

A systematic review of the effectiveness of promoting lifestyle change in general practice

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Background. There is increasing evidence that particular lifestyle behaviours increase the risk of disease and it is widely argued that GPs are ideally placed to encourage patients to modify their behaviour in these areas and thereby reduce their disease risk. There is therefore a need for evidence that GP-based lifestyle interventions are effective in eliciting behaviour change. As there has been no comprehensive attempt to review the literature on this subject, we chose to conduct a systematic review, incorporating meta-analytic techniques where possible, to address this need.

Objectives. This study aimed to examine how effective lifestyle advice provided by GPs is in changing patient behaviour. The following four areas of behaviour were examined: smoking, alcohol consumption, diet, and exercise.

Method. The review was restricted to English-language reports of trials which investigated the effectiveness of lifestyle advice provided in a general practice setting. Studies were included where it could be established that subjects were randomly allocated to experimental groups and where a comparison was made between either a 'no intervention' or 'usual care' control group, or between advice of differing intensities. Six electronic databases were searched and a total of 37 trials were selected for inclusion in the review. Meta-analytic techniques were employed to analyse the data from the smoking advice trials. The results from the trials concerned with the other three behaviours did not lend themselves to this form of analysis. Outcome data were extracted from these trials and summarized in tabular form.

Results. The results of this review suggest that whilst many of the general practice-based lifestyle interventions show promise in effecting small changes in behaviour, none appears to produce substantial changes.

Conclusion. There is a need for more extensive and rigorous research in this area before substantial public funds are committed to general practice-based health promotion. Furthermore, it is clear that if general practice-based interventions are to be effective in a public health sense, a greater number of GPs will need to become involved in promoting behaviour change than the literature suggests is currently occurring.

Keywords. Alcohol, diet, exercise, meta-analysis, smoking.

Introduction

In recent years increasing attention has been paid to reducing the burden of disease on both the individual and the community by focusing effort on preventive activities. There is a strong body of evidence supporting the contention that particular lifestyle behaviours increase the risk of disease and that interventions which are successful in assisting people to modify their

behaviour could result in significant reductions in the incidence of disease.¹

Preventive activity has been focused on a number of areas, of which four have been particularly targeted: smoking, alcohol consumption, dietary behaviour, and exercise. Australian research has shown that the majority of the population feel that lifestyle issues should be discussed as a routine part of medical consultations² and it is widely argued that GPs are uniquely placed to provide effective health promotion advice to their patients.^{3,4} However, there are also a number of barriers which need to be addressed. These include the limited time available in a consultation, problems with remuneration and the commonly held

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perception by doctors that providing lifestyle advice is not effective in changing patient behaviour.⁵

The present study deals with the last of these concerns, namely, the question of how effective the provision of lifestyle advice by GPs is in changing behaviour. As there has been no systematic attempt to review the literature on this subject we chose to conduct a systematic review, incorporating meta-analytic techniques where possible, to address this question. The specific hypotheses tested in this review were that the provision of advice is more effective in eliciting lifestyle-related behaviour change than providing no advice, and that providing intensive advice is more effective than providing brief advice.

Method

Search strategy

A search of six electronic databases was conducted from the year of their inception up to May 1995. The databases searched were: *Medline*, *Psychlit*, *Sociofile*, *Cinahl*, *EMBASE* and *Drug*. Using the indexing terms appropriate to each database the search strategy employed entailed combining three elements: (i) terms which aimed to retrieve randomized controlled trials, using a modified version of Cochrane Collaboration search strategy;⁶ (ii) terms which aimed to retrieve references relating to general practice, e.g. 'family practice', 'primary health care', and 'physician'; and (iii) terms which aimed to retrieve references relating to the four areas of interest, namely 'alcohol', 'smoking', 'diet', and 'exercise'. These terms were truncated and additional terms, *viz.* 'tobacco', 'nicotine', 'nutrition', 'physical fitness' and 'exertion', were also used where appropriate.

Approximately 130 potentially relevant references (including reviews of the literature) were located by this process. These articles were retrieved and their reference lists were also searched. From this initial survey of the literature a set of inclusion criteria was developed and the final selection of trials to be included in the review was made. A total of 37 trials was selected for inclusion.

Inclusion criteria

The review was restricted to English-language reports of trials which investigated the effectiveness of lifestyle advice provided in a general practice setting. We examined trials concerned with each of the four areas named above. Data from trials which looked at the effectiveness of advice on two or more of these areas (referred to in this report as 'multifactorial advice') were extracted and included in the relevant sections. Studies were included where it could be established that subjects were randomly allocated to experimental groups

and where a comparison was made between either a no intervention or usual care control, or between advice of differing intensities. Advice was classified as brief if it was provided within the confines of a single consultation, and intensive if it involved more than a single consultation. Few trials specified the amount of time taken to provide the intervention. We therefore took a single occasion of advice provision to be a brief intervention and an intervention entailing anything further, including follow-up by appointment, telephone or letter to be an intensive intervention. Generally advice was provided verbally, often with written or other materials as support, although some studies examined the effectiveness of written advice only. We aimed to include as many studies in the review as possible. Studies were included if the advice provided was organized around the structure of a general practice or equivalent primary care setting.

Trials were included irrespective of the follow-up duration, with the exception of smoking cessation trials, where only those trials reporting smoking cessation rates at least 6 months after therapy were included. Trials investigating the effectiveness of smoking cessation advice which included nicotine gum as well as advice were excluded unless the trial included study groups (both an intervention and comparison group) which did not use gum. In such cases only the data relating to the provision of advice were used.

Data extraction

Data were extracted from the reports of the trials included by one of the authors (RA) and checked by the other two authors (CS and DW).

