

# The Factors That Influence Our Food Choices

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Given the priority for population dietary change there is a need for a greater understanding of the determinants that affect food choice. This review examines the major influences on food choice with a focus on those that are amenable to change and discusses some successful interventions.

## 1. Major determinants of food choice

The key driver for eating is of course hunger but what we choose to eat is not determined solely by physiological or nutritional needs. Some of the other factors that influence food choice include:

- Biological determinants such as hunger, appetite, and taste
- Economic determinants such as cost, income, availability
- Physical determinants such as access, education, skills (e.g. cooking) and time
- Social determinants such as culture, family, peers and meal patterns
- Psychological determinants such as mood, stress and guilt
- Attitudes, beliefs and knowledge about food

The complexity of food choice is obvious from the list above, which is in itself not exhaustive. Food choice factors also vary according to life stage and the power of one factor will vary from one individual or group of people to the next. Thus, one type of intervention to modify food choice behaviour will not suit all population groups. Rather, interventions need to be geared towards different groups of the population with consideration to the many factors influencing their decisions on food choice.

## 1.1 Biological determinants of food choice

### Hunger and satiety

Our physiological needs provide the basic determinants of food choice. Humans need energy and nutrients in order to survive and will respond to the feelings of hunger and satiety (satisfaction of appetite, state of no hunger between two eating occasions). The central nervous system is involved in controlling the balance between hunger, appetite stimulation and food intake.

The macro-nutrients i.e. carbohydrates, proteins and fats generate satiety signals of varying strength. The balance of evidence suggests that fat has the lowest satiating power, carbohydrates have an intermediate effect and protein has been found to be the most satiating<sup>49</sup>.

The energy density of diets has been shown to exert potent effects on satiety; low energy density diets generate greater satiety than high energy density diets. The high energy density of high-fat and/or high-sugar foods can also lead to 'passive overconsumption', where excess energy is ingested unintentionally and without the consumption of additional bulk.

An important satiety signal may be the volume of food or portion size consumed. Many people are unaware of what constitutes appropriate portion sizes and thus inadvertently consume excess energy.

### Palatability

Palatability is proportional to the pleasure someone experiences when eating a particular food. It is dependent on the sensory properties of the food such as taste, smell, texture and appearance. Sweet and high-fat foods have an undeniable sensory appeal. It is not surprising then that food is not solely regarded as a source of nourishment but is often consumed for the pleasure value it imparts.

The influence of palatability on appetite and food intake in humans has been investigated in several studies. There is an increase in food intake as palatability increases, but the effect of palatability on appetite in the period following consumption is unclear. Increasing food variety can also increase food and energy intake and in the short term alter energy balance<sup>45</sup>. However, effects on long-term energy regulation are unknown.

## Sensory aspects

'Taste' is consistently reported as a major influence on food behaviour. In reality 'taste' is the sum of all sensory stimulation that is produced by the ingestion of a food. This includes not only taste per se but also smell, appearance and texture of food. These sensory aspects are thought to influence, in particular, spontaneous food choice.

From an early age, taste and familiarity influence behaviour towards food. A liking for sweetness and a dislike for bitterness are considered innate human traits, present from birth<sup>48</sup>. Taste preferences and food aversions develop through experiences and are influenced by our attitudes, beliefs and expectations<sup>9</sup>.

## 1.2 Economic and physical determinants of food choice

### Cost and accessibility

There is no doubt that the cost of food is a primary determinant of food choice. Whether cost is prohibitive depends fundamentally on a person's income and socio-economic status. Low-income groups have a greater tendency to consume unbalanced diets and in particular have low intakes of fruit and vegetables<sup>14</sup>. However, access to more money does not automatically equate to a better quality diet but the range of foods from which one can choose should increase.

Accessibility to shops is another important physical factor influencing food choice, which is dependent on resources such as transport and geographical location. Healthy food tends to be more expensive when

available within towns and cities compared to supermarkets on the outskirts<sup>19</sup>. However, improving access alone does not increase purchase of additional fruit and vegetables, which are still regarded as prohibitively expensive<sup>18</sup>.

## Education and Knowledge

Studies indicate that the level of education can influence dietary behaviour during adulthood<sup>30</sup>. In contrast, nutrition knowledge and good dietary habits are not strongly correlated. This is because knowledge about health does not lead to direct action when individuals are unsure how to apply their knowledge. Furthermore, information disseminated on nutrition comes from a variety of sources and is viewed as conflicting or is mistrusted, which discourages motivation to change<sup>15</sup>. Thus, it is important to convey accurate and consistent messages through various media, on food packages and of course via health professionals.

## 1.3 Social determinants of food choice

### Influence of social class

What people eat is formed and constrained by circumstances that are essentially social and cultural. Population studies show there are clear differences in social classes with regard to food and nutrient intakes. Poor diets can result in under- (micronutrients deficiency) and over-nutrition (energy over consumption resulting in overweight and obesity); problems that face different sectors of society, requiring different levels of expertise and methods of intervention.

