

Invited commentary

Vegetables and fruit are good for us so why don't we eat more?

There is a considerable and growing body of evidence which suggests that diets rich in fruit and vegetables, and the antioxidant nutrients they contain, are protective against a wide range of chronic diseases including coronary heart disease and cancer (Department of Health, 1994, 1998). Dietary advice to the public encouraging increased consumption of fruit and vegetables has remained remarkably consistent over the years. However, the scientific basis underpinning that advice has changed. The rationale has shifted as more has become known about the factors which influence the development of chronic disease (Williams & Marmot, 1997).

In the 1970s and 1980s, fruit and vegetables were promoted, alongside whole-grain cereals, as a source of dietary fibre and a 'gap-filler' to make up for the calories lost if the main component of dietary advice - to reduce fat intake - was followed. By the mid-1980s, fruit and vegetables were being promoted in the United States for their protective effect against cancer, but there was uncertainty about the precise reasons why high intakes of fruit and vegetables were associated with low rates of cancer. By the mid-1990s, most dietary recommendations explicitly recommended fruit and vegetables to help protect against cancer, but remained cautious about which particular components were protective, although the antioxidant vitamins, particularly A and C, were considered to be likely candidates. It was only in the mid-1990s that dietary recommendations began to acknowledge the role of fruit and vegetables, and the antioxidant vitamins they contain, in relation to the prevention of coronary heart disease.

In parallel with the increasing recognition that fruit and vegetables are protective against chronic disease, official reports setting out dietary recommendations began to quantify the desirable amount of fruit and vegetables that people should consume. In 1989 the Committee on Diet and Health of the US National Research Council published a comprehensive report, *Diet and Health: Implications for Reducing Chronic Disease Risk*. This made recommendations to 'eat five or more servings of a combination of vegetables and fruit' (quoted in Williams & Marmot, 1997). This five-per-day message has since been taken up by numerous official bodies including the British Government (Department of Health, undated).

It is therefore, perhaps, surprising that there has been relatively little research exploring the effectiveness of interventions to promote an increased consumption of fruit and vegetables in the general population or indeed of the feasibility of people generally eating more than five-per-day. (Adults in the UK currently eat about three servings per day.)

A recent systematic review of the literature on health promotion interventions to promote healthy eating in the

general population found seventy-six intervention studies carried out between 1985 and 1996 which met reasonably strict methodological criteria (Roe *et al.* 1997). Healthy eating was defined as diet reduced in fat and increased in starchy foods, fruits and vegetables. But the vast majority of the interventions focused on fat reduction. Sixty-three (83%) of the seventy-six studies investigated changes in the amount of high-fat foods consumed, the fat content of the diet, or blood cholesterol levels, but only eight (11%) of the seventy-six studies reported changes in intake of fruit and vegetables.

The studies did frequently show a small but significant effect on fat intake and/or on blood cholesterol. For example, ten (71%) of the fourteen good quality studies which reported changes in fat intake showed a positive effect of the intervention. Of the eight studies which reported changes in fruit and vegetable intakes, three supermarket-based interventions showed an increase in sales but did not measure total dietary intake, four interventions showed no effect, and one poor quality study showed a negative effect. The lack of effect on fruit and vegetable consumption in the small number of studies where it was examined is difficult to interpret but may possibly be due to a lack of attention to this aspect of healthy eating in the interventions studied.

There is then an urgent need for studies of interventions designed specifically to increase consumption of fruit and vegetables. The study by Cox *et al.* (1998) in this issue is therefore a welcome and rare example of a good quality, randomized controlled study to investigate a healthy-eating intervention focused on fruit and vegetables. The intervention was intensive involving a 'fruit and vegetables for health' lecture, leaflets, refrigerator reminder boards, recipes, tasting sessions, a self-monitoring diary, etc. Cox *et al.* show that fruit and vegetable intake increased in the intervention group from a mean of 3.3 portions at baseline to 5.2 portions at 8 weeks. (In the control group consumption fell.) Encouragingly, the intervention group were still consuming a mean of 4.5 portions at 6 months and 4.6 portions at 12 months although intake in the control group was not measured after 8 weeks.

The study by Cox *et al.* demonstrates that it is possible to affect fruit and vegetable consumption: 65% of the intervention group managed to reach the five-per-day target. But note that the subjects of their study were selected for 'contemplating increasing their consumption': 74% were consequently women and 74% were in a non-manual socio-economic group (about 50% of people would be classified as non-manual in the UK). Would the intervention have been so successful in the general, less-motivated population? A randomized controlled trial of a primary care-based intervention is being carried out by members of the Division

of Public Health and Primary Health Care of the University of Oxford. This trial aims to assess whether a primary care-based intervention to increase consumption of fruit and vegetables is effective in a general practice population in central England. In this instance subjects are not being selected for their motivational state. The results of this trial should be published towards the end of 1999.

Cox and his colleagues not only examined the impact of their intervention on fruit and vegetable intake but also studied its impact on attitudes towards dietary change. The paper by Anderson *et al.* (1998) in this issue reports these results. They show a number of differences in the intervention group's beliefs before and after the intervention: for example after the intervention people believed more strongly that eating more fruit and vegetables would reduce their risk of cancer from before the intervention. Changes to perceived barriers and opportunities to increased consumption were also examined. There were few significant changes to perceived barriers but several changes to perceived opportunities. For example, post-intervention subjects perceived greater difficulty in eating two portions of vegetables with a meal than before the intervention. It should be noted that this analysis of the intervention's impact on attitudes did not involve comparisons with a control group so it is uncertain whether the changes observed were related to exposure to the intervention or not.

However, as noted by Anderson *et al.* their data on beliefs, perceived barriers and opportunities does 'make it clear that, even with well-motivated, well-informed consumers' facilitatory factors such as availability and cost are likely to influence consumption'. This conclusion is supported by most of the other studies into perceived barriers to increased consumption of fruit and vegetables (Anderson *et al.* 1998). The problem with most of this attitudinal research is that it relies heavily on what people declare are the barriers and people may not know, or be unwilling to report, actual barriers. Of course data on actual barriers, as opposed to declared barriers, to health-related behaviour are notoriously hard to collect.

Anderson *et al.* show little effect of their intervention on perceived barriers to increased consumption. So the extent to which health advice in the form of lecture, leaflets, etc. can overcome even perceived barriers to increased consumption such as availability and cost remains unclear. It seems, at least by extrapolation from most other health education research, that advice by itself is unlikely to be cost-effective in producing sustained behaviour change in the general population: there has to be other supportive measures. A recent report from the National Heart Forum, for example, called for 'a national co-ordinated and sustained strategy to increase vegetable and fruit consumption' and that 'such a strategy should tackle availability and

access to vegetables and fruit as well as changing attitudes and awareness' (National Heart Forum, 1997).

Numerous components of such a strategy have been variously suggested: ranging from reform of the Common Agricultural Policy Fruit and Vegetable Regime to support for food co-ops providing low-cost fruit and vegetables to low-income consumers; from providing free apples at school to introducing fruit and vegetables into vending machines. All these sound like good ideas: the problem is that we don't as yet know what would be most effective. More research is needed!

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