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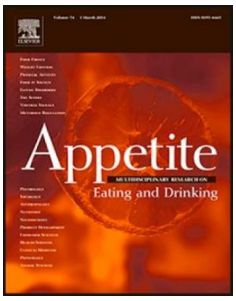

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Meals described as healthy or unhealthy match public health education in England

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Highlights

- People's freely written reports of their recent eating episodes can be quantitatively studied.
- Eating practices perceived as healthy and unhealthy differ in foods and contexts.
- Public perception of healthy and unhealthy eating matches dietary guidance in England.
- Dietary guidelines should go beyond food groups to practices that contribute to health.

Abstract

Dietary guidelines for the general public aim to lower the incidence of nutrition-related diseases by influencing habitual food choices. Yet little is known about how well the guidelines are matched by the actual practices that people regard as healthy or unhealthy. In the present study, British residents were asked in a cognitive interview to write a description of an occasion when either they ate in an unhealthy way or the eating was healthy. The reported foods and drinks, as well as sort of occasion, location, people present and time of day, were categorised by verbal and semantic similarities. The number of mentions of terms in each category were then contrasted between groups in exact probability tests. Perceived unhealthy and healthy eating occasions differed reliably in the sorts of foods and the contexts reported. There was also full agreement with the national guidelines on eating plenty of fruit

and vegetables, eating small amounts of foods and drinks high in fat and/or sugar, drinking plenty of water, and cutting down on alcohol. There was a tendency to regard choices of bread, rice, potatoes, pasta and other starchy foods as healthy. Reported healthy and unhealthy eating did not differ in incidences of meat, fish, eggs, beans and other non-dairy sources of protein or of dairy foods and milk. These results indicate that operationally clear recommendations by health professionals are well understood in this culture but members of the public do not make clear distinctions in the case of foods that can be included in moderate amounts in a healthy diet.

Key words

Healthy eating, dietary guidelines, episodic memory, meal occasion, food and drink intake

Introduction

This paper presents an experiment on people's understanding of the words "unhealthy" and "healthy" when describing examples of their meals that fit these concepts. A large difference in effect of just the two letters distinguishing "*un*healthy" from "healthy" was sought in participants' accounts of a recent occasion of eating.

The context of this study was that guidelines on healthy eating are meant to encourage diets that prevent disease and improve health. The primary question therefore is how the published guidance might be influencing actual dietary practices. Misconceptions of dietary guidelines have been reported to be common (Boylan, Louie & Gill, 2012). However, most studies evaluated awareness or comprehension. No study has assessed if the distinctions individuals describe between healthy and unhealthy eating resemble the dietary guidelines promoted in the population.

Words selected by individuals to talk about their everyday activities possess ecological validity within their culture, according to anthropological principles (Wittgenstein, 1953; Romney, Weller & Batchelder, 1986; Dressler, Oths, Ribeiro et al., 2008). Salient features of any enacted behaviour are manifested as particular words used by the person to describe that event (Maguire & Dove, 2008). In this case, the vocabulary of a person's free account of when she or he ate healthily or unhealthily would indicate the features held in memory for the concepts of benefitting and risking health (Booth, Sharpe, Freeman et al., 2011). This paper measures consensus among those personal standards in a convenience sample from a particular locality and then compares that consensus with online public health messages from government about eating choices.

Individuals are likely to report recent eating occasions because they are more available in memory than remote events (Conway, 2009). Recall of eating occasions has an accuracy of 80-90% over about a week (Smith, Jobe & Mingay, 1991; Fries, Green & Bowen, 1996; Armstrong, MacDonald, Booth et al., 2000). Therefore reports of recent eating patterns could be valid and reliable, whether volunteered as healthy or unhealthy.

It was hypothesised that the vocabulary used in written description of a meal would differ between conditions stated to be "healthy" or "unhealthy." It was further hypothesised that the

differences would correspond well with the concepts in national dietary guidance, at least when they were unequivocal (Table 1).

Method

Participants

The participants were visitors to the School of Psychology during the Open Day at the University of Birmingham in 2008. The volunteers for this experiment were mostly prospective students or their accompanying relatives or friends. A total of 39 people took part. No selection criteria were applied except that volunteers were British residents. Two students and one staff member of the University helped to pilot the study. Procedure and materials were not altered as result of piloting, so those three people were also included. Participants categorised themselves as "child", "young person" or "adult." Only five wrote "child" who were female high school pupils, and so they were included in the younger group with 21 participants who wrote "young person", mostly undergraduate students. The "adult" participants, constituting the older group, included parents as well as postgraduate students and university staff. All participants spoke English as their first language.

