

## Research Report

## Patterns of eating and movement that best maintain reduction in overweight

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**Abstract**

Two studies of the influences of specific patterns of eating and exercising behaviour on body weight in English Midlands women were re-analysed using correlations as the measure of effect size. As predicted from computational modelling of hunger-sating mechanisms, avoiding energy-containing drinks and foods at the ends of and between meals was the behaviour most influencing year-long weight loss. However, although eating between meals is often called snacking, the term ‘snack’ appeared to be too ambiguous in this culture for its use in helping efforts to control weight. Avoidance of particular sorts of fat-rich foods was also associated with longer-term weight loss. Attempts at severe restriction of intake at mealtimes were associated with weight loss during a period of intensive dieting, but did not contribute to maintenance of that weight reduction. Using diet formulae to attain rapid weight loss was associated with significant weight gain over a year. These results support the suggestion that the first line of defence against weight gain is avoiding all sources of energy during drink breaks, with personally relevant advice on lower fat versions of particular foods also being important. Continued neglect of the behaviour-specific correlational approach to gaining evidence for less fattening habits does nothing to slow the rise in obesity.

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**Keywords:** Weight control; Energy-free drink breaks; Reduced-fat foods; Diet formulae; Fasting**Introduction**

Using the investigators’ descriptions of behaviour, Lewis and Booth (Booth, 1988a; Lewis & Booth, 1986) found in a retrospective design that dieters who reported reducing fat intake maintained a loss of reported weight whereas those who reported that they avoided snacking did not report weights that went down. In contrast, when Blair, Booth, Lewis, and Wainwright (1989)<sup>1</sup> used respondents’

descriptions of behaviour in a prospective design, they found that the reported weights went down over a period of 12 months or more among those who avoided calories in drinks and snackfoods between meals or what they called ‘sweet extras.’ One possibility, for which there has been some subsequent evidence (Chamontin, Pretzer, & Booth, 2003), is that the term ‘snack’ is ambiguous in British usage between eating between regular meals and having a light meal at a usual time. That hypothesis is further tested in this report by seeing if the sweet extras and between-meals calories question items lay within the same multivariate in factor analysis of data from Blair, Booth et al.

The wider pattern of findings in those two studies indicated the merits of using respondents’ own wordings in questionnaire items, as had long been recommended to attitude researchers (Fishbein & Ajzen, 1975). Furthermore, these and other results of Blair, Booth et al. (1989) showed the importance of identifying discrete patterns of choice of

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<sup>1</sup> A reviewer insisted on insertion of the word ‘retrospective’ in the subtitle of this paper. Nevertheless, the design was fully prospective, with reports of current body weight and current frequency of each behaviour being collected at baseline and again 12–14 months later. Current behaviour frequency of course includes the recent past but, unlike Lewis and Booth (1986) and Westenhoefer, Stelfeldt, and Martens (1997) for example, there was no reliance on recall of behaviour in the distant past.



particular sorts of food on specific types of occasion (cp. Booth & Platts, 2000).

However, while obesity rose rapidly in the 1990s, there was remarkably little use of this behaviourally specific correlational methodology to identify sustainable ‘lifestyle’ practices that are effective in avoiding weight (re)gain. A number of studies endeavoured to be more specific about dietary practices than the standard nutrient-based recommendations; yet they used the investigators’ own terms and merely studied prevalences of each sort of behaviour among dieters or weight losers, without relating eating patterns to weight change (e.g. French & Jeffery, 1997; Levy & Heaton, 1993; Middleman, Vazquez, & Durant, 1998; Wardle, Griffith, Johnson, & Rapoport, 2000). We have been able to find only two other studies in which changes in specific patterns of food choice were tested prospectively for association with losses in body weight: French, Jeffery, and Murray (1999) related changes in many different sorts of behaviour to changes in weight over a period of 4 years and found considerable differences between practices, in a pattern broadly consistent with the findings of Blair, Booth et al. (1989) over 1 year; Coakley, Rimm, Colditz, Kawachi, and Willett (1998) limited their consideration of food habits to eating between meals. Recently, Westenhoefer, von Falck, Stellfeldt, and Fintelmann (2003) have reported prospective data over 3 years but with specific practices combined for the calculation of odds ratios.