Quality assessment

The methodological quality of the studies included in the review was assessed using a simplified scheme described by Chalmers *et al.*⁷ Briefly, it involves assessing three dimensions of trial methodology which are important potential sources of significant bias. These are: (i) the quality of the random allocation (i.e. control of selection bias at entry); (ii) the extent to which the primary analysis included every person entered into the randomized cohorts (i.e. control of selection bias after entry); and (iii) the extent to which those assessing outcome(s) were unaware of the group assignment of the individuals being examined (i.e. control of bias in assessing outcomes). For each of the three dimensions we used a three-point rating scale (ranging from a score of 3 if the effort to control potential bias had been maximal, through to 1 if there had been little or no effort to control potential bias). The scores allocated to each trial are included in the first table of each section of this report. It should be noted that, in many cases, the scores allocated to the studies included in this review may have been more a reflection of the quality of reporting than the methodological quality of the trials

themselves. This is because information was often lacking in the reports about the elements of methodological quality we examined. There was insufficient time to approach investigators to clarify these issues.

Data analysis

For trials concerning smoking cessation advice, cessation rates at maximum follow-up were extracted for a quantitative analysis using meta-analytic techniques. It was not possible to pool and summarize the data from the remaining trials in this manner due to the heterogeneous nature of the outcomes measured. Instead, outcome data were extracted from these trials and summarized in tabular form. These results tables report all the relevant outcome measures of each of the trials. Where an outcome was not measured in a particular trial or the result was not significant, this is indicated in the table. When a significant result was found this is stated and the value provided if it was included in the trial report. Outcome measures ranged from changes in alcohol consumption levels, γ -glutamyl transpeptidase (GGT) levels and alcohol-related morbidity for the alcohol advice trials; changes in fat and fibre intake, lipid and blood pressure levels and in body weight for dietary advice trials; and changes in the duration and frequency of exercise, and in blood pressure, lipid levels and body weight for exercise advice trials.

For the quantitative analysis of smoking cessation trials, the statistical methods involved calculating the typical odds ratio and its confidence interval using a fixed effects model.⁸ Results have been expressed as an odds ratio (OR) (advice:control or intensive advice:brief advice) for achieving abstinence from smoking at maximum follow-up, together with the 95% confidence intervals (CI) for this estimate. Tests for heterogeneity were performed using a Mantel-Haenszel approach.⁹

Results

Smoking

Characteristics of the trials. A total of 23 trials (Table 1), conducted between 1972 and 1995, were included in the meta-analysis.¹⁰⁻³² Most of the trials recruited subjects from the general population of smokers, rather than from a particular group, such as those with a specific health condition. The studies generally limited recruitment of subjects to those within a broad age range, although one trial was concerned only with smokers aged 60 years or over²⁵ and one multifactorial trial from which the smoking data has been extracted was restricted to subjects between the ages of 35 and 64 years.³¹ One study was concerned with female smokers only³⁰ and one was concerned only with angina sufferers.²⁹

The majority of the studies (13) compared the provision of brief advice with a no advice control group. Three studies compared intensive advice with no advice, and three compared brief advice, intensive advice and a control. In addition, four studies compared brief and intensive advice but did not include a control group in their study design. In some cases more than one type of brief or intensive advice was compared. For this meta-analysis these groups were combined into single brief or intensive advice groups.

In 14 of the 23 trials advice was provided by a GP only. In six trials both a GP and another health professional, such as a nurse or counsellor, provided the smoking cessation advice. In three studies the advice was provided by health professional other than a GP. In most of the trials subjects were provided with written information to support the verbal advice they were given. Data from three multifactorial trials are included in this meta-analysis. In the remaining studies, smoking cessation advice was the only advice assessed. Fourteen of the 23 trials were conducted with a follow-up duration of 1 year. The follow-up period was less than 1 year in four trials and more than 1 year in five of the studies.

Over half of the trials scored well in terms of their control of selection bias after entry but most scored poorly in their reporting of the method of randomization employed. The trials were of mixed quality with respect to controlling bias in assessing outcomes.

Effectiveness of smoking cessation advice. Smoking cessation rates were identified for each of the study groups in each trial. The strictest available criteria to define abstinence was used for determining these rates, for example a sustained rate rather than a point prevalence was used whenever possible. In trials where patients were lost to follow-up, these patients were considered to be continuing smokers.

When the results of all the trials which compared advice with a no-advice control group were pooled significant heterogeneity was found. This resulted from two trials in which the difference in cessation rates between intervention and control groups was particularly high, resulting in high odds of quitting (Russell *et al.*¹¹—OR: 3.81, CI: 2.07–7.01; Richmond *et al.*¹⁸—OR: 6.76, CI: 2.93–15.59). In all but four of the remaining studies the odds ratios were less than 2. In the case of the trial conducted by Russell *et al.*¹¹ the high odds ratio is a function of relatively low quit rates in the control group. In the case of the Richmond *et al.*¹⁸ study the high odds ratio is caused by a very high success rate (23%) in the intervention group. When these two studies were removed from the analysis no significant heterogeneity between the trials was found ($\chi^2 = 25.27$, 19 d.f., $P = 0.15$) and it was therefore valid to pool the remaining results (see Table 2). These results are based on data for 16 385 subjects. Pooling