### Cultural influences

Cultural influences lead to the difference in the habitual consumption of certain foods and in traditions of preparation, and in certain cases can lead to restrictions such as exclusion of meat and milk from the diet. Cultural influences are however amenable to change: when moving to a new country individuals often adopt particular food habits of the local culture.

## Social context

Social influences on food intake refer to the impact that one or more persons have on the eating behaviour of others, either direct (buying food) or indirect (learn from peer's behaviour), either conscious (transfer of beliefs) or subconscious. Even when eating alone, food choice is influenced by social factors because attitudes and habits develop through the interaction with others. However, quantifying the social influences on food intake is difficult because the influences that people have on the eating behaviour of others are not limited to one type and people are not necessarily aware of the social influences that are exerted on their eating behaviour<sup>23</sup>.

Social support can have a beneficial effect on food choices and healthful dietary change<sup>16</sup>. For example, social support has been found to be a strong predictor for fruit and vegetable consumption among adults.<sup>46</sup> Social support may enhance health promotion through fostering a sense of group belonging and helping people to be more competent and self-efficacious<sup>8</sup>.

The family is widely recognised as being significant in food decisions. Research shows the shaping of food choices taking place in the home. Because family and friends can be a source of encouragement in making and sustaining dietary change, adopting dietary strategies which are acceptable to them may benefit the individual whilst also having an effect on the eating habits of others<sup>3</sup>.

## Social setting

Although the majority of food is eaten in the home, an increasing proportion is eaten outside the home, e.g. in schools, at work and in restaurants. The venue in which food is eaten can affect food choice, particularly in terms of what foods are on offer. The availability of healthy food at home and 'away from home' increases the consumption of such foods. However, access to healthy food options is limited in many work/school environments. This is particularly true for those with irregular hours or with particular requirements, e.g. vegetarian<sup>22</sup>. With the majority of adult women and men in employment, the influence

of work on health behaviours such as food choices is an important area of investigation<sup>16</sup>.

## 1.4 Meal patterns

People have many different eating occasions daily, the motivations for which will differ from one occasion to the next. Most studies investigate the factors that influence habitual food choice but it may be useful to investigate what influences food choice at different eating occasions.

The effects of snacking on health have been debated widely. Evidence shows that snacking can have effects on energy and nutrient intakes but not necessarily on body mass index<sup>28</sup>. However, individuals with normal weight or overweight may differ in their coping strategies when snack foods are freely available and also in their compensatory mechanisms at subsequent meals. Moreover, snack composition may be an important aspect in the ability of individuals to adjust intake to meet energy needs.

Helping young adults to choose healthy snack choices poses a challenge to many health professionals. In the home, rather than forbidding unhealthy snacks, a more positive approach may be the introduction of healthy snack options over time. Moreover, healthy food choices outside the home also need to be made more readily available.

## 1.5 Psychological factors

### Stress

Psychological stress is a common feature of modern life and can modify behaviours that affect health, such as physical activity, smoking or food choice.

The influence of stress on food choice is complex not least because of the various types of stress one can experience. The effect of stress on food intake depends on the individual, the stressor and the

circumstances. In general, some people eat more and some eat less than normal when experiencing stress<sup>39</sup>.

The proposed mechanisms for stress induced changes in eating and food choice are motivational differences (reduced concern about weight control), physiological (reduced appetite caused by the processes associated with stress) and practical changes in eating opportunities, food availability and meal preparation.

Studies also suggest that if work stress is prolonged or frequent, then adverse dietary changes could result, increasing the possibility of weight gain and consequently cardiovascular risk<sup>51</sup>.

## Mood

Hippocrates was the first to suggest the healing power of food, however, it was not until the middle ages that food was considered a tool to modify temperament and mood. Today it is recognised that food influences our mood and that mood has a strong influence over our choice of food.

Interestingly, it appears that the influence of food on mood is related in part to attitudes towards particular foods. The ambivalent relationship with food – wanting to enjoy it but conscious of weight gain is a struggle experienced by many. Dieters, people with high restraint and some women report feeling guilty because of not eating what they think they should<sup>17</sup>. Moreover, attempts to restrict intake of certain foods can increase the desire for these particular foods, leading to what are described as food cravings.

Women more commonly report food cravings than do men. Depressed mood appears to influence the severity of these cravings. Reports of food cravings are also more common in the premenstrual phase, a time when total food intake increases and a parallel change in basal metabolic rate occurs<sup>21</sup>.

Thus, mood and stress can influence food choice behaviour and possibly short and long term responses to dietary intervention.

## 2. Eating disorders

Eating behaviour, unlike many other biological functions, is often subject to sophisticated cognitive control. One of the most widely practised forms of cognitive control over food intake is dieting.

