; Sustainable eating; Qualitative

Unhealthy diets are a major cause of death and disability, exacerbating the risk of obesity, cardiovascular disease, certain cancers and type 2 diabetes<sup>(1)</sup>. These poor-quality diets are typically characterised by the overconsumption of less healthful foods and nutrients (e.g. processed meats, refined grains and sugar-sweetened beverages, sugar, saturated fat and sodium) and the inadequate consumption of health promoting foods and nutrients (e.g. fruits, vegetables, wholegrains, legumes, nuts, seeds, fibre, unsaturated fats and potassium)<sup>(2)</sup>. While these individual dietary components can have important effects on specific disease risks (e.g. saturated fat and cardiovascular disease

risk), it is a person's overall dietary pattern that shows the strongest link with health<sup>(3)</sup>. Unfortunately, despite continuous efforts to promote healthier food choices, most people's diets remain below optimal levels<sup>(3)</sup>.

Compounding this health burden, food systems exert a considerable strain on the environment. According to some estimates, the global food system accounts for around a third of all greenhouse gas emissions (GHGe)<sup>(4)</sup>, approximately 70% of all freshwater use<sup>(5)</sup>, and is responsible for 78% of fresh and oceanic eutrophication<sup>(6)</sup>. Moreover, agricultural practices are the leading cause of biodiversity loss worldwide<sup>(7)</sup>. Clark *et al.*<sup>(8)</sup>, estimated that even in a

\*Corresponding author: Daniel Hazley, email: [D20125509@mytudublin.ie](mailto:D20125509@mytudublin.ie)

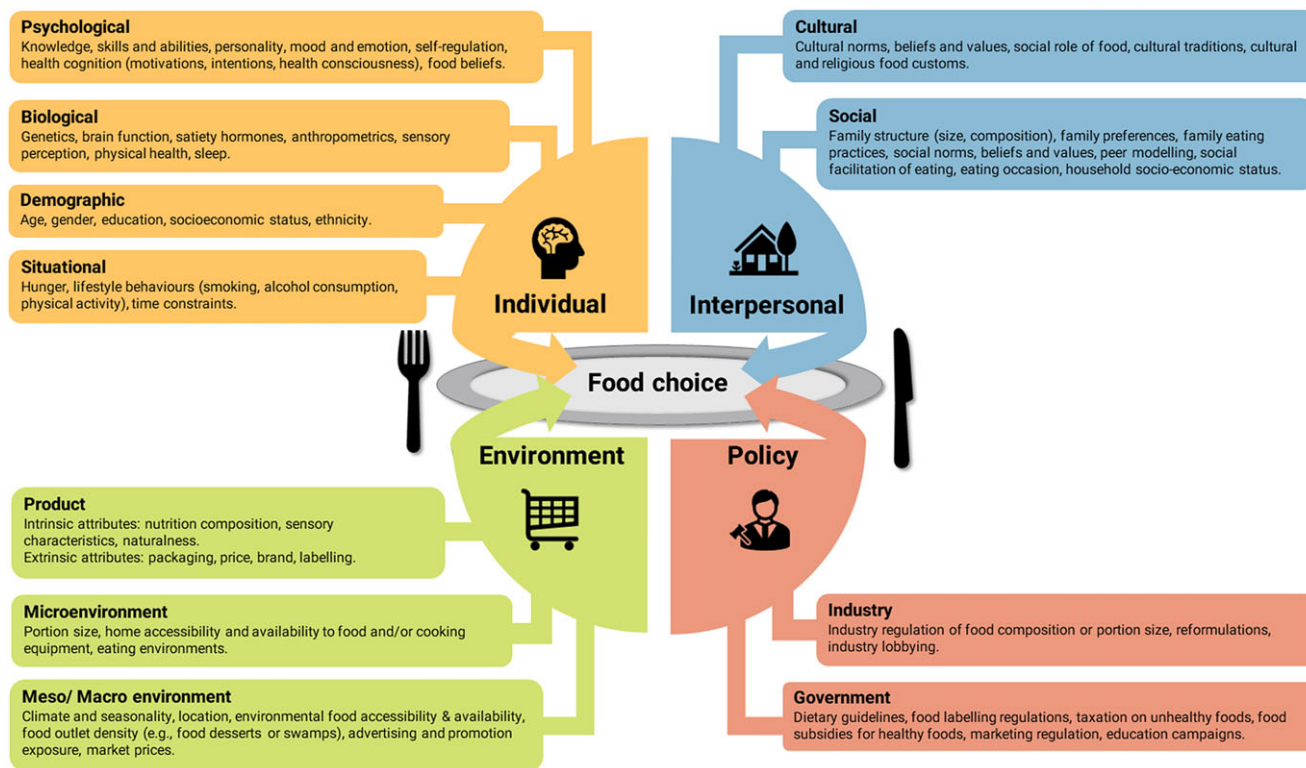


Fig. 1 Individual, interpersonal, environmental and policy-related factors influencing food choices, adapted from Symmank *et al.*<sup>(15)</sup>

scenario where all fossil fuel emissions were immediately halted, the 1.5°C Paris Agreement target would remain elusive without substantial changes to the food system. There is now a broad consensus that improving both human and planetary health will require us to change the way we produce and consume food.

Sustainable healthy diets are defined as ‘*dietary patterns that promote all dimensions of individuals’ health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable*’<sup>(9)</sup>. This definition is complex and incorporates aspects relating to health and environmental protection, as well as social and economic considerations. The precise makeup of a sustainable diet depends on the country context. That said, most organisations agree on some fundamental principles: only eat to meet ones’ energy needs, prioritise plant-based foods and moderate intakes of animal sourced foods, especially ruminant meat, limit the consumption of energy-dense and nutrient poor foods and minimise food waste<sup>(9)</sup>.