TABLE 1 *Characteristics of smoking advice trials*

Trial	Country	No. of participants	Inclusion criteria	Study groups ^a	Intervener	Mode of intervention ^b	Duration of study	Quality score ^c
Porter and McCullough 1972 ¹⁰	UK	191	Cigarette smokers aged 16-76 years who smoked ≥ 4 cigarettes a day	(1) Brief advice (2) Control	GP	S, A group (1)	6 months	A2, B3, C3
Russell <i>et al.</i> 1979 ¹¹	UK	2138	Cigarette smokers aged ≥ 16 years	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A2, B1, C1
Stewart and Rosser 1982 ¹²	Canada	691	Cigarette smokers >11 years old	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A2, B3, C3
Wilson <i>et al.</i> 1982 ¹³	Canada	211	Smokers aged >16 years, excluding pregnant women, smokers with communication disorders, or with terminal illness	(1) Brief advice (2) Intensive advice	GP	S, A groups (1) and (2)	14 months	A1, B1, C3
Russell <i>et al.</i> 1983 ¹⁴	UK	1420	Cigarette smokers aged ≥ 16 years	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A2, B1, C1
Jamrozik <i>et al.</i> 1984 ¹⁵	UK	2110	Smokers aged >16 years	(1) Brief advice (2) Intensive advice (3) Control	GP, health visitor	S, A groups (1) and (2)	1 year	A1, B3, C3
McDowell <i>et al.</i> 1985 ¹⁶	Canada	366	Smokers aged >15 years who had been smoking for ≥ 1 year and were currently smoking ≥ 1 cigarette a day	(1) Brief advice (2) Intensive advice (3) Control	GP, counsellor	S, A group (1)	1 year	A1, B1, C1
Page <i>et al.</i> 1986 ¹⁷	Canada	182	Daily smokers aged 18-65 years	(1) Brief advice (2) Control	GP	S	6 months	A2, B1, C3
Richmond <i>et al.</i> 1986 ¹⁸	Australia	200	Cigarette smokers aged 16-65 years, excluding those with a poor understanding of English and those intending to move during the course of the study	(1) Intensive advice (2) Control	GP	S, A group	3 years	A2, B3, C3
Thompson <i>et al.</i> 1988 ¹⁹	USA	951	English-speaking smokers aged ≥ 18 years who were free from debilitating mental illness	(1) Brief advice (2) Intensive advice (3) Control	GP, counsellor	S, A some subjects in groups (1) and (2)	9 months	A1, B1, C1
Logsdon <i>et al.</i> 1989 ²⁰	USA	239	Non-pregnant smokers not suffering from chronic disease	(1) Brief advice (2) Control	GP	M, A group (1)	1 year	A1, B1, C1
Sanders <i>et al.</i> 1989 ²¹	UK	2061	Smokers aged 16-65 years	(1) Brief advice (2) Control	Nurse	S, A group (1)	1 year	A2, B1, C1
Demers <i>et al.</i> 1990 ²²	USA	583	Smokers aged ≥ 18 years	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A1, B1, C3
Secker-Walker <i>et al.</i> 1990 ²³	USA	155	Smokers who smoked ≥ 1 cigarette a day	(1) Brief advice (2) Intensive advice	GP, counsellor	S	18 months	A1, B1, C1

TABLE 1 *Characteristics of smoking advice trials (cont.)*

Trial	Country	No. of participants	Inclusion criteria	Study groups ^a	Intervener	Mode of intervention ^b	Duration of study	Quality score ^c
Slama <i>et al.</i> 1990 ²⁴	Australia	311	Smokers aged 18–60 years who could read and write English	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A1, B2, C3
Vetter and Ford 1990 ²⁵	UK	471	Smokers aged ≥ 60 years	(1) Brief advice (2) Control	GP, nurse	S	6 months	A1, B3, C1
Wilson <i>et al.</i> 1990 ²⁶	Australia	1109	Smokers aged 16–64 years, excluding those who were incapacitated, distressed or who were unable to read or write English	(1) Brief advice (2) Control	GP	S	1 year	A1, B3, C3
Segnan <i>et al.</i> 1991 ²⁷	Italy	629	Smokers aged 20–60 years who were free from life-threatening disease	(1) Brief advice (2) Intensive	GP	S, A group (1)	1 year	A1, B3, C1
Hollis <i>et al.</i> 1993 ²⁸	USA	2691	Smokers aged 18–70 years	(1) Brief advice (2) Intensive advice	GP, nurse	S, A groups (1) and (2)	1 year	A1, B3, C
Cupples and McKnight 1994 ²⁹	Ireland	127	Smokers aged <75 years suffering from angina for ≥ 6 months, with no other severe illness	(1) Intensive advice (2) Control	Health visitor	M	2 years	A2, B1, C3
Haug <i>et al.</i> 1994 ³⁰	Norway	604 women	Pregnant and non-pregnant women, aged 18–34 years, who were daily smokers, lived with a partner and had no serious social or medical problem	(1) Intensive advice (2) Control	GP	S, A group (1)	18 months	A1, B3, C3
ICRF OXCHECK 1994 ³¹	UK	1759	Smokers aged 35–64 years	(1) Brief advice (2) Control	Nurse	M	1 year	A1, B3, C2
Slama <i>et al.</i> 1995 ³²	France	3128	Smokers ≥ 15 years	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A1, B1, C1

^a Brief advice: within the confines of a single consultation; intensive advice: involving more than a single consultation.

^b Whether advice was provided as part of a single intervention (S) or multifactorial intervention (M), and whether aids, e.g. written advice or information, were also provided (A).

^c Quality score: low to high score 1–3: A, selection bias at entry; B, selection bias after entry; C, bias assessing outcome(s).

these results demonstrates that the provision of either brief or intensive advice significantly increases the odds of stopping smoking compared with providing no advice (OR: 1.32, CI: 1.18–1.48). The odds of quitting are marginally higher when intensive, rather than brief advice is provided (OR: 1.46 compared with 1.27). These results can be expressed in terms of the number of patients it would be necessary to treat in order to produce one quitter. It would be necessary to provide advice (either brief or intensive) to 35 smokers to

produce one quitter as a result; 50 patients would need to receive brief advice or 25 patients would need to receive intensive advice.

