Factors Affecting Consumer Food Choice

Subjects: Others

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Understanding individual food choices is critical for transforming the current food system to ensure healthiness of people and sustainability of the planet. Throughout the years, researchers from different fields have proposed conceptual models addressing factors influencing the food choice, recognized as a key leverage to improve planetary and human health. However, a multidisciplinary approach is needed to better understand how different factors are involved and interact with each other in the decision-making process. The present paper reviews and analyzes existing models, providing an intact point-of-view by integrating key elements into a bigger framework. Key determinants of general food choice are identified and categorized, including food-internal factor (sensory and perceptual features), food-external factors (information, social environment, physical environment), personal-state factors (biological features and physiological needs, psychological components, habits and experiences), cognitive factors (knowledge and skills, attitude, liking and preference, anticipated consequences, and personal identity), as well as sociocultural factors (culture, economic variables, political elements). Moreover, possible directions of influence among the factors towards final food choice were discussed. The need of multidisciplinary impulses across research field with the support of empirical data are crucial for understanding factors influencing food choice as well as for enriching existing conceptual models. The framework proposed here would serve as a roadmap for facilitating communications and collaborations between research fields in a structural and systematic way.

consumer behavior context of choice healthy and sustainable food choices decision making food system

1.Consumer Food Choice: An Important Role in Achieving Healthy and Sustainable Food System

Global food systems possess a complex and multi-faceted set of challenges, regarding both human and environmental health, from farm to fork. From a human society point of view, there are still 690 million people who suffer from hunger while food insecurity is predicted to increase due to the present Coronavirus disease 2019 (Covid-19) pandemic and the consequent economic shock [1]. Meanwhile, 677.6 million adults, equal to 13.1% of the population worldwide, are obese [2], resulting in a double burden of malnutrition. The high prevalence of overweight and obesity, especially in urban areas, can be related to a change in lifestyle, low levels of physical activity [3], and unhealthy diets [4] based on the interaction between individual characteristics on food choices and obesogenic environments. Especially, obesogenic environments are recognized as crucial drivers of the increasing prevalence of obesity epidemic [5][6], including microenvironments at individual level (e.g., school, workplace, home, neighborhood) and macroenvironments at societal level (e.g., education and health systems, government policy,

society's attitudes and beliefs) [7]. The outcome of food choice is based on interactions between environmental and individual factors [8].

Individual food choices, embedded in the pattern of food consumptions, evolved according to the changes of natural environment, biological basis, physical need, lifestyle, and development of technology [9]. In the modern society, owing to increasing national wealth and urbanized living, people consume more animal proteins as well as processed food. At the same time, consumptions of whole food or minimally-processed foods such as whole grains, legumes, and other sources of fiber decreased [10]. Some studies have highlighted that eating patterns and food choice have changed with the change of global food systems and food supply, resulting in a shift toward increased intake of unhealthy food [11]. The change of global food supply chains influences the food environments, [12]. Particularly, food choice with ultra-processed food significantly increased, owing to the easy access, cheap price and marketing strategies [13][14][15]. The vicious cycle has been created between food choice and the consequence of food choice as it is confirmed that consumption of heavily-processed foods is significantly associated with higher BMI and increased likelihood of being obese [13][14][16]. On the other hand, overweight and obese individuals tend to show more liking and to select more energy-dense foods [17][18][19].

Given that negative impacts on human beings as well as on the planet (e.g., pre- and post- production activities in food system produces up to 37% of the total anthropogenic Greenhouse Gas emissions [20]) have considerably grown, promoting healthier and more sustainable food choices and better diets have been a new multidisciplinary research impulse [21][22][23][24][25]. According to Food and Agriculture Organization [26], sustainable healthy diets are 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. Grunert [22] has pointed out that consumers have great potential in making food chains more sustainable by choosing more sustainable food production and rejecting less sustainable alternatives through their food choices. For example, choosing low-impact foods (e.g., minimally-processed plant-based foods) and increasing use efficiency of agricultural input offer larger environmental benefits [27]. While food choices with heavily-processed food have negative impacts on the environment [28], lowering consumption of more discretionary products (e.g., oils and sugar) can reduce land use, emission, and freshwater withdrawals [29]. Thus, promoting healthier and more sustainable dietary patterns, rooted in food choices at individual level, has been recognized as a potential and crucial solution [30]. A number of multidisciplinary studies have shed light on the importance of addressing the role of individual food choice in tackling the current nutrition and also environmental crisis [31][32][33].

2. Exploring Factors Influencing Consumer Food Choice and Constructing the Conceptual Models

2.1. Three Main Categories of Factors Influencing Food Choices: Food-Related Features, Individual Differences, and Society-Related Features

A rich body of literature has focused on exploring factors influencing individual food choice. Due to the complex nature of food choice, proposed factors as well as the categorization of factors differed from one study to another.