Many individuals express a desire to lose weight or improve their body shape and thus engage in approaches to achieve their ideal body mass index. However, problems can arise when dieting and/or exercise are taken to extremes. The aetiology of eating disorders is usually a combination of factors including biological, psychological, familial and socio-cultural. The occurrence of eating disorders is often associated with a distorted self-image, low self-esteem, non-specific anxiety, obsession, stress and unhappiness<sup>36</sup>.

Treatment of an eating disorder generally requires weight stabilisation and one-to-one psychotherapy. Prevention is more difficult to define but suggestions include avoidance of child abuse; avoidance of magnifying diet and health issues; showing affection without over-controlling; not setting impossible standards; rewarding small attainments in the present; encouraging independence and sociability<sup>36</sup>.

## 3. Consumer attitudes, beliefs, knowledge and optimistic bias

### Consumer attitudes and beliefs

In both the areas of food safety and nutrition, our understanding of consumers' attitudes are poorly researched<sup>26</sup>. A better understanding of how the public perceive their diets would help in the design and implementation of healthy eating initiatives.

The Pan-European Survey of Consumer Attitudes to Food, Nutrition and Health found that the top five influences on food choice in 15 European member states are 'quality/freshness' (74%), 'price' (43%), 'taste' (38%), 'trying to eat healthy' (32%) and 'what my family wants

to eat' (29%). These are average figures obtained by grouping 15 European member states results, which differed significantly from country to country. In the USA the following order of factors affecting food choices has been reported: taste, cost, nutrition, convenience and weight concerns<sup>27</sup>.

In the Pan-European study, females, older subjects, and more educated subjects considered 'health aspects' to be particularly important. Males more frequently selected 'taste' and 'habit' as main determinants of their food choice. 'Price' seemed to be most important in unemployed and retired subjects. Interventions targeted at these groups should consider their perceived determinants of food choice.

Attitudes and beliefs can and do change; our attitude to dietary fat has changed in the last 50 years with a corresponding decrease in the absolute amount of fat eaten and a change in the ratio of saturated to unsaturated fat.

## Optimistic bias

There is a low level of perceived need among European populations to alter their eating habits for health reasons, 71% surveyed believing that their diets are already adequately healthy<sup>31</sup>. This high level of satisfaction with current diets has been reported in Australian<sup>52</sup>, American<sup>10</sup> and English subjects<sup>37</sup>.

The lack of need to make dietary changes, suggest a high level of optimistic bias, which is a phenomenon where people believe that they are at less risk from a hazard compared to others. This false optimism is also reflected in studies showing how people underestimate their likelihood of having a high fat diet relative to others<sup>25</sup> and how some consumers with low fruit and vegetable intakes regard themselves as 'high consumers'<sup>11</sup>.

If people believe that their diets are already healthy it may be unreasonable to expect them to alter their diets, or to consider nutrition/healthy eating as a highly important factor when choosing their food. Although these consumers have a higher probability of having a healthier diet than those who recognise their diet is in need of improvement, they are still far short of the generally accepted public health nutrition goals<sup>26</sup>. It is also unlikely that these

groups will be motivated further by dietary recommendations. Hence, future interventions may need to increase awareness among the general population that their own diet is not wholly adequate in terms of, for example fat, or fruit and vegetable consumption<sup>13</sup>. For those who believe their diets to be healthy it has been suggested that if their beliefs about outcomes of dietary change can be altered, their attitudes may become more favourable and they therefore may be more likely to alter their diets<sup>40</sup>. Thus, a perceived need to undertake change is a fundamental requirement for initiating dietary change<sup>31</sup>.

## 4. Barriers to dietary and lifestyle change

### Focus on cost

Household income and the cost of food is an important factor influencing food choice, especially for low-income consumers. The potential for food wastage leads to a reluctance to try 'new' foods for fear the family will reject them. In addition, a lack of knowledge and the loss of cooking skills can also inhibit buying and preparing meals from basic ingredients.

Education on how to increase fruit and vegetable consumption in an affordable way such that no further expense, in money or effort, is incurred has been proposed as a solution<sup>18</sup>. Efforts of governments, public health authorities, producers and retailers to promote fruit and vegetable dishes as value for money could also make a positive contribution to dietary change<sup>12</sup>.

### Time constraints

Lack of time is frequently mentioned for not following nutritional advice, particularly by the young and well educated<sup>33</sup>. People living alone or cooking for one seek out convenience foods rather than cooking from basic ingredients. This need has been met with a shift in the fruit and vegetables market from loose to prepacked, prepared and ready-to-cook products. These products are more expensive than loose products but people are willing to pay the extra cost because of the convenience they bring. Developing a greater range of tasty,

convenient foods with good nutritional profiles offers a route to improving the diet quality of these groups.

## 5. Models for changing behaviour

### Health Behavioural Models

Understanding how people make decisions about their health can help in planning health promotion strategies. This is where the influence of social psychology and its associated theory-based models play a role. These models help to explain human behaviour and in particular to understand how people make decisions about their health. They have also been used to predict the likelihood that dietary behaviour change will occur. This section focuses on a select few.