Transitioning to a more sustainable food system requires actions throughout the food chain, from farmers to consumers<sup>(10,11)</sup>. A central focus of this transition will be changing the way people eat. For instance, studies suggest that even modest changes to peoples’ diets could bring substantial health<sup>(12)</sup> and environmental benefits<sup>(13)</sup>. But changing the way people eat is notoriously difficult, especially at a population level<sup>(14)</sup>. Food choices are complex, multifaceted behaviours influenced by a multitude of interacting individual, interpersonal, environmental and policy-related factors (Fig. 1)<sup>(14,15)</sup>. To effectively

promote healthy and sustainable diets, it is essential that researchers and practitioners acknowledge the myriad of factors influencing peoples’ eating behaviours.

Most consumers rate health as a leading motive for their food choices<sup>(16,17)</sup>. In contrast, despite gaining traction among consumers, food sustainability remains far less influential<sup>(18)</sup>. A key factor underpinning these food choice motives is consumers perceptions of healthy and sustainable eating. While consumers often say health is a key driver of what they put on their plates, how health and healthy eating are conceptualised will determine how this motivation is expressed<sup>(19,20)</sup>. Thus, peoples’ perceptions of healthy and sustainable eating may act as an important determinant of their food choices.

Moreover, understanding consumers perceptions of healthy and sustainable eating is critical to gauge the effectiveness of promotional messaging and to ensure that future messages align with peoples’ values and beliefs. Thus, insights into how people interpret healthy and sustainable eating can provide valuable guidance for policymakers. Armed with this knowledge, practitioners can design interventions and policies that better connect with the way consumers think about food, health and sustainability.

The aim of this review was to examine how consumers interpret healthy and sustainable eating. The evidence presented in this review will focus on adults in high-income countries, with a specific emphasis on studies conducted in the UK and Ireland where possible. While we assessed both quantitative and qualitative research, a particular emphasis was placed on qualitative studies as they provided a more in-depth exploration of the different

meanings people associate with healthy and sustainable diets. As most consumers perceive healthy eating and sustainable eating as distinctive concepts<sup>(21)</sup>, we examined each of these separately before examining how consumers conceptualised them as a combined construct.

### *Consumers' interpretation of healthy eating*

Most people recognise a link between what they eat and their health. But consumers understanding of this connection is complex, as health and healthy eating are conceptualised in a variety of ways. Understanding these varying interpretations could aid health promoters design interventions that are more aligned with peoples' everyday food practices, facilitating dietary change in a more meaningful way. Quantitative research suggests that most consumers are reasonably aware of healthy eating principles when pre-coded answers are provided<sup>(22,23)</sup>. However, these quantitative findings fail to capture the vast and varied meanings people associate with healthy eating. To understand these complex interpretations, one must look to the qualitative literature.

Several reviews have attempted to synthesise the qualitative literature examining how adults in high-income countries conceptualise healthy eating<sup>(19,20,24)</sup>. These studies find that consumers interpret healthy eating as a multidimensional concept, combining aspects consistent with formal dietary guidance (e.g. a diet high in fruits and vegetables) with concepts outside traditional nutrition discourse (e.g. enjoyment of food)<sup>(19,20)</sup>. Here we have categorised the different ways consumers conceptualise healthy eating into three broad areas: (1) Food categorisation, (2) Ways of eating and (3) Outcomes.

*Food categorisation: foods, nutrients and food characteristics.* People categorise food in several context specific ways<sup>(25)</sup>. One of the most common of these is to categorise foods as either 'healthy' or 'unhealthy'<sup>(25)</sup>. Healthy eating, therefore, is almost always described through the categorisation of specific foods, food groups and/ or nutrients<sup>(19,20)</sup>. However, consumers also categorise the healthiness of foods based their specific characteristics (e.g. fresh, natural, unprocessed, homemade)<sup>(19,20,26)</sup>.

In general, the foods and nutrients that consumers label as 'healthy' and 'unhealthy' align with dietary guidelines<sup>(27)</sup>. Participants almost always emphasise the consumption of fruits and vegetables<sup>(19,20,24)</sup>, as well as wholegrains, legumes, fish, nuts and seeds<sup>(20,26)</sup>. In contrast, consumers consistently describe 'junk', or processed foods (e.g. sugar-sweetened beverages) that are high in fat, sugar and salt as unhealthy<sup>(20,26)</sup>. Some foods, like meat, especially red meat, garner more mixed opinions<sup>(20,24)</sup>. For some, meat is perceived as a healthy and 'natural' source of protein<sup>(24,28)</sup>. For others, meat has more negative health connotations, being described as fatty or 'bad' for cholesterol<sup>(26,28)</sup>. Some research suggests that the perceived healthiness of meat differs by gender, with women being more likely to view meat as unhealthy and men more likely to perceive it as essential and a key source of protein<sup>(28)</sup>.

Consumers consistently view processed, ready-made and fast foods as synonymous with unhealthy eating, whereas fresh, home-cooked meals are seen as pillars of a healthy diet<sup>(20,26)</sup>. Consumers negative perception of processed foods often stems from the presence of additives or other negatively perceived components (e.g. gluten) that are viewed as unnatural<sup>(20,26)</sup>. For many, the healthiness of a food is equated with how natural it is perceived<sup>(20,29)</sup>. These naturalness evaluations are based on three main criteria, a food's farming origin (e.g. organic or non-organic), method of production (e.g. presence of artificial additives) and the specific characteristics of the final product (e.g. how fresh it is perceived)<sup>(29)</sup>. While there may be some merit to limiting the consumption of ultra-processed foods high in fat, sugar and salt<sup>(30)</sup>, the belief that a foods healthfulness is determined by its 'naturalness' is less well founded<sup>(31)</sup>.

In addition to the 'healthy' and 'unhealthy' labels, many consumers also categorise food using moralistic language, describing foods' as 'good' or 'bad'<sup>(20,26)</sup>. This moral framing is indicative of the inner turmoil experienced by individuals as they grapple with the desire to make the 'right' food choices<sup>(32)</sup>. Such moral dichotomy may inadvertently cast the pleasure and satisfaction derived from food in a negative light, further intensifying feelings of guilt when one falls short of the prevailing standards of healthy eating<sup>(32,33)</sup>. Health advocates should aim to counteract the negative moral implications of traditional healthy eating initiatives by designing messages that highlight the pleasure and satisfaction derived from consuming nutritious foods, helping to create a more positive perception of healthy eating<sup>(34)</sup>.