However, although works from different research fields (e.g., nutrition, psychology, social science, marketing, etc.) provided evidence with different perspectives, the factors affecting food choices can be leveled into three main categories: (1) Food-related features: intrinsic features such as color and aroma, and extrinsic features such as information and packaging [34][35]); (2) individual difference: biological (e.g., hunger, appetite, and taste), physical (e.g., access, skills of cooking, and time), psychological (e.g., mood and stress), cognitive (e.g., attitudes or preference, beliefs, and knowledge), and social (e.g., family, and peers) factors (see [36][37][38]); (3) society-related features: culture, economic variables such as price and income, and policy (e.g., [39]).

2.2. The Role of Food Environments as Factors Influencing Food Choices

In addition to the three main categories, in recent years, 'food environments' have been defined and recognized as important factors influencing people's food choice. According to Swinburn, et al. [40], food environment equals to the collective physical, economic, policy, and sociocultural surroundings, opportunities, and conditions that influence people's food choices and nutritional status. In fact, 'food environments' include different factors from the aforementioned three main categories, such as physical and social environments as well as economic, policy, and sociocultural environments. Some studies attempted to provide a more holistic point of view by integrating the role of food environments. For example, an early paper [41] proposed that food consumption is based on food preference, under the influence of food characteristics (e.g., taste, texture, and cost), individual characteristics (e.g., nutritional status, knowledge, and attitudes to health), and environment characteristics (e.g., season, degree of urbanization, and size of family). Rozin [42] specified the influence of biological (physiological and evolutionary/adaptive), psychological (preference and context), social (sociology), and cultural (anthropology) factors on food choice.

It has been concluded that there are social and environmental influences on food choice (e.g., modelling influences, eating competence family environment, food labels, taste, appearance, personal food history, habits, and familiarity) as well as psychological influences on eating behavior (perceived behavioral control and motivation) [43]. Leng, et al. [44] pointed out the determinant of food choice, including dietary components (e.g., highly palatable foods), physiological mechanisms (e.g., neural mechanism of hunger and satiety as well as motivation and reward based on foods), cognitive-affective factors (perceived stress, health attitude, anxiety, and depression), familial, genetic, and epigenetic influences on personality characteristics, and diverse cultural and social pressures. Castro, et al. [45] focused on factors influencing choice in food retail environments such as shelf display and product factors (shelf display, branding, nutrition labeling, and food sampling), pricing and price promotion factors, in-store and customer decision-making factors (customers' implicit beliefs about the relationship between taste and healthfulness), and store environment factors (e.g., smaller aisles). Bauer and Reisch [46] summarized that food decisions are affected by individual (psychological, physical, neurological), social, and environmental factors.

2.3. Development of Early Conceptual Models of Food Choice as the Prototypes

It is recognized that food choices are multifaceted, situational, dynamic, and complex [47]. Thus, a multidisciplinary approach and a holistic picture are needed to understand not only how different factors are involved but also how the factors are structured and interact with each other in the decision-making process. To this aim, comprehensive conceptual models of food choice behavior have been developed for understanding the process of making food choices. Furst, et al. [48] proposed the model with factors involved in food choice being categorized into three components: life course, influences, and personal system. According to the authors, the life course includes the personal roles and the social, cultural and physical environments to which a person has been and is exposed to. A person's life course generates a set of influences: ideals, personal factors, resources, social framework and food context. These influences inform and shape people's personal systems, including conscious values, negotiations and unconsciously operationalized strategies that may occur in a food-related choice situation. In another model [49], features of food, personal state, and socio-economic factors were included. The features of food (e.g., chemical properties and nutrient content) can trigger physiological effects (e.g., hunger) that directly influence food choice. Moreover, food features can influence a person's perception (e.g., taste and texture) which contribute to the formation of attitudes under the influence of socio-economic context (e.g., price, brand, and culture). The attitudes then influence the output of food choice. Finally, personal psychological factors such as personality, mood, and beliefs can influence final food choice directly or by affecting the attitudes. Similarly, the model proposed by Steenkamp [50] demonstrated that properties of food (physiological effects and sensory perception) personal-related factors (biological, psychological, socio-demographic), and environmental factors (economic, cultural, marketing) all contribute to the food decision process which involves need recognition, search for information, evaluation, and the final food choice.

In addition, Grunert, et al. [51]'s total food quality model distinguishes "before" from "after" purchase evaluations. Cost cues, extrinsic quality cues, intrinsic quality cues, and the perception of these cues all contribute to expected quality (taste, health, convenience, and process), which influence purchase motive fulfillment and intention to buy. Moreover, this model includes the time domain, showing the important influence of experienced quality after purchase on future choices. So far, all these models focus on individual and social determinants of food choice. Sobal, et al. [52] proposed that factors in the bio-physical environment (e.g., biodiversity, land, air, water, energy) as well as in the social environment (e.g., knowledge, capitals, policy) affect the consumer behavior.

These conceptual models of food choice can be seen as the prototypes. They introduced not only factors involved in the food decision-making process but also constructed the model emphasizing the relationship among the factors and indicating the process or pathway contributing to the final food choice.

3. Discussion

3.1. Main Findings: The Multifactorial Nature of Individual Food Choice

In recent years, research as well as large scale initiatives have been launched, substantiating the imperative for individuals and governments to improve population health by taking substantial actions in the domain of individual food choice and eating behavior [11]. Since consumers' daily food choices have great potential in transforming

towards healthier and more sustainable food systems [11][22], the first and essential step before considering interventions is understanding factors influencing individual food choice in a structural and systematic way. The present paper provides an insight into the complex and multifactorial nature of individual food choice by analyzing factors included in conceptual models.