Seven studies allowed a direct comparison between intensive and brief advice (see Table 3). Based on the results for 6275 subjects there was no significant difference in the odds of quitting smoking if intensive compared with brief advice was provided. The pooled results of these studies produced an odds ratio of 1.07 (CI: 0.88–1.29).

TABLE 2 *Effect of smoking cessation advice versus control (to maximum follow-up)*

Trial	Treatment (obs/tot)	Control (obs/tot)	Odds ratio	95% CI
<i>Brief advice</i>				
Porter and McCullough 1972 ¹⁰	5/101	4/90	1.12	0.29–4.26
Stewart and Rosser 1982 ¹²	11/504	4/187	1.02	0.32–3.23
Russell <i>et al.</i> 1983 ¹¹	43/761	35/659	1.07	0.68–1.69
Jamrozik <i>et al.</i> 1984 ¹⁵	77/512	58/549	1.50	1.04–2.15
McDowell <i>et al.</i> 1985 ¹⁶	13/90	13/93	1.04	0.45–2.38
Page <i>et al.</i> 1986 ¹⁷	8/114	5/68	0.95	0.30–3.04
Thompson <i>et al.</i> 1988 ¹⁹	52/380	25/196	1.08	0.65–1.80
Logsdon <i>et al.</i> 1989 ²⁰	32/224	15/97	0.91	0.46–1.78
Sanders <i>et al.</i> 1989 ²¹	35/751	58/1310	1.06	0.69–1.63
Demers <i>et al.</i> 1990 ²²	15/292	5/292	2.81	1.15–6.85
Slama <i>et al.</i> 1990 ²⁴	6/205	1/106	2.46	0.51–11.90
Vetter and Ford 1990 ²⁵	34/237	20/234	1.77	1.00–3.12
Wilson <i>et al.</i> 1990 ²⁶	43/577	17/532	2.30	1.36–3.86
ICRF OXCHECK 1994 ³¹	26/616	60/1143	0.80	0.51–1.26
Slama <i>et al.</i> 1995 ³²	216/2199	71/929	1.30	1.00–1.69
Subtotal (95% CI)	616/7561	391/6486	1.27	1.11–1.45
<i>Intensive advice</i>				
Jamrozik <i>et al.</i> 1984 ¹⁵	160/1049	58/549	1.49	1.10–2.01
McDowell <i>et al.</i> 1985 ¹⁶	31/183	13/93	1.25	0.63–2.46
Thompson <i>et al.</i> 1988 ¹⁹	46/375	25/196	0.96	0.57–1.61
Cupples and McKnight 1994 ²⁹	14/65	11/62	1.27	0.53–3.03
Haug <i>et al.</i> 1994 ³⁰	68/398	15/206	2.28	1.40–3.72
Subtotal (95% CI)	319/2070	122/1106	1.46	1.18–1.80
Total	935/9631	513/7592	1.32	1.18–1.48

Between-trial test for heterogeneity: χ^2 (df = 19) = 25.35.

TABLE 3 *Effect of intensive versus brief smoking cessation advice (to maximum follow-up)*

Trial	Treatment (obs/tot)	Control (obs/tot)	Odds ratio	95% CI
Wilson <i>et al.</i> 1982 ¹³	21/106	11/105	2.06	0.97–4.36
Jamrozik <i>et al.</i> 1984 ¹⁵	160/1049	77/512	1.02	0.76–1.36
McDowell <i>et al.</i> 1985 ¹⁶	31/183	13/90	1.20	0.61–2.38
Thompson <i>et al.</i> 1988 ¹⁹	46/375	52/380	0.88	0.58–1.35
Secker-Walker <i>et al.</i> 1990 ²³	5/77	6/78	0.83	0.25–2.83
Segnan <i>et al.</i> 1991 ²⁷	34/567	3/62	1.23	0.40–3.75
Hollis <i>et al.</i> 1993 ²⁸	79/1983	25/708	1.13	0.72–1.76
Total	376/4340	187/1935	1.07	0.88–1.29

Between-trial test for heterogeneity: χ^2 (df = 6) = 4.22.

Alcohol consumption

Characteristics of the trials. Six trials were identified which investigated the effectiveness of advice to reduce alcohol consumption (Table 4).^{20,33-37} In all of these studies the subjects recruited consumed alcohol at above the recommended safe levels (not more than two standard drinks a day for women or four for men³⁹). One trial included only female subjects³⁶ and one had a study population of men only.³⁷ Five of the six trials investigated the effectiveness of advice relating to alcohol consumption only, rather than advice concerning a number of lifestyle areas. Subjects in five of the trials were provided with written material in addition to verbal advice, and in all studies the advice was provided by a GP. In all but one trial subjects were followed up 1 year after they were advised to reduce their alcohol consumption. The six trials were generally of good methodological quality, although three scored poorly with respect to control of selection bias at entry.

Effectiveness of advice to reduce alcohol consumption.

Although these trials varied in their measures of outcome, they all calculated the proportion of subjects in each of the study groups who reduced their alcohol consumption from a heavy to a moderate level (Table 5). Three of the six studies found that a significantly higher proportion of subjects who were given advice reduced their consumption compared with those subjects who were not advised to moderate their alcohol use. The trial which demonstrated the greatest difference provided intensive rather than brief advice to intervention subjects. The remaining studies found no significant difference between intervention and control or comparison groups. Five of the trials measured changes in GGT and two found significantly lower levels in some intervention group subjects. However, the authors of both of these trials doubt the usefulness of these data because of the questionable reliability of GGT levels as a measure of alcohol consumption levels. None of the trials which measured the degree of alcohol-related morbidity found significant differences between intervention and control groups.