*Ways of eating: balance, variety and restraint.* As with many dietary guidelines, consumer perceptions of healthy eating are heavily shaped around concepts like dietary variety, balance and self-control or restriction<sup>(19,20,24)</sup>. Consumers often describe a healthy diet as varied, including a mixture of different foods, food groups and/ or nutrients<sup>(19,20,24)</sup>. For many, dietary variety is closely connected to the concept of 'balanced' eating, with healthy diets containing a 'balance' of food groups (i.e. eating fruit and vegetables, meats and starches) and/ or nutrients (i.e. macro- and micro-nutrients)<sup>(19,20,24)</sup>. These descriptions are consistent with messages used in many dietary guidelines. For instance, the Irish dietary guideline recommends '*eating a wide variety of nourishing foods*'<sup>(35)</sup>.

However, consumers conceptualise 'balanced' eating in multiple ways, with many interpretations straying further from recommendations<sup>(19,20,24)</sup>. In addition to dietary variety, balanced eating is also used to describe a compensatory behaviour, in which unhealthy food choices are 'balanced' with healthy ones<sup>(19,24,36)</sup>. This compensatory behaviour is sometimes described on a day-to-day basis, where overconsumption on one day is balanced with less on the next, or it is portrayed over the course of a day, in which healthy meals compensate for the consumption of 'treats'<sup>(19,24)</sup>. For example, Hollywood *et al.*<sup>(36)</sup>, found that one of the approaches consumers use





to construct a healthy food shop is to offset their selection of unhealthy products (e.g. sugary snack foods) by purchasing healthy items (e.g. fruits and vegetables).

The term balanced is also mentioned in combination with concepts such as moderation and restraint or self-control<sup>(19,20)</sup>. Several studies highlight how many consumers view healthy eating as something that requires constant vigilance<sup>(19,20)</sup>. People appear to manage these feelings of restraint by balancing them with rewards of non-restrictive or unhealthy intakes<sup>(19,20)</sup>. Bouwman *et al.*<sup>(37)</sup> found that participants often felt being overly restrictive would be to deny oneself pleasure. Thus, even health-conscious eaters strive to compensate for unhealthy consumption to achieve a health-pleasure balance<sup>(19,37)</sup>.

These findings are consistent with the Compensatory Health Belief Model, which suggests that people overcome value conflicts (e.g. health *v.* pleasure) through the belief that the negative effects of unhealthy behaviours can be offset by engaging in healthy behaviours<sup>(38)</sup>. An issue with this belief system is that consumers perceptions of moderate consumption may be well above what is recommended. For instance, vanDellen *et al.*<sup>(39)</sup>, found that people defined 'moderation' based on their personal consumption habits. In other words, the more someone consumed, the larger they estimated a moderate intake. This means that regardless of the amount consumed, people may implicitly view their intake of unhealthy products as appropriate as it is less than what they perceive as 'moderate'<sup>(39)</sup>. Thus, without clear guidance on what terms like moderate or balanced mean, messages promoting these concepts may be subject to misinterpretation.

*Outcomes: physical and mental.* Several studies have highlighted how consumers also conceptualise healthy eating in terms of the consequences or outcomes they associate with better or worse eating<sup>(19,20,26)</sup>. These can be physical health outcomes, such as energy, weight, disease or condition management/ prevention, or athletic performance; or they can be mental health outcomes, like psychosocial or spiritual well-being, satisfaction, or enjoyment<sup>(19,20)</sup>.

By far the most common physical outcome people associate with healthy eating is body weight<sup>(19,20,24)</sup>. For many, healthy eating is synonymous with weight loss or the maintenance of an 'ideal' weight<sup>(19,20,24)</sup>. Managing one's weight is an integral reason why moderation or self-control are considered central components of a healthy diet<sup>(19,20,24,26)</sup>. In some cases, this connection with body weight may lead some to be optimistic about their diet, believing it is healthier than it truly is<sup>(26,40)</sup>. In other words, some people may use their perceived health characteristics to determine the healthiness of their diet (i.e. 'if I feel good and aren't overweight then my diet *must* be healthy')<sup>(40)</sup>. The physical outcomes people associate with healthy eating tend to differ by life stage. For instance, younger adults are more likely to see eating healthily as a way to optimally 'fuel' their athletic or professional activities<sup>(19,41)</sup>. However, older adults are

more likely to view healthy eating as way to manage their health conditions (e.g. to reduce their cholesterol)<sup>(19,41)</sup>. This distinction is likely shaped by the different health experiences that younger and older adults encounter throughout their lives. As younger adults rarely experience serious health conditions, the benefits of eating healthily are primarily shaped by short term goals, like maintaining energy or feeling physically and mentally well<sup>(19,41)</sup>. In contrast, older adults' perceptions of healthy eating is often influenced by their health status and their desire to maintain independence and not be a burden on their family<sup>(19,41)</sup>.

For most people, food provides many functions beyond nourishment<sup>(20,42)</sup>. These other functions are sometime integrated into peoples' interpretations of healthy eating<sup>(19,20,26)</sup>. For example, some people see food's role in promoting well-being and satisfaction as fundamental to living a healthy life<sup>(19,20,43)</sup>. Under this view, even foods that are seen as 'unhealthy' from a nutritional standpoint may be considered 'healthy' through their non-nutritive functions<sup>(19,26)</sup>. These findings suggest that the healthiness of foods is often context-dependent, as certain 'unhealthy' foods can be seen as 'healthy' under certain circumstances as they provide benefits to one's mental well-being<sup>(26,43)</sup>.