The early development of conceptual models of food choice can be dated back to the 1990s. There were three main types of models. The first one, which can be seen as the prototype of the models, already demonstrated three levels of factors influencing the final choice, namely food features, personal system, and environment [41][48][49]. The second type focuses on the effect of price, quality, and value [51][53]. While the third one, the model proposed by Sobal, Khan and Bisogni [52] took into consideration a broader view including relationships of the food and nutrition system to other systems such as environmental system, governmental system, health care system, cultural system, economic system, and even transportation system. The conceptual models we included in the analysis mainly follow the three-level framework of food features, personal system, and environment. However, different models might include different numbers of factors with different ways of categorization within and across these three levels. Thus, the present review analyzed existing conceptual models of food choice, summarized influential factors affecting food choice, then re-categorized and integrated the results from the literature into a proposed three-level framework of factors influencing food choice, namely food-related features, individual differences, and society-related features. The ultimate goal is to provide a clear and simple roadmap for facilitating future development of research in the field of consumer food choice and maximize the contribution from individual studies. Being on the same page, the framework may help researchers communicate the idea, compare research data, and replicate existing results with ease. In our framework, influential factors determining food choice are categorized into food-internal factor (sensory and perceptual features), food-external factors (information, social environment, physical environment), personal-state factors (biological features, physiological needs, psychological components, habits, and experiences), cognitive factors (knowledge and skills, attitude, liking and preference, anticipated consequences, and personal identity), and sociocultural factors (culture, economic variables, political elements).

In our samples, five most frequently addressed factors in the models are as follows: (1) social environment which belongs to food-external factors [21][23][34][41][47][48][52][54][55][56][57][58][59][60][61][62][63][64][65][66][67][68][69][70][71][72][73][74][75][76][77][78][79][80][81][82]; (2) personal-state focusing on psychological component [21][23][25][34][47][48][49][50][51][52][55][56][57][59][60][61][83][60][84][61][85][86][53][83][87][88][89][63][64][90][91][70][92][74][76][78][81][93]; (3) economic variables such as income, socioeconomic status, and price [21][32][41][47][48][49][50][51][52][54][94][55][56][57][58][59][61][53][83][89][62][65][66][90][69][71][92][73][75][76][77]; (4) food-related information which also belongs to food-external factors [21][22][24][32][34][49][50][51][54][55][56][57][58][84][61][86][53][62][64][65][66][67][68][90][91][95][69][70]; and (5) physical environment which also belongs to food-external factors [23][32][34][41][48][49][51][52][54][55][58][59][84][61][83][62][63][65][66][91][69][71][92][72][73][75][77][93].

The results reflect the facts that (1) social environment is the most addressed factor influencing food choice; (2) due to the availability of research evidence, factors such as food information, food environment, and economic variables are easier to be manipulated and measured in the experimental settings. Thus, the role of these factors in influencing food choice is more carefully and clearly examined and concluded; (3) compared to studies from other

field, the complex mechanisms and interactions between food perception (food-internal factor) and bio-physiological (personal-state) still need more investigations and the results should be integrated into the conceptual models of food choice; (4) while some factors affecting food choice could be universal (e.g., life course, (see [48]), large-scale and cross-cultural studies are needed to address factors influencing cultural-specific choices (see [96]). In addition, considering the obesogenic environment nowadays, despite the growing body of literature focusing on the role of cognitive function and food environment in food choice e.g., [97][98][99], we would like to emphasize the importance of understanding the complicated cognitive decision-making process (see [55]) and disentangling the interaction between cognitive functions and food environments, especially food-related information and physical environment (food-external factor) in order to develop effective interventions for helping individuals make better choice that is good for human health and the planet [100][101][102].

About the directions of influence among the factors in the conceptual models, fewer conceptual models are supported with empirical data [57][60][61][85][86][64][68][74][75][76][79][93][103][104].

Table S2 in the Supplementary Materials summarizes the directions of influence of factors affecting food choices based on publications with empirical data we included. We observed that factors proposed in theory of planned behavior (attitude, norms, and intention) and their effects are frequently examined with experimental settings and thus empirical data was obtained. Some other factors and the effects are also frequently investigated such as liking, food or nutritional knowledge, personal values, emotion, income, and sensory properties of food. Future studies should explore other factors and their effects on food choices.

In conclusion, the more specific factors the model addressed, the clearer indications of direction of influence could be made, supported by experimental data. We appreciate the multifactorial nature of individual food choice and the effort of including as many factors as possible in the models in providing a more intact and holistic view. However, the trade-off of expanding the models should be recognized too. In this case, interdisciplinary research is expected for constructing a holistic conceptual model of food choice supported by empirical data from studies in different fields (see [55][72]).