French et al. (1999) are also the only workers that we can find since Blair, Booth et al. (1989) and Blair, Lewis, & Booth (1989) to use correlational estimates of the efficacy of a weight-control practice. They present a multiple regression analysis almost incidentally to the main emphasis of the paper, referring to the regression coefficients only in the last paragraph of the paper, and as being ‘dose–response’ data. In fact, a correlation coefficient is a versatile measure of the size of an effect, equivalent to the most widely used measure of effect size—the difference in means between groups as a proportion of the standard deviation. A primary purpose of the present paper is therefore to report the findings by Lewis and Booth for the first time as bivariate correlations (instead of as differences between groups, without SDs). This is also the first peer-reviewed report of correlations with weight loss (briefly presented by Booth, 1996), because Blair, Booth et al. were concerned with the therapeutically more realistic measure of weight loss as a proportion of the difference between current and personal target weights.

A second purpose of the present paper is to present factor-analytic findings from the prospective study of self-described behaviour leading to loss in reported weight. These results were recently presented as an abstract (Blair, Lewis, & Booth, 2003), but have not been previously published in full because journals have been focused on representative sampling of populations, which is unrealistic for large bodies of volunteered data and unnecessary for

seeking evidence of associations among variables. Unlike the multiple regression used by French et al. (1999), factor analysis uses the confounding between effects to identify underlying commonalities. This paper thus tests the hypotheses that calories between meals and ‘sweet extras’ are similar behaviour, that cutting back on various high-fat foods are all examples of the construct of lowering dietary fat and that practices of long-term dieting are distinguishable from those for rapid weight loss whose failure in the longer term is widely thought to instigate disordered eating and a sense of failure, resulting in worse obesity (Blair, Booth et al., 1989; Blair, Lewis, & Booth, 1990).

It should be noted that we are not endeavouring to construct psychometric scales of dieting behaviour, as is the routine in clinically oriented research, cp. the EDI and the EAT for disordered eating, the DRQ (Booth, Lewis, & Blair, 1990), TFEQ and DEBQ for dieters’ practices, or inventories of food lifestyles, practices, preferences or aversions in the general population. Therefore, factor scores and measures of their self-consistency are not relevant to the present hypotheses. The only issue is whether or not verbally disparate descriptions group together in accord with the theoretical constructs that are available for their interpretation.

## Method

### *Study one*

Female adults shopping during the daytime in several West Midland town centres during May 1982 were asked for physical and demographic information and whether they had dieted, in the broadest sense of ‘changing what you eat, exercise you take, or whatever—to lose weight or for any other reason.’ Those women who indicated that they had dieted (54%) were then asked to take part in an in-depth study. Women were recruited to represent the range of ages between 18 and 60 years and of socio-economic status (SES), excluding ethnic minorities and the pregnant. All who agreed (76% of dieters) up to a quota of 100 were interviewed by appointment later at home.

The recruiting and interviewing were carried out by eight trained female interviewers from a reputable market research company. Interviewers did not differ significantly from respondents in SES or in weight relative to the desirable range (Society of Actuaries, 1980). The 100 dieters who participated in the home interview did not differ from those who declined, in age, SES or weight relative to that desirable for health.

Included in the information that respondents gave at interview were their weight and height at present and their weight immediately before and after their previous dieting episode. The mean reported weight of respondents at time of interview was 71.1 kg (SD=11.3) and estimated Body Mass Index (BMI) averaged 26.8 kg/m<sup>2</sup> (SD=4.3).



Table 1

Study one: investigator-specified strategies for control of body weight (Lewis & Booth, 1986)

1.	Walk whenever possible, instead of using bus, car, lift, escalator, etc.
2.	Take some exercise or sport on a regular (daily) basis
3.	Reduce sugar intake, e.g. cut out sweets, cakes, biscuits, etc.
4.	Reduce fat intake, e.g. grill not fry, remove excess fat or oil from foods before serving, spread margarine or butter thinly, etc.
5.	Eat slimmers' meal replacements instead of 1 meal each day, e.g. 'HPD', 'Slender', 'Slimgard', etc.
6.	Reduce starch intake, e.g. cut out bread and potatoes
7.	Stick to a specific number of calories per day, e.g. 1000 or 1500
8.	Substitute low-calorie products for some foods, e.g. soft drinks, sauces, spreads, Marvel, etc.
9.	Avoid snacking between meals and in the evenings
10.	Eat meals at (exactly) the same time each day

Respondents were also asked about 10 strategies which they might have used to control their weight (Table 1). In particular they were asked whether or not they had used that strategy during their last dieting episode and also whether or not they were using it currently. The professed use (=1; non-use=0) of each strategy when dieting was correlated with weight loss during the dieting episode calculated from the time-point recalls, while the professed current use (or non-use) of each strategy was correlated with weight loss calculated from weights reported for the start of the dieting episode and at the time of interview.