### Consumers' interpretations of sustainable eating

Almost all consumers are familiar with the concept of a healthy diet. Sustainable eating, however, is less well understood. For example, a 2021 survey by the Food Standards Agency (FSA) found that 75% of UK adults felt they knew what a healthy diet was, whereas only 48% said they knew what a sustainable diet was<sup>(44)</sup>. Similarly, a recent survey found that only around a third of Irish adults believed they had good knowledge of a sustainable diet<sup>(21)</sup>. These results are consistent with qualitative research conducted in several high-income countries, finding participants often express uncertainty when they are asked to describe a sustainable diet<sup>(26,45-47)</sup>. This uncertainty likely explains why consumers perceptions of food sustainability is often inconsistent with scientific evidence.

Van Bussel *et al.*<sup>(47)</sup>, recently reviewed the literature examining how adults from high-income countries interpret food sustainability. As with healthy eating, they found that people conceptualise sustainable eating in multiple ways. However, consumers primarily viewed food sustainability from an environmental perspective, with little emphasis on the social or economic aspects of sustainability. To most people, a sustainable diet means eating local and seasonal foods (i.e. reducing 'food miles'), limiting plastic packaging, eating organic and avoiding food waste<sup>(26,47)</sup>. Some also acknowledge the importance of ethical production methods (e.g. free-range eggs), conserving natural resources, limiting pollution and preventing overfishing<sup>(26,47)</sup>. In contrast, few consumers associated sustainable eating with actual dietary choices, such as limiting red meat consumption<sup>(26,47)</sup>.

Quantitative research further corroborates these qualitative findings. For example, a survey conducted by the FSA found almost half of respondents thought food

packaging (47%) and transportations (46%) contributed to the environmental impact of food, whereas only 18% felt the production of meat had an impact<sup>(48)</sup>. Studies consistently find that most consumers are either unaware, or do not believe that meat production has a negative effect on the environment<sup>(47,49)</sup>. Although one longitudinal study indicated that Swiss consumers have become more aware of the environmental impact of red meat, most still perceived other factors like eating local food and limiting plastic packaging as having a larger impact<sup>(50)</sup>.

Reducing plastic packaging and eating seasonally does have some role to play in creating a more sustainable food system. However, consumers overestimate the environmental costs of these actions and underestimate the impact of limiting red meat consumption. Hoolohan *et al.*<sup>(13)</sup>, estimated that the removal of all packaging and the elimination of hot-housing and air freighting (i.e. a way of modelling more seasonal and local food consumption) would only reduce the GHGe of the average UK diet by 3% and 5%, respectively. In contrast, swapping red meat with less carbon-intensive meats like pork or poultry, or cutting out meat entirely was estimated to reduce food-related emissions by 18% and 35%, respectively<sup>(13)</sup>. This is not to say that animal sourced foods have no role to play in a sustainable diet. Moderate amounts of animal products can provide a vital source of nutrition in a healthy and sustainable diet<sup>(51)</sup>. But current intakes of meat, especially red meat, exceeds planetary boundaries in most high-income countries<sup>(52)</sup>. Thus, improving consumers awareness of the environmental costs of high meat intakes is warranted.

Studies often show that consumers perceive organically produced foods are more environmentally sustainable<sup>(47)</sup>. While organic production systems do present a clear benefit to the biodiversity of agricultural landscapes<sup>(53)</sup>, the evidence for other environmental indicators such as eutrophication, GHGe, land use and acidification potential is less clear. In fact, in many cases, conventionally produced foods have a lower environmental impact<sup>(54)</sup>. For instance, Smith *et al.*<sup>(55)</sup>, modelled the effect of converting all food production in England and Wales to organic and found that despite modest improvements in resource efficiency, the lower yields from organic production led to greater total GHGe. Overall, these findings suggest that most consumers have a poor understanding of the environmental impact of their food choices and often overemphasise the importance of less costly actions (e.g. reducing packaging).

### Consumers' interpretations of healthy and sustainable eating

To date, most studies have examined consumers interpretations of either healthy eating or sustainable eating. Only a few studies have explored how people conceptualise the integration of these concepts (i.e. healthy and sustainable eating)<sup>(26,45,56–58)</sup>. A recent survey of Irish adults found that only 12% of participants thought a healthy diet and a sustainable diet were the same, with around 80% believing they were 'similar but different'

(60%) or 'not the same' (20%) and the remaining 6% stated that they didn't know<sup>(21)</sup>. These findings suggest that most consumers believe there are some similarities between a healthy diet and a sustainable diet. However, few consistencies are found when consumers are asked to explain these similarities.

In general, consumers seem receptive to the concept of a healthy and sustainable diet, but few consider this combination in their everyday lives<sup>(26,45)</sup>. The actions consumers most commonly perceive as benefiting both health and the environment are reducing processed foods and eating organic<sup>(26,45)</sup>. Interestingly, the perceived environmental impact of processed foods mainly relates to the packaging associated with these products, whereas organic foods are perceived as healthy and environmentally friendly as they are perceived as more natural and free from chemicals or pesticides<sup>(26,45)</sup>. Overall, consumers seem to have a limited awareness of the commonalities between a healthy diet and a sustainable diet. In a qualitative study of 20 Irish adults, we found few consistencies in the dietary behaviours participants perceived as both healthy and sustainable<sup>(26)</sup>. For instance, while some thought reducing red meat consumption would be good for their health and the environment, this was not a view shared by most participants. These findings underscore the need to improve consumers awareness of the commonalities between a healthy and sustainable diet.

We also found that participants perceptions of healthy eating were deeply rooted in their personal dietary experiences and self-interested goals (e.g. losing weight)<sup>(26)</sup>. In contrast, participants perceptions of sustainable eating emerged as abstract dietary ideals, often disconnected from their actual behaviour or food choice motives<sup>(26)</sup>. This personal disconnect may act as a barrier to embracing environmentally conscious eating habits<sup>(59)</sup>. While eating for health is driven by personal motives (e.g. maintaining a healthy weight), sustainable eating is shaped by non-personal motives (e.g. animal welfare)<sup>(60)</sup>. As personal motives are more salient to consumers food choices, highlighting the health benefits of sustainable dietary practices may be more appealing than outlining their environmental impacts<sup>(10,18)</sup>.