3.2. Implication of Factors Influencing Healthy and/or Sustainable Food Choice

In recent years, research has shed light on the factors affecting food choice towards healthier and more sustainable products. New conceptual models of food choice have been proposed to further depict how different factors essentially affect healthier and sustainable food choices. Through the literature review, the models were framed according to four types of choices: (1) healthier food choice [24][88][90][91]; (2) sustainable food choice [22][24][95][105][106]; (3) organic food [21][24][25]; and (4) fruit and/or vegetable [89][62].

For food-internal factors, the nutritional properties and the health value of the food items are especially important for the choice [88][89]. Health value [107] is an important index, including absence of contaminants [108]. For food-external factors, information based on nutrition facts, sustainability labels, and organic identity were included in the models as important drives [21][22][23][24][90][91][95]. Moreover, some studies pointed out that certification of origin and

food miles, recycling packaging, as well as indications of local, traditional, ethic, and environmentally friendly products, can affect the food choice [107][108][109]. Social interaction and engagement in social institutions in social environment are important for making food decision, especially for fruits, vegetables, and organic food [21][23]. For physical environment, the availability of healthy or sustainable food products and the accessibility to nutrition environment, supermarket, or local stores are critical [23][91][107][110].

As personal-state factors, psychological components such as personality [23] as well as emotion [25][110] have impacts on healthier and organic food choice. Some other studies also mentioned motivation and intention as important factors contributing to the final food choice [23][111][112][113][114]. Cognitive factors such as belief, attitude, awareness, self-concept, and positive outcome expectation were addressed in determining food choice [21][22][23][24][25][88][89][62][90][91][95][105]. Finally, sociocultural context and familiarity based on cultural habits could affect food choices [89][62]. Income and economic situation are still a crucial determinant [89][90]. Food price heavily affects whether consumer will choose healthier and more sustainable food or not [89][62][107][108][109][114]. For making healthier and more sustainable food choice available, policy plays an essential role not only with healthy food eating policy but also with policies related to food supply chain, especially how food is produced, and environmental sustainability [35][92].

References

1. FAO; IFAD; UNICEF; WFP; WHO. The State of Food Security and Nutrition in the World 2020. In Transforming Food Systems for Affordable Healthy Diets; FAO: Rome, Italy, 2020.
2. 2020 Global Nutrition Report: Action on Equity to End Malnutrition; Development Initiatives: Bristol, UK, 2020.
3. World Health Organization. Physical Activity. Available online: https://www.who.int/news-room/fact-sheets/detail/physical-activity (accessed on 8 April 2020).
4. World Health Organization. Noncommunicable diseases. Available online: http://www.emro.who.int/noncommunicable-diseases/causes/unhealthy-diets.html (accessed on 8 April 2020).
5. Lake, A.; Townshend, T. Obesogenic environments: Exploring the built and food environments. J. R. Soc. Promot. Health 2006, 126, 262–267.
6. Swinburn, B.; Egger, G. Preventive strategies against weight gain and obesity. Obes. Rev. 2002, 3, 289–301.
7. Swinburn, B.; Egger, G.; Raza, F. Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. Prev. Med. 1999, 29, 563–570.

8. Swinburn, B.A.; Sacks, G.; Hall, K.D.; McPherson, K.; Finegood, D.T.; Moodie, M.L.; Gortmaker, S.L. The global obesity pandemic: Shaped by global drivers and local environments. Lancet 2011, 378, 804–814.
9. Montanari, M. Food is Culture; Columbia University Press: New York, NY, USA, 2006.
10. McMichael, A.J.; Powles, J.W.; Butler, C.D.; Uauy, R. Food, livestock production, energy, climate change, and health. Lancet 2007, 370, 1253–1263.
11. Jacka, F.N.; Sacks, G.; Berk, M.; Allender, S. Food policies for physical and mental health. BMC Psychiatry 2014, 14, 1–6.
12. Zobel, E.H.; Hansen, T.W.; Rossing, P.; von Scholten, B.J. Global changes in food supply and the obesity epidemic. Curr. Obes. Rep. 2016, 5, 449–455.
13. Crino, M.; Sacks, G.; Vandevijvere, S.; Swinburn, B.; Neal, B. The influence on population weight gain and obesity of the macronutrient composition and energy density of the food supply. Curr. Obes. Rep. 2015, 4, 1–10.
14. Monteiro, C.A.; Moubarac, J.C.; Cannon, G.; Ng, S.W.; Popkin, B. Ultra-processed products are becoming dominant in the global food system. Obes. Rev. 2013, 14, 21–28.
15. Thavarajah, P. Is Global Food System Causing Obesity and Diabetes? Curr. Res. Diabetes Obes. J. 2018, 6, 1–2.
16. Poti, J.M.; Braga, B.; Qin, B. Ultra-processed food intake and obesity: What really matters for health—Processing or nutrient content? Curr. Obes. Rep. 2017, 6, 420–431.
17. Cox, D.N.; Hendrie, G.A.; Carty, D. Sensitivity, hedonics and preferences for basic tastes and fat amongst adults and children of differing weight status: A comprehensive review. Food Qual. Prefer. 2016, 48, 359–367.
18. Dressler, H.; Smith, C. Food choice, eating behavior, and food liking differs between lean/normal and overweight/obese, low-income women. Appetite 2013, 65, 145–152.
19. Mela, D.J. Determinants of food choice: Relationships with obesity and weight control. Obes. Res. 2001, 9, 249S–255S.
20. Shukla, P.R.; Skea, J.; Calvo Buendia, E.; Masson-Delmotte, V.; Pörtner, H.-O.; Roberts, D.C.; Zhai, P.; Slade, R.; Connors, S.; van Diemen, R.; et al. Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems; Intergovernmental Panel on Climate Change (IPCC): Geneva, Switzerland, 2019; in press.
21. Asioli, D.; Aschemann-Witzel, J.; Caputo, V.; Vecchio, R.; Annunziata, A.; Næs, T.; Varela, P. Making sense of the “clean label” trends: A review of consumer food choice behavior and discussion of industry implications. Food Res. Int. 2017, 99, 58–71.