### The Health Belief Model (HBM) and the Protection Motivation Theory

The HBM was originally proposed by Rosenstock<sup>43</sup>, was modified by Becker<sup>z</sup> and has been used to predict protective health behaviour, such as screening, vaccination uptake and compliance with medical advice. The model suggests that people considering changing their behaviour must feel personally threatened by a disease/illness and that they then engage in a cost-benefit analysis. This model also suggests that people need some kind of cue to take action to change behaviour or make a health-related decision.

### The Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB)

The Theory of Reasoned Action<sup>4</sup> or its extension in the form of The Theory of Planned Behaviour<sup>5</sup> have been used to help explain as well as to predict the intention of a certain behaviour. These models are based on the hypothesis that the best predictor of the behaviour is behavioural intention. The model proposes that an individual's behavioural intention is jointly derived from three components;

1. attitudes,
2. perception of social pressure to perform the behaviour and
3. perceived control over the behaviour.

In dietary studies TPB/TRA enables a comparison of the strength of influences upon individuals and between sample groups and can be used to build an understanding of the determinants of food choice. The TRA has been successful in explaining behaviours such as fat, salt and milk intake. The TPB model was also used to help explain attitudes and beliefs about starchy foods in the UK<sup>50</sup>.

### Stage classification for health-related behaviour

The Stages of Change model developed by Prochaska<sup>42</sup> and co-workers suggests that health related behaviour change occurs through five separate stages. These are pre-contemplation, contemplation, preparation, action and maintenance. The model assumes that if different factors influence transitions at different stages, then individuals should respond best to interventions tailored to match their stage of change.

The Stages of Change model, in contrast to the other models discussed, has proven to be more popular for use in changing behaviour rather than in explaining current behaviour. This is probably because the model offers practical intervention guidance that can be taught to practitioners. In addition, large random samples can be tested with messages tailored to the person's stage of readiness to change.

It has been suggested that a stage model may be more appropriate for simpler more discrete behaviours such as eating five servings of fruit and vegetables every day, or drinking low-fat milk (food-based goals) than for complex dietary changes such as low-fat eating (nutrient-based goal)<sup>29</sup>.

Presently, no one theory or model sufficiently explains and predicts the full range of food-choice behaviours<sup>38</sup>. Models in general should be viewed as a means to understanding the factors influencing individual decisions and behaviour. Despite the number of models of behaviour change, they have been employed in relatively few nutrition interventions; the Stages of Change model being the most popular.

However, the best test of this model, whether stage-matched dietary interventions outperform standardised approaches, has yet to be performed.

## 6. Changing food behaviour: successful interventions

Dietary change is not easy because it requires alterations in habits that have been built up over a life-time. Various settings such as schools, workplaces, supermarkets, primary care and community based studies have been used in order to identify what works for particular groups of people. Although results from such trials are difficult to extrapolate to other settings or the general public, such targeted interventions have been reasonably successful, illustrating that different approaches are required for different groups of people or different aspects of the diet.

Interventions in supermarket settings are popular given this is where the majority of the people buy most of their food. Screening, shop tours and point-of-purchase interventions are ways in which information can be provided. Such interventions are successful at raising awareness and nutrition knowledge but their effectiveness of any real and long-term behaviour change is unclear at present.

Schools are another obvious intervention setting because they can reach the students, their parents and the school staff. Fruit and vegetable intake in children has been increased through the use of tuck shops, multimedia and the internet and when children get involved in growing, preparing and cooking the food they eat<sup>1,6,35</sup>. Moreover, covert changes to dishes to lower fat, sodium and energy content improved the nutritional profile of school dinners without losing student participation in the school lunch programme<sup>44</sup>. Workplace interventions can also reach large numbers of people and can target those at risk. Increasing availability and appeal of fruit and vegetables proved successful in worksite canteens<sup>34</sup> and price reductions for healthier snacks in vending machines increased sales<sup>24</sup>. Thus, the combination of nutrition education with changes in the workplace are more likely to succeed particularly if interactive

activities are employed and if such activities are sustained for long periods<sup>41</sup>.

Tackling several dietary factors simultaneously such as reducing dietary fat and increasing fruit and vegetables, has proved effective in the primary care setting<sup>47</sup>. Behavioural counselling in conjunction with nutrition counselling seems most effective in such settings although the cost implications of training primary care professionals in behaviour counselling are unclear at this time. Educational and behavioural strategies have also been used in public health/ community settings, which have been shown to increase fruit and vegetable intake<sup>2,3,12</sup>.

## 7. Conclusion

There are many influences on food choice which provide a whole set of means to intervene into and improve people's food choices. There are also a number of barriers to dietary and lifestyle change, which vary depending on life stages and the individual or group of people in question.

It is a major challenge both to health professionals and to the public themselves to effect dietary change. Different strategies are required to trigger a change in behaviour in groups with different priorities. Campaigns that incorporate tailored advice that include practical solutions as well as environmental change are likely to succeed in facilitating dietary change.

