Authors' Manuscript for *Appetite* (2000) 34, 107-108, PLUS A COPY OF THE TOOL
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Research Letter

Tool for assessing and reducing an individual's fat intake. DAVID A. BOOTH AND ROSEMARY G. PLATTS. *Food & Nutrition Laboratory, School of Psychology, University of Birmingham, Edgbaston, Birmingham B15 2TT, U.K.*

Medical advice in the U.K., as in other industrialised countries, is that food policy and nutrition education should encourage a reduction of the nation's average proportion of energy ingested as fats, in favour of complex carbohydrates (COMA 1994). Recently the guidelines to the public have been changed from nutrient terms to foods. At the same time, less emphasis has been placed on "negative" messages such as cutting down on fatty foods and more on increasing the intake of fruit and vegetables, as well as of starchy foods.

However, messages to the public on healthy eating are still based on a chemical understanding of the diet and of the methods of dietary assessment: what people do and say is construed solely as weights of particular chemical mixtures (foods) presumed to have passed down the oesophagus. In contrast, a behavioural, cognitive and social construction of the diet allows that a person's diet is a succession of decisions in particular contexts as to which foods and drinks to select for consumption (Armstrong et al., 1999; Booth, 1988; Booth et al., 1999; Schutz, 1999).

Chemically conceived dietary assessment is widely judged to be of value only for estimating intakes averaged across sample groups. Nevertheless there have been repeated attempts to use food-frequency questionnaires to estimate individuals' intakes. At best, these account for about 30% of the variance in fat intake estimated from weighed food records (Paisley et al. 1996). We have therefore conducted a pilot test of the psychological approach to see if it was more predictive, as well as better suited to informing the individual which practical steps would be healthiest for them personally.

First we selected 20 adults' 16-day weighed food records (Bingham et al., 1994) from 100 community volunteers that showed the 5 highest and the 5 lowest average daily fat intakes in each sex. Each of the recorded days was then divided into 6 periods (mealtimes and between/after meals). Foods, drinks and combinations of them consumed in a particular period of the day were categorised by their usual descriptive name and by their fat, carbohydrate and

salt content. The number of times that one of these categories of occasion-specific food choice was recorded by an individual over the 16 days was tested for its association with average fat intake estimated from the same record (Booth et al., 1999). The 35 most predictive choices were then presented by questionnaire to 70 individuals who had earlier completed 16-day weighed food records; each person was asked to state how often they made that choice. These occasion-food frequencies were then linearly regressed onto recorded fat intake as percent of dietary energy (fat % en).

The occasion-specific food choices most predictive of high fat intake were *some egg or sausage or bacon at breakfast* (r = 0.33) and *chips* [french fries] *from a take-away shop in the evening* (r = 0.23), presumably deep-fried (unlike pre-prepared french fries cooked in an oven at home). The frequency of eating *crisps* [U.S.A: potato chips] *in the afternoon* also correlated with fat % en, r = 0.42. In contrast, low fat % en was predicted by frequencies of having *marmalade, jam or honey at breakfast* (r = - 0.34), *bread* (-0.46) or *a banana* (-0.20) *at lunchtime* and *an evening meal of something with vegetables* (-0.56).

Some drink choices were also predictive, presumably because of their behavioural associations with high- or low-fat food choices: *lunchtime coffee* -0.49; *afternoon coffee* -0.21; *afternoon drink with whole milk* +0.39; *fizzy soft drink with evening meal* + 0.37. The inclusion of such drink items should increase the accuracy of a tool at predicting fat intake. However, feedback on them is not likely to help in reducing high intake as much as is advice to eat more of the high-carbohydrate foods, fruit and vegetables and less of the fatty foods.

When those 11 occasion-specific choices were scored according to their regression scatterplots, the total scores for these 70 respondents correlated 0.71 with fat % en estimated from the 16-day weighed food records. That is to say, this short occasion-specific food-frequency questionnaire accounts for about twice the variance ($r^2 = 0.50$) covered by most uncontextualised food-frequency questionnaires with many more items (r-values of around 0.5). When the respondents were divided into quartiles of fat intake, a mean of 94% were classified in the correct half of the weighed intakes (same or adjacent quartile). This occasion-food questionnaire has been scored to give a distribution of intakes similar to that seen over the British population in current surveillance. Scores can therefore be fed back to individuals as fat % en relative to recommended intake, with personally tailored evidence-based advice on changes in frequencies of the assessed occasion-food choices. Neither our new approach nor weighed food recording or traditional frequency questionnaires

can be validated on the individual's fat intake, since there is no other way of measuring a person's free-living intake of all particular foods.