22. Grunert, K.G. Sustainability in the food sector: A consumer behaviour perspective. Int. J. Food Syst. Dyn. 2011, 2, 207–218.
23. Hansen, T.; Sørensen, M.I.; Eriksen, M.-L.R. How the interplay between consumer motivations and values influences organic food identity and behavior. Food Policy 2018, 74, 39–52.
24. Hoek, A.; Pearson, D.; James, S.; Lawrence, M.; Friel, S. Healthy and environmentally sustainable food choices: Consumer responses to point-of-purchase actions. Food Qual. Prefer. 2017, 58, 94–106.
25. Aertsens, J.; Verbeke, W.; Mondelaers, K.; Van Huylenbroeck, G. Personal determinants of organic food consumption: A review. Br. Food J. 2009, 111, 1140–1167.
26. Food and Agriculture Organization. Sustainable Healthy Diets; FAO: Rome, Italy, 2019.
27. Clark, M.; Tilman, D. Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. Environ. Res. Lett. 2017, 12, 064016.
28. Garnett, T. Cooking up a Storm: Food, Greenhouse Gas Emissions and Our Changing Climate. Surrey, UK: Food Climate Research Network. Center for Environmental Strategy. Available online: http://www.fcrn.org.uk/sites/default/files/CuaS_web.pdf (accessed on 29 March 2020).
29. Poore, J.; Nemecek, T. Reducing food's environmental impacts through producers and consumers. Science 2018, 360, 987–992.
30. Tilman, D.; Clark, M. Global diets link environmental sustainability and human health. Nature 2014, 515, 518–522.
31. Joyce, A.; Dixon, S.; Comfort, J.; Hallett, J. Reducing the environmental impact of dietary choice: Perspectives from a behavioural and social change approach. J. Environ. Public Health 2012.
32. Lartey, A.; Hemrich, G.; Amoroso, L.; Remans, R.; Grace, D.; Albert, J.; Fischer, C.; Garnett, T. Influencing Food Environments for Healthy Diets; Food and Agriculture Organization of the United Nations: Rome, Italy, 2016.
33. Willett, W.; Rockström, J.; Loken, B.; Springmann, M.; Lang, T.; Vermeulen, S.; Garnett, T.; Tilman, D.; DeClerck, F.; Wood, A. Food in the Anthropocene: The EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet 2019, 393, 447–492.
34. Eertmans, A.; Baeyens, F.; Van Den Bergh, O. Food likes and their relative importance in human eating behavior: Review and preliminary suggestions for health promotion. Health Educ. Res. 2001, 16, 443–456.
35. Wang, Q.J.; Mielby, L.A.; Junge, J.Y.; Bertelsen, A.S.; Kidmose, U.; Spence, C.; Byrne, D.V. The role of intrinsic and extrinsic sensory factors in sweetness perception of food and beverages: A review. Foods 2019, 8, 211.