*Reviewed by Dr France Bellisle, INRA, France*

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Given the priority for population dietary change there is a need for a greater understanding of the determinants that affect food choice. This review examines the major influences on food choice with a focus on those that are amenable to change and discusses some successful interventions.

## 1. Major determinants of food choice

The key driver for eating is of course hunger but what we choose to eat is not determined solely by physiological or nutritional needs. Some of the other factors that influence food choice include:

- Biological determinants such as hunger, appetite, and taste
- Economic determinants such as cost, income, availability
- Physical determinants such as access, education, skills (e.g. cooking) and time
- Social determinants such as culture, family, peers and meal patterns

- Psychological determinants such as mood, stress and guilt
- Attitudes, beliefs and knowledge about food

The complexity of food choice is obvious from the list above, which is in itself not exhaustive. Food choice factors also vary according to life stage and the power of one factor will vary from one individual or group of people to the next. Thus, one type of intervention to modify food choice behaviour will not suit all population groups. Rather, interventions need to be geared towards different groups of the population with consideration to the many factors influencing their decisions on food choice.

## 1.1 Biological determinants of food choice

### Hunger and satiety

Our physiological needs provide the basic determinants of food choice. Humans need energy and nutrients in order to survive and will respond to the feelings of hunger and satiety (satisfaction of appetite, state of no hunger between two eating occasions). The central nervous system is involved in controlling the balance between hunger, appetite stimulation and food intake.

The macro-nutrients i.e. carbohydrates, proteins and fats generate satiety signals of varying strength. The balance of evidence suggests that fat has the lowest satiating power, carbohydrates have an intermediate effect and protein has been found to be the most satiating<sup>49</sup>.

The energy density of diets has been shown to exert potent effects on satiety; low energy density diets generate greater satiety than high energy density diets. The high energy density of high-fat and/or high-sugar foods can also lead to 'passive overconsumption', where excess energy is ingested unintentionally and without the consumption of additional bulk.

An important satiety signal may be the volume of food or portion size consumed. Many people are unaware of what constitutes appropriate portion sizes and thus inadvertently consume excess energy.

## Palatability

Palatability is proportional to the pleasure someone experiences when eating a particular food. It is dependent on the sensory properties of the food such as taste, smell, texture and appearance. Sweet and high-fat foods have an undeniable sensory appeal. It is not surprising then that food is not solely regarded as a source of nourishment but is often consumed for the pleasure value it imparts.

The influence of palatability on appetite and food intake in humans has been investigated in several studies. There is an increase in food intake as palatability increases, but the effect of palatability on appetite in the period following consumption is unclear. Increasing food variety can also increase food and energy intake and in the short term alter energy balance<sup>45</sup>. However, effects on long-term energy regulation are unknown.

## Sensory aspects

'Taste' is consistently reported as a major influence on food behaviour. In reality 'taste' is the sum of all sensory stimulation that is produced by the ingestion of a food. This includes not only taste per se but also smell, appearance and texture of food. These sensory aspects are thought to influence, in particular, spontaneous food choice.

From an early age, taste and familiarity influence behaviour towards food. A liking for sweetness and a dislike for bitterness are considered innate human traits, present from birth<sup>48</sup>. Taste preferences and food aversions develop through experiences and are influenced by our attitudes, beliefs and expectations<sup>9</sup>.

## 1.2 Economic and physical determinants of food choice

## Cost and accessibility

There is no doubt that the cost of food is a primary determinant of food choice. Whether cost is prohibitive depends fundamentally on a person's income and socio-economic status. Low-income groups have a greater tendency to consume unbalanced diets and in particular have low intakes of fruit and vegetables<sup>14</sup>. However, access to more money does not automatically equate to a better quality diet but the range of foods from which one can choose should increase.

Accessibility to shops is another important physical factor influencing food choice, which is dependent on resources such as transport and geographical location. Healthy food tends to be more expensive when available within towns and cities compared to supermarkets on the outskirts<sup>19</sup>. However, improving access alone does not increase purchase of additional fruit and vegetables, which are still regarded as prohibitively expensive<sup>18</sup>.

## Education and Knowledge

Studies indicate that the level of education can influence dietary behaviour during adulthood<sup>30</sup>. In contrast, nutrition knowledge and good dietary habits are not strongly correlated. This is because knowledge about health does not lead to direct action when individuals are unsure how to apply their knowledge. Furthermore, information disseminated on nutrition comes from a variety of sources and is viewed as conflicting or is mistrusted, which discourages motivation to change<sup>15</sup>. Thus, it is important to convey accurate and consistent messages through various media, on food packages and of course via health professionals.

### 1.3 Social determinants of food choice

#### Influence of social class

What people eat is formed and constrained by circumstances that are essentially social and cultural. Population studies show there are clear differences in social classes with regard to food and nutrient intakes. Poor diets can result in under-

(micronutrients deficiency) and over-nutrition (energy over consumption resulting in overweight and obesity); problems that face different sectors of society, requiring different levels of expertise and methods of intervention.