### Study two

During 1987, an initial questionnaire (Time 1) was completed by 493 respondents who had been contacted after their participation in a sponsored slimming effort organised by the British Heart Foundation, had volunteered in response to publicity about the work of this research team in a local newspaper, had participated in previous studies by this research team or had had a questionnaire passed on to them by a member of one of the above groups. There was a considerable diversity of age and employment in both sexes. The majority of respondents were middle class and lived in either the West Midlands or East Midlands areas of England.

Approximately 1 year later, 187 respondents were successfully re-contacted and completed the same questionnaire for a second time (Time 2). To enhance comparability between Study one and Study two, only data from the 112 adult females who reported actively controlling their weight at least once per year and who provided adequate information are included in the present paper.

Respondents were asked at Time 1 to report their current weight and height, and also their weight immediately before and after their last episode of dieting. At Time 2 they were again asked to report their weight at the time of questionnaire completion. The mean reported weight of

respondents immediately before the dieting episode was 72.4 kg (SD=14.0) and estimated BMI averaged 28.0 kg/m<sup>2</sup> (SD=5.2); 73% of respondents had an estimated BMI of at least 24 kg/m<sup>2</sup>.

In addition at each time point, respondents were asked to report their frequency of use (0=never, 10=all the time) of 27 eating and movement practices (Table 2), both when they were actively controlling their weight or shape and also when not actively controlling weight or shape. They were also asked to score the extent to which they were currently dieting (0=not at all, 10=completely). The wordings of the descriptions of the 27 practices had been developed during open-response interviews with a pilot sample from the same pool of volunteers (Blair, Booth et al., 1989; Blair, Lewis et al., 1989): the practices were not elicited as strategies in weight control, although attending a slimming club and some others were clearly presumed to be such; indeed, use of salt was included as a health-related

Table 2

Study two: dietary, exercising and social practices specified by informants from the study population for health or weight control (Blair, Booth et al., 1989)

1.	Limit amount of food eaten and drunk at meals (e.g. have small portions, no second helpings)
2.	Do vigorous exercise regularly (e.g. sport, aerobics)
3.	Go to a slimming club or weight-reduction class
4.	Stick to the same number of calories every day
5.	Eat few nuts, crisps or other high-fat snackfoods
6.	Walk or cycle whenever possible
7.	Drink little or no alcohol
8.	Add little or no salt to food when cooking or at the table
9.	Eat slimmers' meal replacements for one or more meals a day
10.	Avoid fat in cheese and cream (e.g. eat low-fat or cottage cheese, yoghurt rather than cream)
11.	Avoid sweet 'extras' (biscuits, cakes, sweets, chocolate)
12.	Avoid unnecessary fat in meals (e.g. avoid fatty and red meats, avoid frying, remove oil before serving)
13.	Eat food high in fibre (e.g. wholemeal bread, bran cereals)
14.	Fast or miss out meals completely
15.	Eat food high in polyunsaturates (e.g. seafish, soya/sunflower spreads)
16.	Avoid calories in drinks and snackfoods between meals
17.	Avoid losing vitamins when preparing vegetables (e.g. do not peel vegetables, do not overboil vegetables)
18.	Be strict about your eating style (e.g. have small mouthfuls, eat slowly, do not eat when doing something else)
19.	Avoid unnecessary fat when using spreads (e.g. use low-fat spread rather than butter or margarine, spread thinly)
20.	Choose foods and drinks low in calories at main meals
21.	Avoid sugary food (e.g. tinned fruit in syrup, sugar with cereals, beans with added sugar)
22.	Eat small amounts of starch (e.g. bread, potatoes)
23.	Avoid sugar (e.g. use a low-calorie substitute) in coffee/tea
24.	Whenever possible, choose food and drink labelled 'reduced-' or 'low-calorie'
25.	Eat fresh fruit and salads instead of higher-calorie foods
26.	Use skimmed or semi-skimmed milk instead of whole milk
27.	Eat meals at the same time each day



practice that by itself would not be expected to affect weight.