Design

The study had the experimental design of comparisons between subjects in two different conditions, eating perceived as unhealthy or healthy. Each participant had a single interview session. Attempting random assignment to conditions might have imposed the reporting of unhealthy eating on some who were unwilling to confess such practices. Therefore the volunteers were allowed to assign themselves from the initially proposed condition of "unhealthy" eating to the condition of "healthy" eating.

Recruitment

Volunteers were recruited by two researchers (one male and one female) in a room displaying some of the research carried out in the School. The experiment was presented as *Research on healthy eating* through a notice on the investigators' table inviting people to take part. Each investigator administered questionnaires to different attendees as they came to the table. The

volunteers were asked the question: *Would you be willing to tell us about a time when you ate in an unhealthy way?* If the person seemed doubtful or did not say 'yes' immediately, the investigator offered the other option: *…or you may prefer to tell us about when you ate in a healthy way*. Volunteers who agreed to either of these options then described the respective occasion in writing.

Measurement Questionnaire

Accurate accounts of everyday behaviour can be elicited by participant's free recall of recent activities, including eating occasions (Smith, Jobe & Mingay, 1991; Fries, Green & Bowen, 1996; Armstrong, MacDonald, Booth et al., 2000). The specification of the occasion to be recalled needs to be sufficiently rich in detail to provide non-leading prompts to the mental reconstruction of that event. This principle is the basis of the cognitive interview: questions in a structured series serve as mnemonics, about time of day, location, people present and other features particular to one incident (Knibb & Booth, 2011). The answer about the timing of an occasion of a recognised piece of behaviour provides information about its frequency during that period of time and also distinguishes an autobiographical memory from general knowledge (Tulving, 1972).

Thus, participants responded in their own words to a sequence of question items that applied the principles of the Cognitive Interview to support recall of the eating episode that they regarded as healthy or unhealthy. The first item asked the participant to describe the eating occasion. This item included prompts to report the sort of occasion, the location, the number of people present and the food and drink consumed with rough quantities. The second item asked for the date and time of the episode. The third and fourth items asked the participant for factors that she or he thought would make eating in that way again in the future more likely (3^{rd} item) or less likely (4^{th}). The responses to these last questions are not presented in this paper since they were used as data in another study about influences on lapsing from a dietary change.

Analysis of Data

The difference from 50% in the proportion of participants who opted to describe healthy eating rather than unhealthy eating was tested using Fisher's test of exact probabilities (FEP)

with one-tailed *p* values. The difference between occasions of healthy and unhealthy eating in the reported time period between occurrence and recall was inferred by Mann-Whitney *U* test of ranks. A *p* value below 0.05 was used to reject the null hypothesis.

The words describing an occasion were divided into the Food intake, Sort of occasion, Location, and People present, corresponding to the CI prompts to recall. Within each of these features, words that were regarded by the investigators as meaning the same were assigned to one conceptual category. The number of times that each category had been written was contrasted between *healthy* and *unhealthy* eating episodes using FEP with two-tailed *p* values.

In addition, the agreement of elicited food words and their health attributions with current UK Food Standards Agency's dietary guidelines (Table 1) was assessed by a member of the research team (AL-C) with a bachelor degree in human nutrition and checked by a registered research nutritionist (DAB).

Results

Choice to report healthy over unhealthy eating

A total of 61% of participants preferred not to report *unhealthy* eating, $p = 0.07$ (FEP; Table 2). Reliably higher proportions of adults as well as of females opted to describe *healthy* rather than *unhealthy* eating, $p < 0.0002$ and $p < 0.01$.

Descriptions of healthy and unhealthy meals

The accounts of episodes of eating a *healthy* or *unhealthy* meal configured foods and the context of eating into a coherent whole. Examples of descriptions of *healthy* meals included the following.

> I had cereal and fruit for breakfast.

> Lunch time at college with friends. Cheese sandwich, brown bread, one apple, one glass of water.

> Dinner with cousins at their home fruit, chapatti and vegetable soup.

The following are examples of descriptions of meals regarded as *unhealthy*.

> One regular pizza and two glasses of fizzy lemonade on my sofa in front of the TV alone.