The reports by Scott and Anderson³⁶ and Anderson and Scott³⁷ were of the same trial, the 1990 report presenting the data relating to women³⁶ and the 1992 report dealing with men.³⁷ For women, although both intervention and control groups reduced their alcohol consumption, no significant differences between them were found. However, amongst men, significant reductions in consumption were found in the intervention group. This may suggest that advice to reduce alcohol consumption is more likely to change the drinking behaviour of men than women. However, the authors note that a lower than expected sample size of women was achieved and that this may have affected the

ability of the study to detect an independent effect of advice on women.

While half of the studies found that consumption was significantly reduced when advice was provided, the results of these trials do not provide conclusive evidence that providing advice to reduce alcohol consumption is effective. The efficacy of providing advice can therefore not be rejected. Further research is needed before any final conclusions can be reached about the types of intervention which are most effective for particular patients and the extent to which consumption levels are likely to be reduced.

Dietary behaviour

Characteristics of the trials. A total of 10 trials assessing the effectiveness of advice to modify dietary behaviour were identified (Table 6).^{20,29,31,40-46} Six of these trials examined the efficacy of dietary advice only, while the remaining four studies assessed advice given as part of a broader lifestyle intervention. Of the six single advice trials, three examined the effectiveness of advice in subjects with a specific health condition affected by dietary behaviour, such as hypercholesterolaemia or hypertension. Four trials compared brief advice with no advice, five studies examined the effectiveness of intensive advice compared with a no-advice control group, and one trial compared brief with intensive advice. A GP provided the advice to intervention group subjects in three of the studies, while advice was provided by a nurse, dietitian or health visitor in the remaining studies, except for that of Campbell *et al.*⁴⁴ which assessed the effectiveness of advice provided by letter. Advice to modify dietary behaviour was supplemented by written or other materials in half of the trials. Subjects were followed up at least 1 year after the intervention in seven of the studies. The methodological quality of these trials, in terms of their control of possible bias, was generally poor.

Effectiveness of advice to change diet. As the dietary advice trials differed substantially in the outcomes they measured, the results of these studies will be discussed using the same approach adopted for the alcohol advice trials.

The results of these trials are very mixed (Table 7). Four trials directly assessed dietary behaviour change by collecting data on changes in fat and fibre intake.^{29,40,42,43} Of these, one found very positive results, one found no significant difference on either measure, while the remaining two studies found significant differences for one measure but not the other. These trials differed substantially in their study populations and in the interventions they employed so it is difficult to draw any meaningful conclusions from these data.

Six trials measured differences in lipid levels as an indirect indicator of dietary change. In three of these

TABLE 4 Characteristics of alcohol advice trials

Trial	Country	No. of participants	Inclusion criteria	Study groups ^a	Intervener	Mode of intervention ^b	Duration of study	Quality score ^c
Heather <i>et al.</i> 1987 ³³	UK	104	Patients aged 18–65 years consuming > 35 units of alcohol a week if male, or > 20 units if female	(1) Brief advice (2) Intensive advice (3) Control	GP	S, A group (2)	6 months	A1, B1, C3
Wallace <i>et al.</i> 1988 ³⁴	UK	929	Patients aged 17–69 years consuming ≥ 35 units of alcohol a week if male, or ≥ 21 units if female	(1) Intensive advice (2) Control	GP	S, A group (1)	1 year	A1, B3, C3
Logsdon <i>et al.</i> 1989 ²⁰	U.S.	2218	Non-pregnant adult patients not suffering from serious chronic disease	(1) Brief advice (2) Control	GP	M, A group (1)	1 year	A1, B1, C1
Romelsjo <i>et al.</i> 1989 ³⁵	Sweden	83	Patients aged 18–64 years consuming > 40g 100% ethanol per day if male, or > 30g if female, or who had other indications of high alcohol consumption; excluded more severe cases	(1) Brief advice (2) Intensive advice	GP	S	1 year	A2, B3, C2
Scott and Anderson 1990 ³⁶	UK	72 women	Female patients aged 17–69 years consuming > 21 units of alcohol per week and < 70 units per week; excluded those who had received advice in the previous year	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A2, B3, C3
Anderson and Scott 1992 ³⁷	UK	154 men	Male patients aged 17–69 years consuming > 350g of alcohol per week and < 1050 g per week; excluded those who had received advice in the previous year	(1) Brief advice (2) Control	GP	S, A group (1)	1 year	A2, B3, C3

^a Brief advice: within the confines of a single consultation; intensive advice: involving more than a single consultation.

^b Whether advice was provided as part of a single intervention (S) or multifactorial intervention (M), and whether aids, e.g. written advice or information, were also provided (A).

^c Quality score: low to high score 1–3: A, selection bias at entry; B, selection bias after entry; C, bias assessing outcome(s).

studies no significant differences were found. However, Koopman *et al.*⁴¹ did find a significant difference in lipid level reduction (intervention group versus control group), the ICRF OXCHECK study³¹ found significant differences in lipid levels for women but not for men and the Family Heart Study Group (FHSG)⁴⁵ found significant differences for men but not for women. Two trials reported methodological difficulties in interpreting data relating to lipids.^{40,46} Five trials col-

lected data on blood pressure reduction but none found a significant impact of advice on blood pressure. Of the five trials which measured weight reduction as an outcome, only one found a significant weight reduction in the intervention group after the provision of advice.²⁰ Interpretation of these data is complicated by the fact that in some cases dietary advice was given as part of general lifestyle advice. In the case of the general lifestyle advice trials it would be difficult to ascribe an