In a cross-sectional analysis (comparable with Study one), the professed frequency of use of each strategy when actively controlling weight was correlated with weight loss during the dieting episode as recalled at Time 1. In a prospective analysis, the estimated current use of each practice was correlated with loss of weight from that reported at Time 1 to the report at Time 2; the actual use of a practice at each time point was chosen in accord with the report whether or not the respondent was actively dieting at that time.

## Results

### Study one

Supposed weight losses during dieting, estimated from recalled weights, had a mean value of 8.52 kg (SD=6.71) and the estimate of weight still kept off by the time of interview averaged 5.12 kg (SD=5.60).

Only one highly reliable effect of the 10 weight-control strategies emerged from the data. Those who reported attempting to reduce intake of fats were estimated from their weight reports to have lost more weight while on a diet and also to have maintained that loss better afterwards than those who did not so report (Table 3). Indeed, the minority who apparently failed to behave this way reported losing

a mean of only 5.1 kg during their diet and 3.4 kg by time of report. This contrasted with the group who professed use of this strategy, whose reports implied the loss of a mean of 9.2 kg body weight during the diet and 6.0 kg by time of report.

In addition, three other reported weight-control strategies showed statistically significant effects. The professed use of the strategy of sticking to a specific number of calories per day was positively associated with reported weight loss during a dieting episode. However, this behaviour was not associated with keeping weight off by time of report (Table 3). In contrast, while not being at all correlated with weight loss during the dieting episode, professed use of the strategy of regular exercise was positively associated with weight loss by time of report (Table 3). Finally, the professed continued use of slimmers' meal replacements after the dieting episode was associated with poor maintenance; indeed, the few respondents who did this were on average reportedly slightly heavier at interview than before their last intensive effort to lose weight.

### Study two

Estimated weight losses during dieting recalled at Time 1 averaged 5.33 kg (SD=5.15) and the weight still kept off by the time of completion of the second questionnaire averaged 2.87 kg (SD=6.01).

The professed uses of several of the 27 eating and other practices were positively associated both in the cross-sectional design with reported weight loss during the dieting episode and also in the prospective design with the maintenance of that weight loss for at least 1 year afterwards (Table 4).

In line with prediction, the practice most strongly correlated with weight loss to time of report at Time 2 (12–14 months from Time 1) was the professed avoidance of calories between meals. This habit was also significantly correlated with weight loss during the initial dieting episode. Lower but still significant correlations with both of the estimates of effective weight control were seen for the professed limiting of calories in foods at meals, the limiting of fat intake both in cheese and cream and also at meals generally, the avoidance of sugary food, the choice of high-fibre foodstuffs, the choice of fresh fruit and salads over higher-calorie alternatives, being strict about one's eating style, sticking to a specific number of calories per day, and choosing foods and beverages labelled 'low-calorie'.

Other practices showed modestly significant associations with estimated weight loss during a recalled episode of dieting, but not with estimated maintenance of weight loss between times of reporting weight: these were the professed avoidance of starchy food, keeping vitamins in vegetables, walking or cycling whenever possible and attending a slimming club.

Finally, a set of practices appeared to be relevant particularly to long-term weight control, being positively

Table 3

Study one: correlations ( $\times 100$ ) between reported kilogram reduction in body weight and professed use (or non-use) of each of 10 weight-control strategies, arranged in descending order of longer-term efficacy ( $n = 100$ )

Strategy	Recalled weight loss	
	During diet	At the time of interview
Reduce fat intake, e.g. grill not fry, remove excess fat (etc.)	23**	22*
Take some exercise or sport on a regular (daily) basis	0	19*
Eat meals at (exactly) the same time each day	4	15
Reduce sugar intake, e.g. cut out sweets, cakes, biscuits, etc.	−9	10
Reduce starch intake, e.g. cut out bread and potatoes	0	7
Avoid snacking between meals and in the evenings	1	5
Stick to a specific number of calories per day (e.g.)	17*	3
Substitute low-calorie products for some foods (e.g.)	−1	−3
Walk whenever possible, instead of using bus, car, lift (etc.)	−2	−5
Eat slimmers' meal replacements instead of 1 meal each day	−10	−17*

\* $p < 0.05$ , \*\* $p < 0.01$ .