36. Bellisle, F. Why should we study human food intake behaviour? Nutr. Metab. Cardiovasc. Dis. 2003, 13, 189–193.
37. Rozin, P. Food Preferences, Psychology and Physiology of. International Encyclopedia of the Social & Behavioral Sciences, 2nd ed.; Elsevier: Oxford, UK, 2015; pp. 296–299.
38. Shepherd, R.; Raats, M. The Psychology of Food Choice; Cabi: Oxfordshire, UK, 2006; Volume 3.
39. Rayner, G.; Lang, T. Ecological public health: Leaders, movements and ideas to shift the boundaries between the normal and the desirable. In Healthy People, Places and Planet: Reflections Based on Tony McMichael's Four Decades of Contribution to Epidemiological Understanding; ANU Press: Acton, Australia, 2015; pp. 617–641.7.
40. Swinburn, B.; Sacks, G.; Vandevijvere, S.; Kumanyika, S.; Lobstein, T.; Neal, B.; Barquera, S.; Friel, S.; Hawkes, C.; Kelly, B. INFORMAS (I nternational N etwork for F ood and O besity/non-communicable diseases R esearch, M onitoring and A ction S upport): Overview and key principles. Obes. Rev. 2013, 14, 1–12.
41. Randall, E.; Sanjur, D. Food preferences—Their conceptualization and relationship to consumption. Ecol. Food Nutr. 1981, 11, 151–161.
42. Rozin, P. The integration of biological, social, cultural and psychological influences on food choice. Front. Nutr. Sci. 2006, 3, 19.
43. Hardcastle, S.J.; Thøgersen-Ntoumani, C.; Chatzisarantis, N.L.D. Food Choice and Nutrition: A Social Psychological Perspective. Nutrients 2015, 7, 8712–8715.
44. Leng, G.; Adan, R.A.; Belot, M.; Brunstrom, J.M.; de Graaf, K.; Dickson, S.L.; Hare, T.; Maier, S.; Menzies, J.; Preissl, H. The determinants of food choice. Proc. Nutr. Soc. 2017, 76, 316–327.
45. Castro, I.A.; Majmundar, A.; Williams, C.B.; Baquero, B. Customer Purchase Intentions and Choice in Food Retail Environments: A Scoping Review. Int. J. Environ. Res. Public Health 2018, 15, 2493.
46. Bauer, J.M.; Reisch, L.A. Behavioural insights and (un) healthy dietary choices: A review of current evidence. J. Consum. Policy 2019, 42, 3–45.
47. Sobal, J.; Bisogni, C.A. Constructing food choice decisions. Ann. Behav. Med. 2009, 38, s37–s46.
48. Furst, T.; Connors, M.; Bisogni, C.A.; Sobal, J.; Falk, L.W. Food choice: A conceptual model of the process. Appetite 1996, 26, 247–266.
49. Shepherd, R. Social determinants of food choice. Proc. Nutr. Soc. 1999, 58, 807–812.
50. Steenkamp, J.-B.E. Dynamics in consumer behavior with respect to agricultural and food products. In Agricultural Marketing and Consumer Behavior in a Changing World; Kluwer Academic Publishers: Boston, MA, USA, 1997; pp. 143–188.

51. Grunert, K.G.; Larsen, H.H.; Madsen, T.K.; Baadsgaard, A. Market orientation in food and agriculture: Summary, implications, and research perspectives. In Market Orientation in Food and Agriculture; Kluwer Academic Publishers: Boston, MA, USA, 1996; pp. 243–253.
52. Sobal, J.; Khan, L.K.; Bisogni, C. A conceptual model of the food and nutrition system. Soc. Sci. Med. 1998, 47, 853–863.
53. Zeithaml, V.A. Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. J. Mark. 1988, 52, 2–22.
54. Coff, C.; Korthals, M.; Barling, D. Ethical traceability and informed food choice. In Ethical Traceability and Communicating Food; Springer: Berlin/Heidelberg, Germany, 2008; pp. 1–18.
55. Köster, E.P. Diversity in the determinants of food choice: A psychological perspective. Food Qual. Prefer. 2009, 20, 70–82.
56. Marreiros, C.; Ness, M. A Conceptual Framework of Consumer Food Choice Behaviour; University of Évora, Portugal: Évora, Portugal, 2009.
57. Oostenbach, L.H.; Slits, E.; Robinson, E.; Sacks, G. Systematic review of the impact of nutrition claims related to fat, sugar and energy content on food choices and energy intake. BMC Public Health 2019, 19, 1296.
58. Turner, C.; Aggarwal, A.; Walls, H.; Herforth, A.; Drewnowski, A.; Coates, J.; Kalamatianou, S.; Kadiyala, S. Concepts and critical perspectives for food environment research: A global framework with implications for action in low-and middle-income countries. Glob. Food Secur. 2018, 18, 93–101.
59. Darnton, A.; Evans, D. Influencing Behaviours: A Technical Guide to the ISM Tool, 2013; Scottish Government: Edinburgh, UK, 2013.
60. De Boer, J.; Hoogland, C.T.; Boersema, J.J. Towards more sustainable food choices: Value priorities and motivational orientations. Food Qual. Prefer. 2007, 18, 985–996.
61. Kushwah, S.; Dhir, A.; Sagar, M. Ethical consumption intentions and choice behavior towards organic food. Moderation role of buying and environmental concerns. J. Clean. Prod. 2019, 236, 117519.
62. Pollard, J.; Kirk, S.L.; Cade, J.E. Factors affecting food choice in relation to fruit and vegetable intake: A review. Nutr. Res. Rev. 2002, 15, 373–387.
63. Gains, N. The repertory grid approach. In Measurement of Food Preferences; Springer: Berlin/Heidelberg, Germany, 1994; pp. 51–76.
64. Gutjar, S.; de Graaf, C.; Kooijman, V.; de Wijk, R.A.; Nys, A.; Ter Horst, G.J.; Jager, G. The role of emotions in food choice and liking. Food Res. Int. 2015, 76, 216–223.