TABLE 5 Results of alcohol advice trials (at maximum follow-up)^a

Trial	Change in consumption ^b (drinks/week)	Change from heavy to moderate drinking ^c (%)	GGT level	Morbidity
Heather <i>et al.</i> 1987 ^{33,d}	ns	ns	Lower for intensive versus brief brief advice; ns for either advice group versus control	ns
Wallace <i>et al.</i> 1988 ³⁴	Men: 10.1 ($P < 0.001$) Women: 5.2 ($P < 0.05$)	Men: 18.2% ($P < 0.001$) Women: 18.5% ($P < 0.05$)	Significantly lower for men but not for women	Not measured
Logsdon <i>et al.</i> 1989 ²⁰	Not measured	15.5% ($P < 0.01$)	Not measured	Not measured
Romelsjo <i>et al.</i> 1989 ^{35,e}	ns	ns	ns	ns
Scott and Anderson 1990 ³⁶	ns	ns	ns	ns
Anderson and Scott 1992 ³⁷	6.5 ($P < 0.05$)	13% ($P < 0.05$)	ns	No difference

^a Table adapted from Kahan *et al.* 1995.³⁸

^b Difference between changes in consumption (standard drinks per week): intervention group versus control group.

^c Difference in change in proportion of subjects drinking heavily: intervention group versus control group.

^d Comparison for this trial is between brief advice, intensive advice and a control group.

^e Comparison for this trial is between brief and intensive advice.

effect on blood pressure, lipid levels or weight to dietary advice as exercise advice was also given. Changes in exercise behaviour may also have had an effect on these parameters.

Exercise

Characteristics of the trials. Six trials were identified which assessed the effectiveness of advice relating to exercise behaviour (Table 8).^{20,29,31,45,47,48} Of these, the majority dealt with the effectiveness of general lifestyle advice, including advice about exercise. Only one study⁴⁷ examined the provision of exercise advice alone. In most studies, patients suffering from a chronic disease were excluded, although the study by Cupples and McKnight²⁹ was concerned only with angina sufferers. Four of the trials compared brief advice with a no-advice control group, and two compared intensive advice with no advice. In half of the studies advice was provided by a GP, while in the remaining three trials the advice to modify exercise behaviour was given by a nurse or health visitor. Only one trial had a follow-up period of less than 1 year. The trials were of mixed methodological quality in terms of their control of bias.

Effectiveness of exercise advice. There is a large amount of variability in the outcome measures used by these six trials, and few measures for which more than a

couple of results can be compared (Table 9). Significant results were found on measures of exercise behaviour in three of the four trials which collected this type of data. Lewis and Lynch⁴⁷ found that both the duration and frequency of exercise increased amongst those who had received advice and that the proportion of subjects in the intervention group who exercised increased significantly compared with those in the control group. These positive results need to be qualified by the fact that this trial had a follow-up period of only 2 months. It is possible that provision of advice may have a positive impact on motivation to change behaviour in the short term but that this behaviour change is not sustained for the length of time necessary for health benefits to be gained. However, the other two trials which found positive effects of advice on exercise behaviour were conducted over longer time periods, one of them for a period of 2 years. The INSURE project trial²⁰ collected data on the proportion in each group who started physical activity during the period that the trial was conducted but found no significant differences between intervention and control groups. Overall, the results of these four trials are encouraging in that they suggest that patients do respond positively to advice to take more exercise.

Four of the trials measured lipid levels, blood pressure or weight reduction as indicators of the effectiveness of providing general lifestyle advice, including advice

TABLE 6 *Characteristics of dietary advice trials*

Trial	Country	No. of partici-	Inclusion criteria	Study groups ^a	Inter- ven- er	Mode of intervention ^b	Duration of study	Quality score ^c
Logsdon <i>et al.</i> 1989 ²⁰	USA	2218	Non-pregnant adult patients not suffering from serious chronic disease	(1) Brief (2) Control	GP	M, A group (1)	1 year	A1, B1, C1
Baron and Gleason 1990 ⁴⁰	UK	368	Patients aged 25–60 years not suffering from severe psychosis, debilitating chronic illness, or being treated for hyperlipidaemia or coronary artery disease	(1) Intensive advice (2) Control	Nurse	S, A group (1)	1 year	A1, B1, C1
Koopman <i>et al.</i> 1990 ⁴¹	Netherlands	35	Patients with mild to moderate hypertension	(1) Intensive advice (2) Control	Dietitian	S	3 months	A1, B1, C1
Cohen <i>et al.</i> 1991 ⁴²	USA	30	Obese and hypertensive patients aged 20–75 years	(1) Intensive advice	GP	S, A group (1)	1 year	A1, B3, C1
Beresford <i>et al.</i> 1992 ⁴³	USA	242	Patients aged >18 years with a home telephone and at least an 8th-grade education	(1) Brief advice (2) Control	Nurse	S, A group (1)	3 months	A1, B1, C3
Campbell <i>et al.</i> 1994 ⁴⁴	USA	558	Patients aged ≥ 18 years	(1) Brief advice (2) Control	Advice provided by letter	S	4 months	A1, B1, C1
Cupples and McKnight 1994 ²⁹	Ireland	688	Patients <75 years suffering from angina for ≥ 6 months, with no other severe illness	(1) Intensive advice (2) Control	Health visitor	M	2 years	A2, B1, C3
FHSG 1994 ⁴⁵	UK	12–472	Men aged 40–59 years and their partners identified by household	(1) Intensive advice (2) Control	Nurse	M, A group (1)	1 year	—
ICRF OXCHECK 1994 ³¹	UK	6124	Patients aged 35–64 years	(1) Brief advice (2) Control	Nurse	M	1 year	A1, B3, C2
Tomson <i>et al.</i> 1995 ⁴⁶	Sweden	76	Patients aged 24–54 years with a serum cholesterol in the range 7.0–7.8 mmol/l; excluded those with hypertension, diabetes mellitus or ischaemic heart disease	(1) Brief advice (2) Intensive advice	GP, dietician	S	1 year	A1, B1, C1

^a Brief advice: within the confines of a single consultation; intensive advice: involving more than a single consultation.