Table 4

Study two: correlations ( $\times 100$ ) of the reported frequency (always to never) of a practice [number from Table 2], or of a factor or subset score, with decrease in reported weight (kg) over a period of 12–14 months ( $n=112$ )

Piece of behaviour, factor or subset	During recalled diet	From first to second report
<i>Factor I</i> (seven practices): 26.7% of variance	13	21*
Avoid fat in cheese and cream [10]	18*	20*
Avoid unnecessary fat in meals [12]	23**	23**
Avoid unnecessary fat when using spreads [19]	10	18*
Eat small amounts of starch (e.g. bread, potatoes) [22]	20*	3
<i>Low-fat subset A</i> (the above 4) of Factor I	22*	22*
Avoid sweet 'extras' (biscuits, cakes, sweets, chocolate) [11]	11	26**
Avoid calories in drinks and snack foods between meals [16]	15*	31***
Eat fresh fruit and salads instead of higher-calorie foods [25]	16*	21*
<i>Low-calorie drink break subset B</i> (above 3) of Factor I	17*	28*
<i>Factor II: conventional dieting</i> (five practices): 8.3% of variance	24**	6
Go to a slimming club or weight-reduction class [3]	31***	11
Stick to the same number of calories every day [4]	25**	19*
Eat slimmers' meal replacements for one or more meals a day [9]	7	−5
Be strict about your eating style (e.g. small mouthfuls [etc]) [18]	28***	19*
Choose food and drink labelled 'reduced-' or 'low-calorie' [24]	23**	21*
<i>Factor III: exercise and fibre</i> (three practices): 6.3% of variance	11	1
Do vigorous exercise regularly (e.g. sport, aerobics) [2]	2	−9
Walk or cycle whenever possible [6]	25**	4
Eat food high in fibre (e.g. wholemeal bread, bran cereals) [13]	19*	22**
<i>Factor IV: low snack fat/alcohol/salt</i> (three practices): 5.8%	7	7
Eat few nuts, crisps or other high-fat snack foods [5]	6	9
Drink little or no alcohol [7]	14	7
Add little or no salt to food when cooking or at the table [8]	4	4
<i>Factor V: healthy eating</i> (two practices): 5.2% of variance	14	19*
Eat food high in polyunsaturates [15]	13	15
Avoid losing vitamins when preparing vegetables [17]	24***	14
<i>Factor VI: miss meals</i> (two practices): 4.5% of variance	−1	2
Fast or miss out meals completely [14]	4	5
Eat meals at the same time each day [27] ( <i>negative loading on VI</i> )	6	−27***
<i>Factor VII: cut starch</i> (one practice; also in IA): 4.2% variance	7	7
Eat small amounts of starch [22]	20*	3
<i>Factor VIII: skimmed milk</i> (one practice): 3.8% of variance	2	2
Use skimmed or semi-skimmed milk instead of whole milk [26]	9	16*
<i>Practices not loading highly on any of the eight Factors</i>		
Choose foods and drinks low in calories at main meals [20]	23**	21*
Limit amount of food eaten and drunk at meals [1]	9	14
Avoid sugary food [21]	21*	24**

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

associated with estimates of maintenance of weight loss, but not with estimates of weight loss during the dieting episode. These were the professed limiting of intake of fat both in spreads and also in milk, avoiding sweet 'extras' such as biscuits, cakes, sweets and chocolates, and eating meals at a regular time each day.

Since the frequencies of many of these particular habits were likely to be correlated, principal components were extracted with orthogonal varimax rotation. Eight factors had Eigenvalues greater than 1, accounting for a total of 64.7% of the communal variance. The first factor included a variety of practices likely to limit intake of calories at main courses, as well as at the ends of meals and between meals (Table 4). To allow exploration of the hypothesis that it is the latter type of practice that is crucial for the long-term

maintenance of weight loss, the questions loading on this factor were divided into the two categories of caloric restriction (main course or dessert, after-meal and between-meal practices), omitting practices that are ambiguous in this regard.

As predicted, the set of practices most significantly associated with estimates of long-term maintenance of weight loss was that specifically concerned with limiting intake at the end of or between meals (group B: Table 4). Furthermore, professed frequency of the main-course practices (group A) accounted better for estimated weight loss during the recalled diet than to estimated maintenance of weight loss over 1 year.