> Fish and chips - one portion, a month ago, afternoon, with a friend, no occasion just for fun

> Out on a Friday night with friends. Drank about 8 pints of beer and then went for an Indian meal about midnight

Overall, recorded occasions of perceived eating healthily and unhealthily occurred about one day before their recall, median (lower quartile; upper quartile) = 0.95 days (0.60; 2.00). No reliable difference in recency was found between *healthy* and *unhealthy* conditions, 0.85 days (0.50; 1.40) *vs*. 1.05 days (0.60; 3.40), $U = 187$, $p < 0.6$.

Time of day

There were five categories of timing of the eating occasion (Table 3). Three categories were eating at conventional meal times – Breakfast, Lunch and Dinner/evening meal. The incidences of Breakfast and Lunch did not differ reliably between *unhealthy* and *healthy* meals. The incidence of Dinner occasions was higher in *healthy* than in *unhealthy* eating. Evening meals occurred at home. Relatives were mentioned in the accounts, indicating that these were usually family occasions.

The fourth timing category was for meals that took place out of the home, mostly not at the meal times that are usual in the UK. Participants did not use a particular term to name these meals. Meals out were mentioned more often in unhealthy eating occasions.

The fifth category comprised episodes between meals, including what some reports called a "snack." The incidences of episodes between meals were not reliably different between

unhealthy and *healthy* eating. Nevertheless, occasions between meals in *unhealthy* eating included the three food and drink classes Chocolate, Biscuits and Coke, whereas Fruit such as apple and grapes were included in *healthy* eating.

Location

The locations at which the described eating occasions took place could be categorised into Home, School or work and Out of the home (Table 3). Eating at home was a feature of occasions reported as *healthy*. In contrast, eating out was a feature of *unhealthy* eating. School or the workplace was equally divided between *unhealthy* and *healthy* eating.

People present

The answers regarding people present could be placed into the three categories: eating Alone; With one other; With two or more. The number of people present in proportion to the total did not differ appreciably between *unhealthy* and *healthy* eating (Table 3). Eating with friends was characteristic of *unhealthy* meals, whereas eating with family typified *healthy* meals.

Foods and drinks

The variety of particular foods and drinks reported in each condition formed 27 categories (Table 4). The categories Fruit, Salad/vegetables and Water appeared only in descriptions of *healthy* eating occasions. The categories Chocolate, Burger and chips, Pizza, Coke, Salt and Alcohol occurred only in occasions of *unhealthy* eating. Two other categories that included items from the starchy food group, such as bread or potato, and non-dairy sources of protein group, such as meat or fish, appeared more in occasions of *unhealthy* eating. The other 16 categories did not differ in incidence between *unhealthy* and *healthy* meals.

Relationships to public health education

The assignments of foods to *healthy* and *unhealthy* occasions were in line with the UK governmental guidance for intake of fruit and vegetables, foods high in fat and/or in sugar, water, food high in salt and alcohol a day (Table 4). For the other food guidelines, there was

no evidence that mentions of the corresponding foods differed between occasions of *healthy* and *unhealthy* eating.

Discussion

The difference of just two letters between the words "healthy" and "*un*healthy" had an enormous effect on the words that people wrote down. Good performance of participants at reporting specific sorts of foods in their accounts of healthy or unhealthy meals was shown by some perfect matches with the governmental dietary guidelines. Such a finding is not unexpected because much of the guidance has been well disseminated in the British media, and is supported by labelling on food packs.

Nevertheless, some of the sorts of food in meals reported as *unhealthy* or *healthy* could be regarded as in conflict with the national guidance to the public. For instance, the governmental website specifically stated that inclusion of some meat in the diet is part of healthy eating (Table 1). Yet some cases of meals perceived as unhealthy included some meat, as well as other cases where meat was reported under the concept of healthy eating. Such semantic mismatches indicate that members of public have difficulties in fully incorporating official food guidance to their diet. Indeed, the clarity to the hearer or reader of the wording used to promote change is a key aspect of influencing behaviour (Myers, 2010). In addition, any guidance in terms of foods or food groups is problematic because potential detriment to health depends on excessive amounts of foods that can form part of a healthy diet. Dietary messages need to be elaborated sufficiently to convey the idea of a food being healthy in modest amounts, but unhealthy in large amounts.