## Cultural influences

Cultural influences lead to the difference in the habitual consumption of certain foods and in traditions of preparation, and in certain cases can lead to restrictions such as exclusion of meat and milk from the diet. Cultural influences are however amenable to change: when moving to a new country individuals often adopt particular food habits of the local culture.

## Social context

Social influences on food intake refer to the impact that one or more persons have on the eating behaviour of others, either direct (buying food) or indirect (learn from peer's behaviour), either conscious (transfer of beliefs) or subconscious. Even when eating alone, food choice is influenced by social factors because attitudes and habits develop through the interaction with others. However, quantifying the social influences on food intake is difficult because the influences that people have on the eating behaviour of others are not limited to one type and people are not necessarily aware of the social influences that are exerted on their eating behaviour<sup>23</sup>.

Social support can have a beneficial effect on food choices and healthful dietary change<sup>16</sup>. For example, social support has been found to be a strong predictor for fruit and vegetable consumption among adults.<sup>46</sup> Social support may enhance health promotion through fostering a sense of group belonging and helping people to be more competent and self-efficacious<sup>8</sup>.

The family is widely recognised as being significant in food decisions. Research shows the shaping of food choices taking place in the home. Because family and friends can be a source of encouragement in making and sustaining dietary change, adopting dietary strategies which are acceptable to them may benefit the individual whilst also having an effect on the eating habits of others<sup>3</sup>.

## Social setting

Although the majority of food is eaten in the home, an increasing proportion is eaten outside the home, e.g. in schools, at work and in restaurants. The venue in which food is eaten can affect food choice, particularly in terms of what foods are on offer. The availability of healthy food at home and 'away from home' increases the consumption of such foods. However, access to healthy food options is limited in many work/school environments. This is particularly true for those with irregular hours or with particular requirements, e.g. vegetarian<sup>22</sup>. With the majority of adult women and men in employment, the influence of work on health behaviours such as food choices is an important area of investigation<sup>16</sup>.

### 1.4 Meal patterns

People have many different eating occasions daily, the motivations for which will differ from one occasion to the next. Most studies investigate the factors that influence habitual food choice but it may be useful to investigate what influences food choice at different eating occasions.

The effects of snacking on health have been debated widely. Evidence shows that snacking can have effects on energy and nutrient intakes but not necessarily on body mass index<sup>28</sup>. However, individuals with normal weight or overweight may differ in their coping strategies when snack foods are freely available and also in their compensatory mechanisms at subsequent meals. Moreover, snack composition may be an important aspect in the ability of individuals to adjust intake to meet energy needs.

Helping young adults to choose healthy snack choices poses a challenge to many health professionals. In the home, rather than forbidding unhealthy snacks, a more positive approach may be the introduction of healthy snack options over time. Moreover, healthy food choices outside the home also need to be made more readily available.

### 1.5 Psychological factors

## Stress

Psychological stress is a common feature of modern life and can modify behaviours that affect health, such as physical activity, smoking or food choice.

The influence of stress on food choice is complex not least because of the various types of stress one can experience. The effect of stress on food intake depends on the individual, the stressor and the circumstances. In general, some people eat more and some eat less than normal when experiencing stress<sup>39</sup>.

The proposed mechanisms for stress induced changes in eating and food choice are motivational differences (reduced concern about weight control), physiological (reduced appetite caused by the processes associated with stress) and practical changes in eating opportunities, food availability and meal preparation.

Studies also suggest that if work stress is prolonged or frequent, then adverse dietary changes could result, increasing the possibility of weight gain and consequently cardiovascular risk<sup>51</sup>.

## Mood

Hippocrates was the first to suggest the healing power of food, however, it was not until the middle ages that food was considered a tool to modify temperament and mood. Today it is recognised that food influences our mood and that mood has a strong influence over our choice of food.

Interestingly, it appears that the influence of food on mood is related in part to attitudes towards particular foods. The ambivalent relationship with food – wanting to enjoy it but conscious of weight gain is a struggle experienced by many. Dieters, people with high restraint and some women report feeling guilty because of not eating what they think they should<sup>17</sup>. Moreover, attempts to restrict intake of certain foods can increase the desire for these particular foods, leading to what are described as food cravings.

Women more commonly report food cravings than do men. Depressed mood appears to influence the severity of these cravings. Reports of food cravings are also more common in the premenstrual phase, a time when total food intake increases and a parallel change in basal metabolic rate occurs<sup>21</sup>.

Thus, mood and stress can influence food choice behaviour and possibly short and long term responses to dietary intervention.

## 2. Eating disorders

Eating behaviour, unlike many other biological functions, is often subject to sophisticated cognitive control. One of the most widely practised forms of cognitive control over food intake is dieting.

Many individuals express a desire to lose weight or improve their body shape and thus engage in approaches to achieve their ideal body mass index. However, problems can arise when dieting and/or exercise are taken to extremes. The aetiology of eating disorders is usually a combination of factors including biological, psychological, familial and socio-cultural. The occurrence of eating disorders is often associated with a distorted self-image, low self-esteem, non-specific anxiety, obsession, stress and unhappiness<sup>36</sup>.