In the light of these results, a one-page tool has been prepared for dissemination. Copyright is retained in order to require any reproduction to be of the document as a whole and to be reported to the author. Health professionals, educators, journalists and members of the public may use the tool to test if an individual in the majority English culture has a diet that is unwisely high in energy from fats, and to identify in such instances the changes in some food choices at or between meals that would most readily contribute to a reduction in that person's fat intake.

In addition, this new approach should be implemented generally in the analysis of timed and weighed food records and of diet diaries with household measures. Current dietary software destroys the information requested on which particular foodstuffs were consumed and the timing of intake, in order to estimate only a 24-hour total for the intake of each nutrient in the food composition database. The algorithms developed in the present study can be programmed into such software to provide values for the individual's usual frequencies of intake of stated amounts of specific foods at functional periods of the day and/or in categories of combination with other foods. Such portion-sized occasion-food frequencies provide no less precise estimates of daily nutrient intake at the same time as generating much needed quantitative measures of individuals' timings, sequences and combinations of food choice and intake. This application of psychological science therefore generates a direct evidence base for both nutritional epidemiology and dietary health promotion.

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THE BRITISH DIET: **are you eating less fat, as recommended?**

First, please ring one answer to each of the following questions.

How often do you eat	A	B	C
marmalade, jam or honey at breakfast?	every day or most days	one to three times a week	fortnightly or less
some egg or sausage or bacon at breakfast?	every day or most days	one to three times a week	fortnightly or less
bread at lunchtime e.g. sandwich, roll or toast?	every day or most days	one to three times a week	fortnightly or less
a banana at lunchtime?	every day or most days	one to three times a week	fortnightly or less
crisps in the afternoon?	every day or most days	one to three times a week	fortnightly or less
chips from a take-away shop in the evening?	every day or most days	one to three times a week	fortnightly or less
an evening meal of something with vegetables and maybe gravy?	every day or most days	one to three times a week	fortnightly or less
How often do you drink			
coffee at lunchtime?	every day or most days	one to three times a week	fortnightly or less
coffee in the afternoon?	every day or most days	one to three times a week	fortnightly or less
a drink with whole milk in the afternoon?	every day or most days	one to three times a week	fortnightly or less
a fizzy soft drink with your evening meal?	every day or most days	one to three times a week	fortnightly or less

Now please go to next page.

Please write your score below for each choice you made on the previous page.

	Food/drink	A	B	C	My score
Bkfast	marmalade	-4	-2	0	_____
Bkfast	egg,saus	+10	+3	0	_____
Lunch	bread	-6	-2	0	_____
Lunch	banana	-5	-1	0	_____
A'noon	crisps	+4	+2	0	_____
Ev.Meal	chips	+15	+4	0	_____
Ev.Meal	with veg.	-7	-2	0	_____
Lunch	coffee	-4	-1	0	_____
A'noon	coffee	-2	0	0	_____
A'noon	wholemilk	+6	+2	0	_____
Ev.Meal	fizzy drink	+5	+2	0	_____

Now add up all your 11 scores above: _____

Divide that total by 3: _____ Add 40: _____ * This is your final score.

If your *final score comes to **more than 33**, you are likely to be eating more fat than is good for you. You should try to eat the foods with a 'minus' score more often and to eat the 'plus' scores less often.

Even if you score **33 or less**, it is worth eating more of 'minus' foods and less of 'plus' foods. These mealtime choices of 'minus' foods help to lower fat intake because they are high in carbohydrate and bulk and low in fat. The basic idea is to eat fruit, vegetables and starchy foods as the major parts of every meal and snack.

Choices to avoid, or to make rarely at most, include fried breakfasts, fried take-aways or lots of fatty spreads or sauces or of cheese, sausages and meat pies. Instead, make main courses truly filling with lots of bread (or pizza or nan), pasta, rice or potatoes without added fat.