### Implications for future practice

The evidence presented above highlights several opportunities to foster healthier and more sustainable eating habits. These include enhancing consumers knowledge and understanding of healthy and sustainable diets; overcoming competing priorities and barriers; and creating system-wide changes.

#### *Improving knowledge and understanding*

The research presented above suggests that most consumers have a basic understanding of the foods and nutrients that are recommended (e.g. fruits and vegetables) or should be limited (e.g. foods high in fat, sugar and salt) in a healthy diet. However, this basic awareness may



not tell the full story. For instance, some studies find that while many can recite dietary recommendations, their ability to determining appropriate portion sizes is less accurate<sup>(61,62)</sup>. Thus, while education campaigns focused on the specific foods one should eat may be less needed, clearer guidance on appropriate portion sizes may still be warranted. In addition to portion size information, guidance on what terms like ‘balanced’ and ‘moderation’ mean in the context of a healthy and sustainable diet may also be beneficial.

In general, consumers understanding of healthy eating greatly exceeds that of food sustainability. Most consumers overestimate the climate impact of eating local, organic foods and reducing packaging and underestimate the impact of reducing the consumption of red meat. Most consumers are either unaware or do not believe that the production of animal products, especially red meat, has a considerable environmental impact. In fact, the consumption of meat remains a peripheral concern for most Europeans when they considered a sustainable diet<sup>(49)</sup>. Thus, there is a need to build a broader awareness of the carbon footprint of meat, especially red meat, compared to plant-based alternatives.

Beyond providing mere declarative knowledge of what dietary behaviours are considered healthy and sustainable, there is also a need to provide procedural (i.e. how-to) knowledge, so consumers can incorporate these recommendations into their diets. For this reason, practitioners are encouraged to focus on promoting food literacy instead of simply improving awareness of recommendations<sup>(63)</sup>. Food literacy refers to the knowledge and skills required to eat a healthy and sustainable diet. This encompasses an awareness of what constitutes a healthy and sustainable diet and the ability to ‘*plan, manage, select, prepare and eat foods to meet needs and determine food intake*’<sup>(63)</sup>. A focus on improving food literacy would aim to equip individuals with the tools they need to make informed choices and adopt healthy, sustainable dietary habits.

While improve consumers knowledge is important, simply providing information may not be enough to change behaviour<sup>(10)</sup>. Knowledge is just one of many factors influencing people’s food choices (Fig. 1). For this reason, knowledge is considered a ‘*necessary but not sufficient factor*’ when it comes to changing eating behaviour<sup>(64)</sup>. For instance, even when people are made aware of the link between the production of red meat and the climate, few appear open to changing the way they eat<sup>(28,65)</sup>. Other research suggests that the people most interested in receiving information on food sustainability are also those with the most sustainable diets<sup>(66)</sup>. Thus, in addition to improving consumer awareness, strategies are needed to address the broader context in which people make food choices, overcoming competing priorities and barriers.

#### *Overcoming competing priorities and barriers*

Foods are rarely selected solely on their health or environmental credentials. Most consumers say they want their food to be produced sustainably. For instance,

Heard *et al.*<sup>(44)</sup> found that 73 % of UK adults felt it was very (24 %) or fairly (48 %) important to buy food that has a low environmental impact<sup>(44)</sup>. But few consumers will compromise on other factors. In general, people prioritise taste, convenience, price and health over sustainability when making food choices<sup>(18,67)</sup>. Thus, there is a need to position healthy and sustainable eating in a way that aligns with other priorities<sup>(14)</sup>.

The way healthy and sustainable eating messages are framed may influence their uptake. For instance, many traditional dietary guidelines promote restraint and restriction which can lead to feelings of guilt when recommendations aren’t achieved<sup>(20,33)</sup>. Instead, practitioner could use pleasure-focused messaging that promotes the sensory and social experiences of healthy and sustainable dietary practices. Several studies have found that pleasure-focused messages are more effective at encouraging healthier eating habits than health-centred approaches<sup>(68)</sup>. Bédard *et al.*<sup>(34)</sup>, noted that viewing the enjoyment of eating in terms of sensory satisfaction, mindful eating, memories and social interactions leads to more positive dietary behaviours<sup>(34)</sup>. These findings support calls for a paradigm shift in health eating promotion, moving away from the ‘food as health’ narrative that emphasises restraint and restriction, to a ‘food as well-being’ perspective that acknowledges the multiple meanings food holds in peoples’ lives<sup>(69)</sup>.

Few consumers react positively to the idea of eating less meat<sup>(28)</sup>. However, some evidence suggests certain framings may be more positively perceived than others. Hoek *et al.*<sup>(45)</sup> found participants saw meat-related recommendations as all or nothing, believing it involved the complete elimination of meat, with little attention to how this reduction will be achieved<sup>(45)</sup>. This misperception may push consumers further away from meat reduction. Therefore, messages aimed at reducing meat should focus on small behaviour changes, emphasising substitutions that align with the characteristics consumers associate with meat, such as protein. For instance, De Boer *et al.*<sup>(70)</sup>, found consumers were more receptive to meat reduction or substitution strategies that encouraged eating smaller portions of meat, eating more sustainable meat and/ or substituting meat with plant-based proteins, than they were with those emphasising meat free days.