A fundamentally different approach reliant on customary patterns of eating avoids such difficulties (Booth & Booth, 2011). A specification of well understood eating patterns would be both clearer and also more readily implemented than putting foods in groups that are or are not part of a healthful diet. The use of locally validated descriptions of widespread habits also sidesteps the arguably insoluble issues of determining the extent to which health is improved by compliance with healthy eating messages that have been professionally implemented from expert interpretations of epidemiological data. The effect on health-risk factors can be measured from individuals' changes in frequency and intensity of each pattern (Blair, Booth, Lewis et al., 1989; Booth, Blair, Lewis, Baek et al., 2004).

An additional point to be made from this small study is that rich data can be obtained from participants' structured reports about their recent eating episodes. In particular, factors in the immediate context could be fundamental to eating either healthily or unhealthy (Cohen & Babey, 2012). For instance, features of meals reported in this study were consistent with eating at home and with family rather than out of the home and with friends which has been claimed to be less healthy (Mesas, Pareja, López-García & Rodriguez-Artalejo, 2012). Similarly, adolescents at school exposed to friends and food cues have been found to eat less healthily (Grenard, Stacy, Shiffman et al. 2013).

Potential limitations of this study

Generalisations from the present quantitative findings would of course require a representative and therefore large sample from a specified population. The data should be analysed in ways that establish consensus on the uses of the elicited wordings.

Nevertheless, even the modest set of data presented here is sufficient to establish diverse residents of an English city agree on categorising a considerable number of foods as healthy or unhealthy. It is not essential to this conclusion to be sure that the meals as worded actually occurred. Nonetheless, the data were dominated by occasions dated within a few days of writing, well in the span of reliable recall. This finding also indicates that eating occasions perceived as either healthy or unhealthy were both highly prevalent within this sample.

The setting where participants were recruited or other momentary factors, could have affected self-allocation to *healthy* or *unhealthy* conditions. It is not obvious how that procedure could have biased the choice of foods to mention. This possibility can only be established empirically and suggests a possibly avenue for future research.

Conclusions

The clarity of the findings of this experiment substantiates the value of exchanging accounts with the public in order to gain insights into the realities of their eating. A choice of foods, even if regarded by experts as a benefit or a risk to health, may be an insufficient specification of behaviour for research into the effects of familiar practices of eating or for the communication of evidence on healthy or unhealthy diets. We need measurements of the

effects on health of widely occurring eating patterns, specified in wordings that have been shown to be clearly recognised within the local culture (Booth & Booth, 2011; Laguna Camacho, 2013).

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377 Table 1. **Messages about healthy eating from the UK Food Standards Agency (2010)**
378

Try to eat
· plenty of fruit and vegetables
· plenty of bread, rice, potatoes, pasta and other starchy foods
· some milk and dairy foods
· some meat, fish, eggs, beans and other non-dairy sources of protein
· just a small amount of foods and drinks high in fat and/or sugar
Try to eat less salt
· no more than 6g a day
Drink plenty of water
· about 6 to 8 glasses of water, or other fluids, every day
Cut down alcohol
· women: up to 2 to 3 units a day
· men: up to 3 to 4 units a day

379 Source: http://www.eatwell.gov.uk/healthydiet; accessed on 15/05/2010
380

381 Table 2. **Counts of opting to describe *unhealthy* (UE) or *healthy* (HE) eating**

382

	Total		% shift from	Younger group		Older group	
	UE	HE	UE to HE	UE	HE	UE	HE
Total	16	26	61	12	14	4	12
Females	10	20	67	7	13	3	7
Males	6	6	50	5	1	1	5

383
384

385 Table 3. **Counts of reported contexts of eating stated to be "unhealthy" or "healthy"**

386

		"Unhealthy" (*N* = 16)		"Healthy" (*N* = 26)		Same counts
Categories	Contextual detail reported	Count	%	Count	%	*p*
Meal time						
Breakfast	breakfast	2	13	6	23	0.69
Lunch	lunch, workday lunch, lunch time	2	13	7	27	0.44
Evening/dinner	dinner, evening meal, family meal [evening], family meal, family occasion, formal ball	1	6	9	35	**0.02**
[between meals]	a snack, when I want to snack, break times	3	19	2	8	0.35
[meals mid-afternoon, night]	no occasion - just for fun [4:30 pm], miss lunch [3:30 pm], meal [3:00 pm], night out, out on Friday night, birthday party	8	50	2	8	**0.05**
Place						
Home	home, house	2	13	16	62	**0.01**
School/Work	collage, school, school canteen, Avanti, building, staff canteen	5	31	8	31	1.00
Out	McDonalds, Burger King, Pizza Hut, Silver Grill, kebab shop, cinema, birthday party, night out, Sudley castle [formal ball], meal out,	9	56	2	8	**0.01**
People present						
Alone	alone, on my own	2	13	6	23	0.69
One other	dad, wife, sister in law, son, daughter, cousins, family, whole family	2	13	4	15	1.00
Two or more	friends, work mates, country people	12	75	16	62	0.50
Relation						
Family members	-	1	6	11	42	**0.01**
Friends	-	13	81	9	35	**0.01**