A number of conventionally severe slimming strategies were intercorrelated in Factor 2. These practices made



the most substantial contribution to estimated weight loss during dieting, but were of no value in estimated maintenance of lost weight for a year (Table 4).

## Discussion

There was no evidence in these data from British samples that the professed avoidance of what these people call ‘snacks’ is of any use in the control of weight, as estimated from individuals’ reports. This was not unexpected, since the traditional concept of a ‘snack’ conflates light meals, drinks and the eating of confectionery, etc. although Californian culture may be different (Kayman, Bruvold, & Stern, 1990). Thus, counselling to avoid ‘snacks’ appears to be too confused to be worthwhile, at least in the UK. It is in any case questionable whether a ‘grazing’ habit based on modest amounts of mixed foods on several separate occasions during the day need give rise to excessive caloric intake, especially in young people, or whether indeed it could be prevented even if it were fattening. These conclusions have been supported by more recent studies in the UK: Conner and Norman (1996) found no evidence that avoidance of snack foods was associated with weight loss; Chamontin et al. (2003) found that a light lunch could be categorised as a snack, not just food intake between meals.

The construct that was supported by the present data as the most helpful in organising behaviour to keep lost weight off for a year was the professed avoidance of all sources of energy ‘between meals.’ Various more food-specific practices were also predictive of estimated weight loss and maintenance. These food choices were explicitly focused on calories between meals or involved typical sources of energy in drinks or their accompaniments which existed in the respondents’ culture. For example, the professed avoidance of sugar as such may have been helpful in longer-term maintenance of weight loss insofar as it led to the avoidance of extra desserts and the nibbling of sweet packet foods between mealtimes. Thus, these correlational tests of both retrospective and prospective self-report data confirmed laboratory-based predictions of the most effective behaviour for long-term control of body weight (Booth, 1988b).

The professed cutting back on fat generally, in meals as well as between meals, was the only case of a nutrient-oriented recommendation among those studied that, when professedly applied as understood by the respondents, was of value in estimated year-long maintenance of weight loss as well as during an intensive effort to lose weight.

Estimated weight loss during a period of intensive dieting was associated with a set of conventional strategies for substantial restriction of intake. However, there was no evidence that continued use of such practices after the diet was of any help in keeping lost weight off over a period of 12 months or so.

The results bring out the importance of a neglected distinction between the use of low-calorie foods, presumably mainly drinks and desserts much reduced in fat and sugar content, and the use of low-calorie meal substitutes marketed to slimmers or of regimes of semi-starvation. Low-calorie labels appeared to be used more successfully by the time of the second study but, in both studies, reliance on low-calorie diets, even when they yielded short-term weight loss, was counterproductive in the longer term. This is consistent with evidence of the long-term ineffectiveness of treatment with very low calorie diets (Wadden, Stunkard, & Liebschutz, 1988) and, more generally, with the psychological theory that reliance on external agencies interferes with the necessary acquisition of self-management skills (Blair et al., 1989; Lewis et al., 1992; Schifter & Ajzen, 1985).

These results apply to losses in reported weight in those who, in most cases, were initially overweight. The effectiveness of an eating or exercise practice in weight loss would not be expected to depend on initial weight from an additive thermodynamic model: a sustained change in frequency of a practice affecting cumulative energy intake or expenditure theoretically produces a step change in energy content of the body, reaching asymptote as change in amount of lean tissue brings energy exchange into balance again (Booth & Mather, 1978; Westerterp, Donkers, Fredrix, & Boekhoudt, 1995).

It should be noted that these estimates of weight reduction during the intensive effort to lose weight and of its maintenance for more than a year thereafter were not directly provided by the respondents, but were calculated from answers to weight-history questions asked quite separately from questions about behavioural strategies. Such difference estimates may be less affected by bias in self-reported weight itself, although in any case this bias can be modest (Stewart, Jackson, Ford, & Beaglehole, 1987). Clearly, however, the results reported here should be further investigated anthropometrically and indeed with measures of metabolic risk factors for chronic disease. The findings provide a substantial justification for such a study.

These factor-analytic findings also provide already a not inconsiderable basis, when taken with the mechanistic evidence for the importance of zero-calorie drink breaks in weight control (Booth, 1988a,b), for a sharper focusing of nutritional recommendations and dietary counselling on weight control, to emphasise the importance of avoidance of all sources of energy in and with drinks consumed after and between meals, in addition to cutting back on fatty foods with meals as well as between meals.

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