There are several factors inhibiting consumers from transition to a healthy and sustainable diet<sup>(18)</sup>. Two central barriers are cost and social or cultural norms. Most consumers perceive healthy and sustainable diets as expensive<sup>(18,71)</sup>. For those living on a low-income, the notion of a climate friendly diet is viewed as a luxury they cannot afford<sup>(72,73)</sup>. Modelling research suggests that a healthy and sustainable diet is possible at all income levels with specific target strategies<sup>(74)</sup>. However, these modelled substitutions only consider the monetary costs associated with dietary change. Daniel<sup>(75)</sup>, showed that the costs associated with a healthy diet relates to more than just the monetary value of the dietary change. Low-income households also consider the costs of wasted food due to rejection, packaging containing more than needed and foods that are consumed too quickly or are unsatisfying<sup>(75)</sup>. Without appreciating the varied expenses



people associated with healthy and sustainable eating, researchers and practitioners may underestimate their true costs. Future initiatives aimed at promoting healthy and sustainable diets should consider the costs of dietary change from the viewpoint of everyday consumers.

Social and cultural norms also play a pivotal role in shaping dietary choices, influencing not only what people eat but also how much they consume<sup>(76)</sup>. In most high-income countries, like the UK and Ireland, meat is considered an essential component of a meal<sup>(28)</sup>. This social norm makes efforts to reduce meat consumption particularly challenging. Traditional information campaigns are unlikely to shift these deeply ingrained norms. However, strategies informed by behavioural science like altering the choice architecture of peoples' food environments show promise. For example, Garnett *et al.*<sup>(77)</sup> demonstrated that positioning vegetarian options prominently at the beginning of cafeteria lines can significantly boost the sale of these dishes. These findings suggest that subtle changes in how choices are presented to consumers can have a meaningful impact on promoting healthier and more environmentally friendly eating habits.

#### *Creating system-wide changes*

Changing consumers dietary habits will play a pivotal role in the transition to a more sustainable food system. But consumer-oriented actions are just one piece of the puzzle. Improving the health of people and the planet will require system-wide changes. In addition to those aimed at influencing dietary choices, actions are also needed to promote sustainable agricultural practices (e.g. improving fertiliser use efficiency), encourage the reorientation of land use (e.g. providing subsidies to farmers for restoring unproductive farmland to natural habitats, such as rewilding forests), improve the sustainability of aquaculture and wild fisheries (e.g. reducing overfishing) and minimising food loss and waste (e.g. improving cold chain infrastructure)<sup>(10,11)</sup>.

#### **Conclusion**

This review highlights how adults in high-income countries hold diverse and multifaceted meanings for healthy eating and sustainable eating. While many consumers have a reasonable awareness of what constitutes a healthy diet, their interpretations extend beyond traditional dietary guidance, often incorporating other aspects of eating, such as enjoyment and socialisation. In contrast, most consumers have a limited understanding of food sustainability. Most view sustainable diets through an environmental lens, often overemphasising the importance of eating local, organic food and reducing packaging, while underestimating the impact of reducing red meat consumption. Moreover, although consumers seem open to the idea of a healthy *and* sustainable diet, this remains a novel concept for many. This disparity in understanding presents an opportunity to enhance public awareness of healthy and sustainable diets. However, knowledge alone is insufficient to drive behavioural

change. Future campaigns should also address consumers' competing dietary priorities and advocate for system-wide changes to promote a healthier and more sustainable food system.

#### **Acknowledgements**

The authors would like to thank the Nutrition Society for the opportunity to present this work as part of the Postgraduate Symposium of the Irish Section Conference 2023 and for the opportunity to publish a review in the Proceedings of the Nutrition Society.

#### **Financial support**

This work was supported by funding from the Irish Department of Agriculture, Food and the Marine (DAFM National Funding Call 2019).

#### **Conflict of interests**

The authors declare no conflicts of interest.

#### **Authorship**

D.H. conducted the literature review and wrote the first draft of the manuscript. J.M.K. provided expert advice throughout the literature review process. Both authors critically reviewed the manuscript and approved the final version submitted for publication.

#### **References**

1. Abbafati C, Machado DB, Cislachi B *et al.* (2020) Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* **396**, 1223–1249.
2. Micha R, Shulkin ML, Peñalvo JL *et al.* (2017) Etiologic effects and optimal intakes of foods and nutrients for risk of cardiovascular diseases and diabetes: systematic reviews and meta-analyses from the nutrition and chronic diseases expert group (NutriCoDE). *PLoS One* **12**, e0175149.
3. Miller V, Webb P, Cudhea F *et al.* (2022) Global dietary quality in 185 countries from 1990 to 2018 show wide differences by nation, age, education, and urbanicity. *Nat Food* **3**, 694–702.
4. Crippa M, Solazzo E, Guizzardi D *et al.* (2021) Food systems are responsible for a third of global anthropogenic GHG emissions. *Nat Food* **2**, 198–209.
5. FAO (2011) *The State of the World's Land and Water Resources for Food and Agriculture. Managing Systems at Risk*. London: Earthscan.
6. Poore J & Nemecek T (2018) Reducing food's environmental impacts through producers and consumers. *Science (1979)* **360**, 987–992.
7. Tilman D, Clark M, Williams DR *et al.* (2017) Future threats to biodiversity and pathways to their prevention. *Nature* **546**, 73–81.