^b Whether advice was provided as part of a single intervention (S) or multifactorial intervention (M), and whether aids, e.g. written advice or information, were also provided (A).

^c Quality score: low to high score 1–3: A, selection bias at entry; B, selection bias after entry; C, bias assessing outcome(s).

TABLE 7 *Results of dietary advice (at maximum follow-up)*

Trial	Lipids ^a	Blood pressure reduction	Fat intake ^b	Fibre intake ^c	Weight reduction	Sodium excretion reduction	Reduction in use of anti-hypertensive medication
Logsdon <i>et al.</i> 1989 ²⁰	Not measured	Not measured	Not measured	Not measured	Significant ($P = 0.05$)	Not measured	Not measured
Baron and Gleason 1990 ⁴⁰	Not significant	Not measured	45% ($P < 0.001$)	44% ($P < 0.001$)	Not significant	Not measured	Not measured
Koopman <i>et al.</i> 1990 ⁴¹	LDL 0.7 mmol/l ($P < 0.05$)	Not significant	Not measured	Not measured	Not measured	Not significant	Not measured
Cohen <i>et al.</i> 1991 ⁴²	Not measured	Not significant	Not measured	Not measured	Not significant	Not measured	Not significant
Beresford <i>et al.</i> 1992 ⁴³	Not measured	Not measured	Not significant	Not significant	Not measured	Not measured	Not measured
Campbell <i>et al.</i> 1994 ⁴⁴	Not measured	Not measured	Significant difference between groups (1) and (3) but not between groups (2) and (3)	No significant difference between groups in fruit and vegetable intake	Not measured	Not measured	Not measured
Cupples and McKnight 1994 ²⁹	Not significant	Not significant	More patients in group (1) increased saturated fat intake than patients in group (2)	Significant difference in intake of high fibre foods	Not measured	Not measured	Not measured
FHSG 1994 ^{45,d}	Significant for men but not for women	Significant (~7 mmHg difference in systolic BP; ~3 mmHg difference in diastolic BP)	Not measured	Not measured	Significant (average of 1 kg difference)	Not measured	Not measured
ICRF OXCHECK 1994 ^{31,d}	Significant for women but not for men	Not significant	Not measured	Not measured	Not significant	Not measured	Not measured
Tomson <i>et al.</i> 1995 ⁴⁶	Not significant	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured

^a Mean difference in change in lipid levels: intervention group versus control group.

^b Difference in reduction of saturated fat intake: intervention group versus control group.

^c Difference in increase in dietary fibre intake: intervention group versus control group.

^d For these trials reported differences are not in changes over time but in lipids, blood pressure and weight 1 year after intervention group received advice, when data for the control group were collected for the first time.

TABLE 8 *Characteristics of exercise advice trials*

Trial	Country	No. of participants	Inclusion criteria	Study groups ^a	Intervener	Mode of intervention ^b	Duration of study	Quality score ^c
Logsdon <i>et al.</i> 1989 ²⁰	USA	2218	Non-pregnant adult patients not suffering from serious chronic disease	(1) Brief advice (2) Control	GP	M A group (1)	1 year	A1, B1, C1
Lewis and Lynch 1993 ⁴⁷	USA	383	Patients aged ≥ 18 years, excluding those who were pregnant, those seeing a physician, and those mentally or emotionally impaired such that they could not be interviewed	(1) Brief advice (2) Control	GP	S A group (1)	2 months	A1, B1, C1
Cupples and McKnight 1994 ²⁹	Ireland	688	Patients <75 suffering from angina for ≥ 6 months, with no other severe illness	(1) Intensive advice (2) Control	Health visitor	M	2 years	A2, B1, C3
FHSG 1994 ⁴⁵	UK	12 472	Men aged 40–59 years and their partners identified by household	(1) Intensive advice (2) Control	Nurse	M A group (1)	1 year	
Graham-Clarke and Oldenburg 1994 ⁴⁸	Australia	758	Patients aged 18–69 years, who could speak and write English, were available for 12 months' follow-up, with \geq one modifiable cardiovascular disease risk factors (excluded if suffering from chronic, debilitating disease)	(1) Brief advice (2) Control	GP	M A group (1)	1 year	A1, B3, C1
ICRF OXCHECK 1994 ³¹	UK	6124	Patients aged 35–64 years	(1) Brief advice (2) Control	Nurse	M	1 year	A1, B3, C2

^a Brief advice: within the confines of a single consultation; intensive advice: involving more than a single consultation.

^b Whether advice was provided as part of a single intervention (S) or multifactorial intervention (M), and whether aids, e.g. written advice or information, were also provided (A).

^c Quality score: low to high score 1–3: A, selection bias at entry; B, selection bias after entry; C, bias assessing outcome(s).