65. Franchi, M. Food choice: Beyond the chemical content. Int. J. Food Sci. Nutr. 2012, 63, 17–28.
66. HLPE. Nutrition and Food Systems; FAO: Rome, Italy, 2017.
67. Jabs, J.; Devine, C.M.; Sobal, J. Model of the process of adopting vegetarian diets: Health vegetarians and ethical vegetarians. J. Nutr. Educ. 1998, 30, 196–202.
68. Kushwah, S.; Dhir, A.; Sagar, M. Understanding consumer resistance to the consumption of organic food. A study of ethical consumption, purchasing, and choice behaviour. Food Qual. Prefer. 2019, 77, 1–14.
69. Kaufmann, H.R.; Panni, M.F.A.K.; Orphanidou, Y. Factors affecting consumers' green purchasing behavior: An integrated conceptual framework. Amfiteatru Econ. J. 2012, 14, 50–69.
70. Rosenfeld, D.L.; Burrow, A.L. The unified model of vegetarian identity: A conceptual framework for understanding plant-based food choices. Appetite 2017, 112, 78–95.
71. Rose, D.; Bodor, J.N.; Hutchinson, P.L.; Swalm, C.M. The importance of a multi-dimensional approach for studying the links between food access and consumption. J. Nutr. 2010, 140, 1170–1174.
72. Symmank, C.; Mai, R.; Hoffmann, S.; Stok, F.M.; Renner, B.; Lien, N.; Rohm, H. Predictors of food decision making: A systematic interdisciplinary mapping (SIM) review. Appetite 2017, 110, 25–35.
73. Bisogni, C.A.; Jastran, M.; Shen, L.; Devine, C.M. A biographical study of food choice capacity: Standards, circumstances, and food management skills. J. Nutr. Educ. Behav. 2005, 37, 284–291.
74. Carfora, V.; Caso, D.; Conner, M. The role of self-identity in predicting fruit and vegetable intake. Appetite 2016, 106, 23–29.
75. Contini, C.; Boncinelli, F.; Marone, E.; Scozzafava, G.; Casini, L. Drivers of plant-based convenience foods consumption: Results of a multicomponent extension of the Theory of Planned Behaviour. Food Qual. Prefer. 2020, 84, 103931.
76. Farragher, T.; Wang, W.C.; Worsley, A. The associations of vegetable consumption with food mavenism, personal values, food knowledge and demographic factors. Appetite 2016, 97, 29–36.
77. Finch, J.; Garnett, T. Conceptual Models of Influences on People's Food Consumption. Available online: https://foodsource.org.uk/book/export/html/89 (accessed on 25 May 2020).
78. Mai, R.; Hoffmann, S.; Hoppert, K.; Schwarz, P.; Rohm, H. The spirit is willing, but the flesh is weak: The moderating effect of implicit associations on healthy eating behaviors. Food Qual. Prefer. 2015, 39, 62–72.
79. Mørk, T.; Bech-Larsen, T.; Grunert, K.G.; Tsalis, G. Determinants of citizen acceptance of environmental policy regulating consumption in public settings: Organic food in public institutions. J. Clean. Prod. 2017, 148, 407–414.

80. Perry, E.A.; Thomas, H.; Samra, H.R.; Edmonstone, S.; Davidson, L.; Faulkner, A.; Petermann, L.; Manafò, E.; Kirkpatrick, S.I. Identifying attributes of food literacy: A scoping review. Public Health Nutr. 2017, 20, 2406–2415.
81. Snoek, H.M.; Eijssen, L.M.; Geurts, M.; Vors, C.; Brown, K.A.; Bogaardt, M.-J.; Dhonukshe-Rutten, R.A.; Evelo, C.T.; Fezeu, L.K.; Finglas, P.M. Advancing food, nutrition, and health research in Europe by connecting and building research infrastructures in a DISH-RI: Results of the EuroDISH project. Trends Food Sci. Technol. 2018, 73, 58–66.
82. Polivy, J.; Herman, C.P. Distress and eating: Why do dieters overeat? Int. J. Eat. Disord. 1999, 26, 153–164.
83. Kittler, P.G.; Sucher, K.P. Accent on taste: An applied approach to multicultural competency. Diabetes Spectr. 2004, 17, 200–204.
84. Fernqvist, F.; Ekelund, L. Credence and the effect on consumer liking of food—A review. Food Qual. Prefer. 2014, 32, 340–353.
85. Olsen, N.V.; Menichelli, E.; Sørheim, O.; Næs, T. Likelihood of buying healthy convenience food: An at-home testing procedure for ready-to-heat meals. Food Qual. Prefer. 2012, 24, 171–178.
86. van Buul, V.J.; Bolman, C.A.; Brouns, F.J.; Lechner, L. Back-of-pack information in substitutive food choices: A process-tracking study in participants intending to eat healthy. Appetite 2017, 116, 173–183.
87. Gutjar, S.; Dalenberg, J.R.; de Graaf, C.; de Wijk, R.A.; Palascha, A.; Renken, R.J.; Jager, G. What reported food-evoked emotions may add: A model to predict consumer food choice. Food Qual. Prefer. 2015, 45, 140–148.
88. Kang, J.; Jun, J.; Arendt, S.W. Understanding customers' healthy food choices at casual dining restaurants: Using the Value–Attitude–Behavior model. Int. J. Hosp. Manag. 2015, 48, 12–21.
89. Krebs-Smith, S.M.; Kantor, L.S. Choose a variety of fruits and vegetables daily: Understanding the complexities. J. Nutr. 2001, 131, 487S–501S.
90. Barreiro-Hurlé, J.; Gracia, A.; De-Magistris, T. Does nutrition information on food products lead to healthier food choices? Food Policy 2010, 35, 221–229.
91. Glanz, K.; Sallis, J.F.; Saelens, B.E.; Frank, L.D. Healthy nutrition environments: Concepts and measures. Am. J. Health Promot. 2005, 19, 330–333.
92. Story, M.; Kaphingst, K.M.; Robinson-O'Brien, R.; Glanz, K. Creating healthy food and eating environments: Policy and environmental approaches. Annu. Rev. Public Health 2008, 29, 253–272.
93. Stranieri, S.; Ricci, E.C.; Banterle, A. Convenience food with environmentally-sustainable attributes: A consumer perspective. Appetite 2017, 116, 11–20.