Treatment of an eating disorder generally requires weight stabilisation and one-to-one psychotherapy. Prevention is more difficult to define but suggestions include avoidance of child abuse; avoidance of magnifying diet and health issues; showing affection without over-controlling; not setting impossible standards; rewarding small attainments in the present; encouraging independence and sociability<sup>36</sup>.

## 3. Consumer attitudes, beliefs, knowledge and optimistic bias

Consumer attitudes and beliefs

In both the areas of food safety and nutrition, our understanding of consumers' attitudes are poorly researched<sup>26</sup>. A better understanding of how the public perceive their diets would help in the design and implementation of healthy eating initiatives.

The Pan-European Survey of Consumer Attitudes to Food, Nutrition and Health found that the top five influences on food choice in 15 European member states are 'quality/freshness' (74%), 'price' (43%), 'taste' (38%), 'trying to eat healthy' (32%) and 'what my family wants to eat' (29%). These are average figures obtained by grouping 15 European member states results, which differed significantly from country to country. In the USA the following order of factors affecting food choices has been reported: taste, cost, nutrition, convenience and weight concerns<sup>27</sup>.

In the Pan-European study, females, older subjects, and more educated subjects considered 'health aspects' to be particularly important. Males more frequently selected 'taste' and 'habit' as main determinants of their food choice. 'Price' seemed to be most important in unemployed and retired subjects. Interventions targeted at these groups should consider their perceived determinants of food choice.

Attitudes and beliefs can and do change; our attitude to dietary fat has changed in the last 50 years with a corresponding decrease in the absolute amount of fat eaten and a change in the ratio of saturated to unsaturated fat.

## Optimistic bias

There is a low level of perceived need among European populations to alter their eating habits for health reasons, 71% surveyed believing that their diets are already adequately healthy<sup>31</sup>. This high level of satisfaction with current diets has been reported in Australian<sup>52</sup>, American<sup>10</sup> and English subjects<sup>37</sup>.

The lack of need to make dietary changes, suggest a high level of optimistic bias, which is a phenomenon where people believe that they are at less risk from a hazard compared to others. This false optimism is also reflected in studies showing how people underestimate their likelihood of having a high fat diet relative to

others<sup>25</sup> and how some consumers with low fruit and vegetable intakes regard themselves as 'high consumers'<sup>11</sup>. If people believe that their diets are already healthy it may be unreasonable to expect them to alter their diets, or to consider nutrition/healthy eating as a highly important factor when choosing their food. Although these consumers have a higher probability of having a healthier diet than those who recognise their diet is in need of improvement, they are still far short of the generally accepted public health nutrition goals<sup>26</sup>. It is also unlikely that these groups will be motivated further by dietary recommendations. Hence, future interventions may need to increase awareness among the general population that their own diet is not wholly adequate in terms of, for example fat, or fruit and vegetable consumption<sup>13</sup>. For those who believe their diets to be healthy it has been suggested that if their beliefs about outcomes of dietary change can be altered, their attitudes may become more favourable and they therefore may be more likely to alter their diets<sup>40</sup>. Thus, a perceived need to undertake change is a fundamental requirement for initiating dietary change<sup>31</sup>.

## 4. Barriers to dietary and lifestyle change

### Focus on cost

Household income and the cost of food is an important factor influencing food choice, especially for low-income consumers. The potential for food wastage leads to a reluctance to try 'new' foods for fear the family will reject them. In addition, a lack of knowledge and the loss of cooking skills can also inhibit buying and preparing meals from basic ingredients.

Education on how to increase fruit and vegetable consumption in an affordable way such that no further expense, in money or effort, is incurred has been proposed as a solution<sup>18</sup>. Efforts of governments, public health authorities, producers and retailers to promote fruit and vegetable dishes as value for money could also make a positive contribution to dietary change<sup>12</sup>.

### Time constraints

Lack of time is frequently mentioned for not following nutritional advice, particularly by the young and well educated<sup>33</sup>. People living alone or cooking for one seek out convenience foods rather than cooking from basic ingredients. This need has been met with a shift in the fruit and vegetables market from loose to prepacked, prepared and ready-to-cook products. These products are more expensive than loose products but people are willing to pay the extra cost because of the convenience they bring. Developing a greater range of tasty, convenient foods with good nutritional profiles offers a route to improving the diet quality of these groups.

## 5. Models for changing behaviour

### Health Behavioural Models

Understanding how people make decisions about their health can help in planning health promotion strategies. This is where the influence of social psychology and its associated theory-based models play a role. These models help to explain human behaviour and in particular to understand how people make decisions about their health. They have also been used to predict the likelihood that dietary behaviour change will occur. This section focuses on a select few.