TABLE 9 Results of exercise advice trials (at maximum follow-up)

Trial	Lipids ^a	Blood pressure reduction	Weight reduction	Energy expenditure due to physical activity ^b	'Positive progression' through stages of change ^c	Minutes of exercise/session	Minutes of exercise/week	No. of sessions/week	% exercising ^d	% taking little exercise (<1/month) ^e	% starting physical activity
Logsdon <i>et al.</i> 1989 ²⁰	Not measured	Not measured	Significant ($P = 0.05$)	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured	Significant ($P = 0.02$)
Lewis and Lynch 1993 ⁴⁷	Not measured	Not measured	Not measured	Not measured	Not measured	Significant ($P = 0.01$)	Significant ($P = 0.01$)	Not significant	Significant ($P = 0.04$)	Not measured	Not measured
Cupples and McKnight 1994 ²⁹	Not significant	Not significant	Not measured	Not measured	Not measured	Not measured	Not measured	Significant ($P < 0.0001$)	Significant ($P < 0.0001$)	Not measured	Not measured
FHSG 1994 ⁴⁵	Significant for men but not for women	Significant (~7 mmHg difference in systolic BP; ~3 mmHg difference in diastolic BP)	Significant (average of 1 kg difference)	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured
Graham-Clarke and Oldenburg 1994 ⁴⁸	Not measured	Not measured	Not measured	Not significant	Not significant	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured
ICRF OXCHECK 1994 ³¹	Significant for women but not for men	Not significant	Not significant	Not measured	Not measured	Not measured	Not measured	Not measured	Not measured	Significant	Not measured (5.1%)

^a Difference in lipid levels: intervention group versus control group.

^b Difference in mean level of energy expenditure: intervention group versus control group.

^c Movement through one or more categories in Prochaska and DiClemente's Transtheoretical model of behaviour change:⁴⁹ intervention group versus control group.

^d Difference in percentage exercising: intervention group versus control group.

^e Difference in percentage exercising less than once a month: intervention group versus control group.

^f For this trial reported difference is the mean reduction in lipid level: intervention group versus control group.

to exercise. The same problems arise in the interpretation of these results as were referred to above in the context of dietary advice. When both dietary and exercise advice were given as part of a general lifestyle intervention it is not possible to isolate particular results as being an effect of a specific component of that general advice. What can be reported, however, is that a range of parameters relevant to cardiovascular disease risk were affected by the provision of this advice.

Discussion

Given the well documented association between specific health behaviours (such as cigarette smoking, sedentary behaviour, poor diet and excessive alcohol consumption) and the risk of various diseases, there has been considerable attention directed towards strategies which may lead to the appropriate modification of these behaviours. There are two complementary approaches to targeting behaviour modification. The first, which is favoured from a public health perspective, is to achieve small modification in the majority of the population, which effectively shifts the overall risk profile for the population to a lower level. The alternative approach, which has a more clinical focus, is to target those patients at greatest risk from such behaviours and to achieve a substantial reduction in their risk profile.

Two hypotheses were examined in this study: (i) that the provision of advice is more effective at eliciting lifestyle behaviour change than not providing advice; and (ii) intensive advice is more effective than brief advice. Of the four behaviours examined in the review, smoking cessation was the behavioural intervention studied most frequently in a general practice setting. For smoking the first hypothesis is supported by a meta-analysis of data from 23 trials. However, no significant difference in cessation rates was found between intensive advice compared with brief advice. Although the same two hypotheses were examined with each of the other three behaviours, there were far fewer studies, many of which had significant differences in study design, including using different outcome measures that did not allow pooling of results.

Despite these methodological difficulties, the results of the six alcohol studies suggest that GP advice can be effective in reducing alcohol consumption. Furthermore, the results in two of the studies that examined GGT levels suggest that this benefit may be detectable at a biochemical level. Our search strategy did not identify any studies which found that GP advice led to increased levels of alcohol consumption. While publication bias is a possibility (that is, studies which demonstrate a positive effect of GP advice may be more likely to be published), it is unlikely that this would fully explain these results.

Diet is another behaviour where interpretation of the results was made difficult by the wide variety of outcome measures used, including weight loss and self-reported dietary intake. In addition, dietary advice was generally given as part of a package of general lifestyle advice. While some of the data found an effect of GP-based interventions on dietary self-reports and certain biological measurements, the results varied widely, and meaningful conclusions are difficult to draw.

There was also wide variation in the outcome measures used in the exercise advice trials identified. In addition, exercise advice was most frequently offered as part of a general multifactorial lifestyle intervention. Whilst there is promising evidence that GPs may have an effect on improving self-reported exercise levels, it is difficult to validate this conclusively.

The results of this review suggest that whilst many of the general practice-based lifestyle interventions show promise in effecting small changes in behaviour, none appear to produce substantial changes. Furthermore, many of the studies included in this review only examined the effect of the behavioural intervention on intermediate or process measures and not on patient outcomes. The results of this analysis are consistent with two recent large scale multifactorial general practice-based lifestyle intervention trials.^{31,45} Both of these trials found little change in patient outcome as a result of nurse-based lifestyle advice in a GP setting. The discussion that followed these two publications concluded that at present there is insufficient evidence to warrant a mass population approach to health checks and lifestyle advice in a general practice setting.⁵⁰ Clearly, there is a need for more research selectively targeting higher risk groups before substantial public funds are committed to general practice-based health lifestyle promotion programmes. Furthermore, it is clear that if general practice-based interventions are to be effective in a public health sense, a greater number of GPs will need to become involved in promoting behaviour change than the literature suggests is currently occurring. For example, a study by Dickinson *et al.*⁵¹ in which videotaped consultations were analysed found that GPs correctly identified only 56.2% of their patients who were smokers. Similar results have been found in other studies using different methodologies.⁵² Therein lies a challenge for medical educators to increase awareness of the importance of GPs identifying patients with 'at risk' lifestyle behaviours on an opportunistic basis.

Conclusion

There is clear evidence that GP-based health programmes have a modest and variable effect on health outcomes such as lifestyle change. For this change to translate into a useful public health effect either a greater

proportion of GPs need to offer lifestyle advice routinely and repeatedly or GPs should direct their efforts towards high-risk groups where the potential for substantial change may be greater.

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