94. Connors, M.; Bisogni, C.A.; Sobal, J.; Devine, C.M. Managing values in personal food systems. Appetite 2001, 36, 189–200.
95. Grunert, K.G.; Hieke, S.; Wills, J. Sustainability labels on food products: Consumer motivation, understanding and use. Food Policy 2014, 44, 177–189.
96. Prescott, J.; Young, O.; O'neill, L.; Yau, N.; Stevens, R. Motives for food choice: A comparison of consumers from Japan, Taiwan, Malaysia and New Zealand. Food Qual. Prefer. 2002, 13, 489–495.
97. Drewnowski, A. Obesity and the food environment: Dietary energy density and diet costs. Am. J. Prev. Med. 2004, 27, 154–162.
98. Popkin, B.M.; Duffey, K.; Gordon-Larsen, P. Environmental influences on food choice, physical activity and energy balance. Physiol. Behav. 2005, 86, 603–613.
99. Stroebele, N.; De Castro, J.M. Effect of ambience on food intake and food choice. Nutrition 2004, 20, 821–838.
100. Yang, Y.; Shields, G.S.; Wu, Q.; Liu, Y.; Chen, H.; Guo, C. Cognitive training on eating behaviour and weight loss: A meta-analysis and systematic review. Obes. Rev. 2019, 20, 1628–1641.
101. Boswell, R.G.; Sun, W.; Suzuki, S.; Kober, H. Training in cognitive strategies reduces eating and improves food choice. Proc. Natl. Acad. Sci. USA 2018, 115, E11238–E11247.
102. Jones, A.; Hardman, C.A.; Lawrence, N.; Field, M. Cognitive training as a potential treatment for overweight and obesity: A critical review of the evidence. Appetite 2018, 124, 50–67.
103. Recio-Román, A.; Recio-Menéndez, M.; Román-González, M.V. Food Reward and Food Choice. An Inquiry Through The Liking and Wanting Model. Nutrients 2020, 12, 639.
104. Costa-Font, M.; Gil, J.M. Structural equation modelling of consumer acceptance of genetically modified (GM) food in the Mediterranean Europe: A cross country study. Food Qual. Prefer. 2009, 20, 399–409.
105. Kumar, B.; Manrai, A.K.; Manrai, L.A. Purchasing behaviour for environmentally sustainable products: A conceptual framework and empirical study. J. Retail. Consum. Serv. 2017, 34, 1–9.
106. Ricci, E.C.; Banterle, A.; Stranieri, S. Trust to go green: An exploration of consumer intentions for eco-friendly convenience food. Ecol. Econ. 2018, 148, 54–65.
107. van Dam, Y.K.; van Trijp, H.C. Relevant or determinant: Importance in certified sustainable food consumption. Food Qual. Prefer. 2013, 30, 93–101.
108. Baudry, J.; Péneau, S.; Allès, B.; Touvier, M.; Hercberg, S.; Galan, P.; Amiot, M.-J.; Lairon, D.; Méjean, C.; Kesse-Guyot, E. Food choice motives when purchasing in organic and conventional

consumer clusters: Focus on sustainable concerns (The NutriNet-Santé Cohort Study). Nutrients 2017, 9, 88.

109. Annunziata, A.; Scarpato, D. Factors affecting consumer attitudes towards food products with sustainable attributes. Agric. Econ. 2014, 60, 353–363.
110. Ma, X.; Blake, C.E.; Barnes, T.L.; Bell, B.A.; Liese, A.D. What does a person's eating identity add to environmental influences on fruit and vegetable intake? Appetite 2018, 120, 130–135.
111. Verain, M.C.; Dagevos, H.; Antonides, G. Sustainable food consumption. Product choice or curtailment? Appetite 2015, 91, 375–384.
112. Verain, M.C.D.; Onwezen, M.; Sijtsema, S.J.; Dagevos, H. The added value of sustainability motivations in understanding sustainable food choices. Appl. Stud. Agribus. Commer. 2016, 10, 67–76.
113. Verain, M.C.; Sijtsema, S.J.; Dagevos, H.; Antonides, G. Attribute segmentation and communication effects on healthy and sustainable consumer diet intentions. Sustainability 2017, 9, 743.
114. Provencher, V.; Jacob, R. Impact of perceived healthiness of food on food choices and intake. Curr. Obes. Rep. 2016, 5, 65–71.