387

388 N = total number of participants per condition. % = percent of total participants in a condition

389 reporting the contextual feature(s) for each category. p = exact probability test. Reliable differences

390 between UE and HE are indicated in bold font.

391

Table 4. **Food and drink ingested on reported occasions of "unhealthy" or "healthy" eating, in counts of food groups listed in UK governmental guidelines**

Food Group	Categories of reported foods and drinks	"Unhealthy" (k = 27)		"Healthy" (k = 80)		Same counts
		Count	%	Count	%	*p*
Fruit and vegetables	- [fresh] fruit, apple, grapes, pineapple, fruit juice	0	0	12	15	**0.02**
	- salad [with cheese and some pickles], vegetables, spinach	0	0	11	14	**0.03**
	- vegetable dish, vegetable stir fry, vegetarian casserole	0	0	3	4	0.41
	All categories	*0*	*0*	*26*	*33*	***0.01***
Bread, rice, potatoes, pasta and other starchy foods	- cereal, oat and porridge, Bran Flakes, muesli [with milk]	0	0	4	5	0.31
	- bread, bran bread, chapattis, toast [with raspberry], nutrigrain	0	0	7	9	0.12
	- pasta and pesto, cous cous, risotto [plus mushrooms]	0	0	3	4	0.41
	- potatoes, new potatoes, hash browns	1	4	2	3	0.84
	- [ham/ cheese] sandwich	0	0	2	3	0.56
	- pizza, burger and fries, [fish and] chips, crisps, [choc] biscuit	11	41	0	0	**0.01**
	All categories	*12*	*44*	*18*	*23*	*0.11*
Meat, fish, eggs, beans and other non-dairy sources of protein	- grilled fish, chicken breast, bacon, egg, sausages	1	4	6	8	0.47
	- beans, pulses, lentils	1	4	4	5	0.63
	- ham [sandwich]	0	0	1	1	0.75
	- burger [and fries], fish [and chips]	4	25	0	0	**0.01**
	- tofu	0	0	1	1	0.75
	All categories	*6*	*22*	*12*	*15*	*0.54*
Milk and dairy foods	- yogurt, low-fat yogurt, [Bran Flakes -] skimmed milk, [muesli with] milk, cheese [sandwich/pizza]	4	14	7	9	0.46
Foods and drinks high in fat and/or sugar	- bag of crisps	1	4	0	0	0.25
	- chocolate biscuit	1	4	0	0	0.25
	- fish and chips	2	7	0	0	0.06
	- [onion & cheese] pizza, regular pizza	3	11	0	0	**0.02**
	- [BigMac] burger and fries/chips	4	14	0	0	**0.01**
	- fizzy lemonade, Coca Cola, Diet Coke	4	14	0	0	**0.01**
	- bar of chocolate, chocolate Toblerone, Kit Kat	5	18	0	0	**0.01**
	All categories	*20*	*74*	*0*	*0*	***0.01***
6. **Food high in salt**	- cereal, soup, pasta, bread, pulses, bacon, sausages, crisps, pizza, burger and fries, fish and chips	13	48	14	18	**0.03**
7. **Water**	- glass of water, bottle of water, water	0	0	10	13	**0.04**
	- cup of tea, mug of tea, mug of coffee	1	4	4	5	0.63
	All categories	*1*	*4*	*14*	*18*	*0.12*
8. **Alcohol a day: ≤ 2-3 units women, 3-4 units men**	- one glass of white wine, two glasses of red wine	1	4	2	3	0.56
	- drink some alcohol, lots of alcohol, eight pints of beer	5	18	0	0	**0.01**
	All categories	*6*	*22*	*2*	*3*	***0.01***

k: number of foods in the eating condition. %: percent of total foods reported in each food group category. p: exact probability. All the reliable differences (in bold font) were in the direction consistent with the national guidelines.