8. Clark MA, Domingo NGG, Colgan K *et al.* (2020) Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. *Science (1979)* **370**, 705–708.
9. FAO & WHO (2019) *Sustainable Healthy Diets: Guiding Principles*. Rome: FAO.
10. Hoek AC, Malekpour S, Raven R *et al.* (2021) Towards environmentally sustainable food systems: decision-making factors in sustainable food production and consumption. *Sustain Prod Consum* **26**, 610–626.
11. Caleffi S, Hawkes C & Walton S (2023) *45 Actions to Orient Food Systems Towards Environmental Sustainability: Co-Benefits and Trade-Offs*. London: Food and Agriculture Organization of the United Nations (FAO).
12. Fadnes LT, Økland J-M, Haaland ØA *et al.* (2022) Estimating impact of food choices on life expectancy: a modeling study. *PLoS Med* **19**, e1003889.
13. Hoolohan C, Berners-Lee M, McKinsty-West J *et al.* (2013) Mitigating the greenhouse gas emissions embodied in food through realistic consumer choices. *Energy Policy* **63**, 1065–1074.
14. Gillison F, Verplanken B, Barnett J *et al.* (2022) *A Rapid Evidence Review of the Psychology of Food Choice*. Bath: University of Bath.
15. Symmank C, Mai R, Hoffmann S *et al.* (2017) Predictors of food decision making: a systematic interdisciplinary mapping (SIM) review. *Appetite* **110**, 25–35.
16. Connors M, Bisogni CA, Sobal J *et al.* (2001) Managing values in personal food systems. *Appetite* **36**, 189–200.
17. Cunha LM, Cabral D, Moura AP *et al.* (2018) Application of the Food Choice Questionnaire across cultures: systematic review of cross-cultural and single country studies. *Food Qual Prefer* **64**, 21–36.
18. Kenny TA, Woodside JV, Perry IJ *et al.* (2023) Consumer attitudes and behaviors toward more sustainable diets: a scoping review. *Nutr Rev* **81**, 1665–1679.
19. Bisogni CA, Jastran M, Seligson M *et al.* (2012) How people interpret healthy eating: contributions of qualitative research. *J Nutr Educ Behav* **44**, 282–301.
20. Klink U, Härtling V & Schüz B (2023) Perspectives on healthy eating of adult populations in high-income countries: a qualitative evidence synthesis. *Int J Behav Med* 1–21. Special Issue: Meta-Analyses and Reviews.
21. Safefood (2023) *Building 'Sustainability' into National Healthy Eating Guidelines. Review of International Practice and Practical Implications for Policy*. Cork, Ireland: Safefood.
22. Eurobarometer (2006) *Special Eurobarometer 246/Wave 64.3 – TNS Opinion & Social. Health and Food*. Brussels, Belgium: European Commission. <https://europa.eu/eurobarometer/surveys/detail/451>
23. Nutrition & Health Foundation (2005) *NHF Health and Lifestyle Research 2005*. Dublin, Ireland. <http://hdl.handle.net/10147/265514>
24. Paquette M-C (2005) Perceptions of healthy eating: state of knowledge and research gaps. *Can J Public Health* **96**, S15–S19.
25. Blake CE, Bisogni CA, Sobal J *et al.* (2007) Classifying foods in contexts: how adults categorize foods for different eating settings. *Appetite* **49**, 500–510.
26. Hazley D, Stack M & Kearney JM (2024) Perceptions of healthy and sustainable eating: a qualitative study of Irish adults. *Appetite* **192**, 107096.
27. Herforth A, Arimond M, Álvarez-Sánchez C *et al.* (2019) A global review of food-based dietary guidelines. *Adv Nutr* **10**, 590–605.
28. Gillison F, Lannon G, Verplanken B *et al.* (2021) *A Rapid Review of the Evidence on the Factors Underpinning the Consumption of Meat and Dairy among the General Public*. Bath: University of Bath.
29. Román S, Sánchez-Siles LM & Siegrist M (2017) The importance of food naturalness for consumers: results of a systematic review. *Trends Food Sci Technol* **67**, 44–57.
30. Taneri PE, Wehrli F, Roa-Díaz ZM *et al.* (2022) Association between ultra-processed food intake and all-cause mortality: a systematic review and meta-analysis. *Am J Epidemiol* **191**, 1323–1335.
31. Sanchez-Siles L, Roman S, Fogliano V *et al.* (2022) Naturalness and healthiness in 'ultra-processed foods': a multidisciplinary perspective and case study. *Trends Food Sci Technol* **129**, 667–673.
32. Delaney M & McCarthy MB (2014) Saints, sinners and non-believers: the moral space of food. A qualitative exploration of beliefs and perspectives on healthy eating of Irish adults aged 50–70. *Appetite* **73**, 105–113.
33. Coveney J (2006) *Food, Morals, and Meaning: The Pleasure and Anxiety of Eating*, 2nd ed. London: Routledge
34. Bédard A, Lamarche PO, Grégoire LM *et al.* (2020) Can eating pleasure be a lever for healthy eating? A systematic scoping review of eating pleasure and its links with dietary behaviors and health. *PLoS One* **15**, e0244292.
35. Department of Health (2016) Healthy Food for Life: The Healthy Eating Guidelines and Food Pyramid. <https://www.gov.ie/en/publication/70a2e4-the-food-pyramid/> (accessed October 2020).
36. Hollywood LE, Cuskelly GJ, O'Brien M *et al.* (2013) Healthful grocery shopping. Perceptions and barriers. *Appetite* **70**, 119–126.
37. Bowman LI, te Molder H, Koelen MM *et al.* (2009) I eat healthfully but I am not a freak. Consumers' everyday life perspective on healthful eating. *Appetite* **53**, 390–398.
38. Rabiau M, Knäuper B & Miquelon P (2006) The eternal quest for optimal balance between maximizing pleasure and minimizing harm: the compensatory health beliefs model. *Br J Health Psychol* **11**, 139–153.
39. vanDellen MR, Isherwood JC & Delose JE (2016) How do people define moderation? *Appetite* **101**, 156–162.
40. Sørensen MR & Holm L (2016) 'I feel good and I am not overweight' – a qualitative study of considerations underlying lay people's self-assessments of unhealthy diets. *Appetite* **107**, 135–143.
41. Bech-Larsen T & Kazbare L (2014) Perceptions of healthy eating in transitional phases of life: results of four focus groups with adolescents and older adults. *Br Food J* **116**, 570–584.
42. Grunert KG (2020) Measuring meaning of food in life. In *Handbook of Eating and Drinking*, pp. 1197–1214 [H Meiselman, editor]. Cham: Springer.
43. Schaefer SE, Biltekoff C, Thomas C *et al.* (2016) Healthy, vague: exploring health as a priority in food choice. *Food Cult Soc* **19**, 227–250.
44. Heard H & Bogdan A (2021) *Healthy and Sustainable Diets: Consumer Poll, Executive Summary*. London: Food Standards Agency.
45. Hoek AC, Pearson D, James SW *et al.* (2017) Shrinking the food-print: a qualitative study into consumer perceptions, experiences and attitudes towards healthy and environmentally friendly food behaviours. *Appetite* **108**, 117–131.
46. Whittall B, Warwick SM, Guy DJ *et al.* (2023) Public understanding of sustainable diets and changes towards