### The Health Belief Model (HBM) and the Protection Motivation Theory

The HBM was originally proposed by Rosenstock<sup>43</sup>, was modified by Becker<sup>z</sup> and has been used to predict protective health behaviour, such as screening, vaccination uptake and compliance with medical advice. The model suggests that people considering changing their behaviour must feel personally threatened by a disease/illness and that they then engage in a cost-benefit analysis. This model also suggests that people need some kind of cue to take action to change behaviour or make a health-related decision.

### The Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB)

The Theory of Reasoned Action<sup>4</sup> or its extension in the form of The Theory of Planned Behaviour<sup>5</sup> have been used to help explain as well as to predict the intention of a certain behaviour. These models are based on the hypothesis that the best predictor of the behaviour is behavioural intention. The model proposes that an individual's behavioural intention is jointly derived from three components;

1. attitudes,
2. perception of social pressure to perform the behaviour and
3. perceived control over the behaviour.

In dietary studies TPB/TRA enables a comparison of the strength of influences upon individuals and between sample groups and can be used to build an understanding of the determinants of food choice. The TRA has been successful in explaining behaviours such as fat, salt and milk intake. The TPB model was also used to help explain attitudes and beliefs about starchy foods in the UK<sup>50</sup>.

### Stage classification for health-related behaviour

The Stages of Change model developed by Prochaska<sup>42</sup> and co-workers suggests that health related behaviour change occurs through five separate stages. These are pre-contemplation, contemplation, preparation, action and maintenance. The model assumes that if different factors influence transitions at different stages, then individuals should respond best to interventions tailored to match their stage of change.

The Stages of Change model, in contrast to the other models discussed, has proven to be more popular for use in changing behaviour rather than in explaining current behaviour. This is probably because the model offers practical intervention guidance that can be taught to practitioners. In addition, large random samples can be tested with messages tailored to the person's stage of readiness to change.

It has been suggested that a stage model may be more appropriate for simpler more discrete behaviours such as eating five servings of fruit and vegetables every day, or drinking low-fat milk (food-based goals)

than for complex dietary changes such as low-fat eating (nutrient-based goal)<sup>29</sup>.

Presently, no one theory or model sufficiently explains and predicts the full range of food-choice behaviours<sup>38</sup>. Models in general should be viewed as a means to understanding the factors influencing individual decisions and behaviour. Despite the number of models of behaviour change, they have been employed in relatively few nutrition interventions; the Stages of Change model being the most popular. However, the best test of this model, whether stage-matched dietary interventions outperform standardised approaches, has yet to be performed.

## 6. Changing food behaviour: successful interventions

Dietary change is not easy because it requires alterations in habits that have been built up over a life-time. Various settings such as schools, workplaces, supermarkets, primary care and community based studies have been used in order to identify what works for particular groups of people. Although results from such trials are difficult to extrapolate to other settings or the general public, such targeted interventions have been reasonably successful, illustrating that different approaches are required for different groups of people or different aspects of the diet.

Interventions in supermarket settings are popular given this is where the majority of the people buy most of their food. Screening, shop tours and point-of-purchase interventions are ways in which information can be provided. Such interventions are successful at raising awareness and nutrition knowledge but their effectiveness of any real and long-term behaviour change is unclear at present.

Schools are another obvious intervention setting because they can reach the students, their parents and the school staff. Fruit and vegetable intake in children has been increased through the use of tuck shops, multimedia and the internet and when children get involved in growing, preparing and cooking the food they eat<sup>1,6,35</sup>.

Moreover, covert changes to dishes to lower fat, sodium and energy content improved the nutritional profile of school dinners without losing student participation in the school lunch programme<sup>44</sup>. Workplace interventions can also reach large numbers of people and can target those at risk. Increasing availability and appeal of fruit and vegetables proved successful in worksite canteens<sup>34</sup> and price reductions for healthier snacks in vending machines increased sales<sup>24</sup>. Thus, the combination of nutrition education with changes in the workplace are more likely to succeed particularly if interactive activities are employed and if such activities are sustained for long periods<sup>41</sup>. Tackling several dietary factors simultaneously such as reducing dietary fat and increasing fruit and vegetables, has proved effective in the primary care setting<sup>47</sup>. Behavioural counselling in conjunction with nutrition counselling seems most effective in such settings although the cost implications of training primary care professionals in behaviour counselling are unclear at this time. Educational and behavioural strategies have also been used in public health/ community settings, which have been shown to increase fruit and vegetable intake<sup>2,3,12</sup>.

## 7. Conclusion

There are many influences on food choice which provide a whole set of means to intervene into and improve people's food choices. There are also a number of barriers to dietary and lifestyle change, which vary depending on life stages and the individual or group of people in question.

It is a major challenge both to health professionals and to the public themselves to effect dietary change. Different strategies are required to trigger a change in behaviour in groups with different priorities. Campaigns that incorporate tailored advice that include practical solutions as well as environmental change are likely to succeed in facilitating dietary change.

*Reviewed by Dr France Bellisle, INRA, France*

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