- sustainability: a qualitative study in a UK population sample. *Appetite* **181**, 106388.
47. van Bussel LM, Kuijsten A, Mars M *et al.* (2022) Consumers' perceptions on food-related sustainability: a systematic review. *J Clean Prod* **341**, 130904.
  48. Armstrong B, King L, Clifford R *et al.* (2023) *Food and You 2: Wave 5 Key Findings*. London: Food Standards Agency.
  49. de Boer J & Aiking H (2022) Do EU consumers think about meat reduction when considering to eat a healthy, sustainable diet and to have a role in food system change? *Appetite* **170**, 105880.
  50. Siegrist M, Visschers VHM & Hartmann C (2015) Factors influencing changes in sustainability perception of various food behaviors: results of a longitudinal study. *Food Qual Prefer* **46**, 33–39.
  51. Beal T, Gardner CD, Herrero M *et al.* (2023) Friend or foe? The role of animal-source foods in healthy and environmentally sustainable diets. *J Nutr* **153**, 409–425.
  52. Godfray HCJ, Aveyard P, Garnett T *et al.* (2018) Meat consumption, health, and the environment. *Science* **361**, eaam5324.
  53. Tuck SL, Winqvist C, Mota F *et al.* (2014) Land-use intensity and the effects of organic farming on biodiversity: a hierarchical meta-analysis. *J Appl Ecol* **51**, 746–755.
  54. Clark M & Tilman D (2017) Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environ Res Lett* **12**, 064016.
  55. Smith LG, Kirk GJD, Jones PJ *et al.* (2019) The greenhouse gas impacts of converting food production in England and Wales to organic methods. *Nat Commun* **10**, 1–10.
  56. Ronto R, Saberi G, Carins J *et al.* (2022) Exploring young Australians' understanding of sustainable and healthy diets: a qualitative study. *Public Health Nutr* **25**, 1–13.
  57. Fox EL, Davis C, Downs SM *et al.* (2021) A focused ethnographic study on the role of health and sustainability in food choice decisions. *Appetite* **165**, 105319.
  58. Godin L & Sahakian M (2018) Cutting through conflicting prescriptions: how guidelines inform 'healthy and sustainable' diets in Switzerland. *Appetite* **130**, 123–133.
  59. Gifford RD & Chen AKS (2017) Why aren't we taking action? Psychological barriers to climate-positive food choices. *Clim Change* **140**, 165–178.
  60. Van Dam YK & van Trijp HCM (2011) Cognitive and motivational structure of sustainability. *J Econ Psychol* **32**, 726–741.
  61. Huizinga MM, Carlisle AJ, Cavanaugh KL *et al.* (2009) Literacy, numeracy, and portion-size estimation skills. *Am J Prev Med* **36**, 324–328.
  62. Rooney C, McKinley MC, Appleton KM *et al.* (2017) How much is '5-a-day'? A qualitative investigation into consumer understanding of fruit and vegetable intake guidelines. *J Hum Nutr Diet* **30**, 105–113.
  63. Vidgen H (2016) *Food Literacy: Key Concepts for Health and Education*. London: Routledge.
  64. Worsley A (2002) Nutrition knowledge and food consumption: can nutrition knowledge change food behaviour? *Asia Pac J Clin Nutr* **11**, 579–585.
  65. Macdiarmid JI, Douglas F & Campbell J (2016) Eating like there's no tomorrow: public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite* **96**, 487–493.
  66. Edenbrandt AK & Lagerkvist C-J (2022) Consumer perceptions and attitudes towards climate information on food. *J Clean Prod* **370**, 133441.
  67. Eurobarometer (2020) *Special Eurobarometer 505: Making our Food Fit for the Future – New Trends and Challenges*. Brussels, Belgium: European Commission. <https://europa.eu/eurobarometer/surveys/detail/2241>
  68. Pettigrew S (2016) Pleasure: an under-utilised 'P' in social marketing for healthy eating. *Appetite* **104**, 60–69.
  69. Block LG, Grier SA, Childers TL *et al.* (2011) From nutrients to nurturance: a conceptual introduction to food well-being. *J Public Policy Market* **30**, 5–13.
  70. De Boer J, Schösler H & Aiking H (2014) 'Meatless days' or 'less but better'? Exploring strategies to adapt Western meat consumption to health and sustainability challenges. *Appetite* **76**, 120–128.
  71. Zorbas C, Palermo C, Chung A *et al.* (2018) Factors perceived to influence healthy eating: a systematic review and meta-ethnographic synthesis of the literature. *Nutr Rev* **76**, 861–874.
  72. Verdeau B & Monnery-Patris S (2024) When food is uncertain, how much does sustainability matter? A qualitative exploration of food values and behaviours among users of a social grocery store. *Appetite* **194**, 107175.
  73. Vos M, Deforche B, Van Kerckhove A *et al.* (2022) Determinants of healthy and sustainable food choices in parents with a higher and lower socioeconomic status: a qualitative study. *Appetite* **178**, 106180.
  74. Reynolds CJ, Horgan GW, Whybrow S *et al.* (2019) Healthy and sustainable diets that meet greenhouse gas emission reduction targets and are affordable for different income groups in the UK. *Public Health Nutr* **22**, 1503–1517.
  75. Daniel C (2020) Is healthy eating too expensive?: How low-income parents evaluate the cost of food. *Soc Sci Med* **248**, 112823.
  76. Higgs S (2015) Social norms and their influence on eating behaviours. *Appetite*, **86**, 38–44.
  77. Garnett EE, Marteau TM, Sandbrook C *et al.* (2020) Order of meals at the counter and distance between options affect student cafeteria vegetarian sales. *Nat Food* **1**, 485–488.